

Dissertation

A quantitative analysis of factors influencing housing demand in South Africa

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Isaac Chipswa

Student number: Chpisa001

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Supervisor: Dr Steven Nabieu Rogers

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Abstract

After the 2008 financial crisis, which was heavily influenced by the housing market bubble, studying the housing market has become a subject of major interest to many scholars and investors globally. Literature identifies several key factors that influence housing demand including, employment, income levels, gross domestic product, monetary policy and demographics among others. This thesis investigates the factors that influence housing demand in South Africa and incorporates quantitative analysis on the relationship between interest rates, exchange rates, inflation and housing demand. Most studies on this subject have been conducted in the developed market context, as such, this research study aims to fill the gap and influence future thinking in the emerging market context. There is currently limited research on the relationship between interest rates, exchange rates, inflation in relation to housing demand in the developing world including South Africa. In the analysis, housing demand is measured by mortgage loans disbursed monthly by the top four commercial banks in South Africa.

In addition to desktop research, the research also incorporates perspectives and thinking from some of the renowned professionals and academics in the housing market. Monthly time series data (from 1995 up to 2015) on interest rates, exchange rates, inflation (CPI) and mortgage loans disbursed was obtained from the South African Reserve Bank (SARB) website. Based on multiple regression analysis, the output results are in line with views held by most academics in the literature review. It was observed from the results that the housing demand (as measured by the mortgage loans disbursed to individuals) is negatively correlated to prime overdraft/inflation rate and positively correlated to foreign exchange rate. As such, an increase in interest and inflation rates, result in a decrease in housing demand. An increase in exchange rate results in decreased housing demand.

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ABBREVIATIONS

SA	South Africa
SARB	South African Reserve Bank
ANC	African National Congress
RDP	Reconstruction and Development Programme
NHFC	National Housing Finance Corporation
CAHF	Centre for Affordable Housing Finance
USA	United States of America
UK	United Kingdom
CPI	Consumer Price Index
IDC	Industrial Development Corporation

DEFINITION OF TERMS

Reconstruction and Development Programme “RDP” – is a socio-economic policy framework implemented by the African National Congress (ANC) led government to address the immense socioeconomic problems brought about by the consequences of the struggle against its predecessors under the Apartheid regime. Provision of free RDP housing to those living below the poverty line emerged as a policy of the framework.

Nominal interest rate refers to the interest rate before taking inflation into account.

Real interest rate refers to a formula that links nominal and real interests. This rate is: nominal rate = real interest rate + inflation rate, or alternatively nominal rate - inflation rate = real rate.

GFC refers to Global Financial Crisis.

House on stand refers to a house or brick/concrete block structure on a separate stand/yard/farm.

Backyard room refers to a house/flat/room in a backyard or on property or larger dwelling/servants’ quarters/granny flat.

Townhouse refers to a cluster house in a complex, townhouse (semi-detached house in a complex), or semi-detached house.

Backyard informal refers to an informal dwelling in a backyard of a free-standing house (shack in backyard).

Informal dwelling refers to an informal dwelling (shack e.g. in informal/squatter settlement or on farm

Traditional dwelling refers to a /hut or structure made of traditional materials

1. INTRODUCTION

1.1. Research area

It has been 20 years since the fall of apartheid, but education and housing remain major challenges for the ANC led government in South Africa. With the social imbalances, which have deeply been engraved in South Africa during the apartheid era still evident, education and housing provision have so far not made an impact in redressing social imbalances. There is considerable evidence suggesting housing shortage in South Africa, particularly among the low-income segment. The South African government views access to housing as a basic human right as entrenched in Section 26 of the Constitution of the Republic of South Africa, 1996 (Moss, 2001). This research particularly focuses on the demand of formal housing in South Africa and the factors that influence it. For the purposes of this research paper, formal housing refers to housing as financed by financial institutions such as banking institutions. Subsidised housing refers to housing as subsidised by the government of South Africa such as the Reconstruction and Development Programme (RDP housing) and informal housing refers to informal settlements such as shacks.

According to Nhlahla (2014), the demand for formal housing in South Africa as well as in Africa is showing persistent growth and thereby attracting private sector investors. Scholars have shown that this trend in demand is prevalent even in countries affected by high interest rates. Even though there is ample literature on the factors influencing housing demand, it is largely limited and focused on developed economies and thus, with a limited view on developing markets. With the former in consideration, this research aims to assess and evaluate the relationship between formal housing demand and other independent variables within the South African context.

1.2. Problem Statement

As per the National Housing Finance Corporation (NHFC) report on the state of housing finance in South Africa (2001), the South African housing policy largely covers: ensuring the stabilisation of housing environment, raising housing credit, housing subsidy support, supporting people in acquiring houses, building institutional capacity and facilitating the speedy allocation and servicing of land.

Despite the difficult macroeconomic environmental factors in recent years, some of the South Africa's top four major banking institutions expect a nominal growth in housing demand in the future. Consumer confidence which is important in measuring the demand for credit for the purposes of financing housing purchases is said to be relatively low in South Africa (ABSA, 2015). Furthermore, the continued rise in interest rates in recent years is a contributing factor as high interest rates result in consumers' inability to repay their debts (ABSA, 2015). 'Household debt to disposable income was at seventy-eight per cent (78%) in 2014 (ABSA, 2015).'

This research paper therefore attempts to establish the real impact of the interest rates, exchange rate and inflation regime on housing demand in South Africa. Housing demand can be measured through the loan book sizes of the top four banks namely, the Standard Bank of South Africa, ABSA (Barclays Africa), First National Bank (FNB) and Nedbank and or the number of housing loan applicants (approved and disapproved) made.

The hypothesis of this research study is as follows:

H0: the identified factors, i.e. interest rates, inflation and exchange rate, do not significantly affect housing demand.

H1: the identified factors, i.e. interest rates, inflation and exchange rates, significantly affect housing demand.

The main research questions of this study are as follow:

- What are the factors influencing housing demand?
- Do interest rates, inflation (CPI) and exchange rates influence the demand for formal housing in South Africa?

The sub-question of this research is as follows:

- What are the policy implications of the findings?

The research has two main objectives. Firstly, it seeks to broadly identify factors influencing housing demand. Secondly, the objective is to establish the relationship among interest rates, inflation and exchange rates to housing demand (measured by individual mortgage loans and/or the number of housing loan applications). The research is also expected to identify monetary policy implications on housing market development.

1.3. Purpose and the significance of the research

Despite a lot of literature on the demand for housing in developed countries and some developing countries, there are limited empirical studies in South Africa about formal housing demand. Mtantato and Churr (2015) did a study on housing demands in South Africa and only focused on a small area in the capital city of Pretoria. The sample size used to report the findings in respect of this research is limited and thus cannot be generalised to the rest of the country. There is also additional research on the housing market in South Africa (Moss 2001 et al), although none of these studies attempted to empirically estimate the degree of responsiveness of the housing demand versus the unit change in the independent variables (such as interest rates, inflation, exchange rate, household income, demographics and GDP per capita). This research study is therefore significant because it reviews and includes the variables that have thus far been absent from empirical research. This study was also undertaken because housing in South Africa is practically and fundamentally different from that of the developed world and other emerging economies.

This research study therefore, aims to fill the academic literature gap which tends to neglect the role of interest rates, exchange rate and inflation in relation to housing demand in South Africa.

The key beneficiaries of the research in South Africa include, the financial institutions (banks and insurance companies), the South African government (particularly the human settlement department and local government), National Housing Finance Corporation, Commercial Banks, Housing Investment Partners, the Financial and Fiscal Commission and other private sector players in the property development and construction industry.

1.4. Chapter Summary

The first chapter focuses on addressing parameters of the research, problem statement, and significance of study. The author also gives a disclaimer that the research is conducted in an ethical manner. The next chapter discusses the literature around formal housing and factors that influence it.

2. LITERATURE REVIEW

2.1. Background

Firstly, the literature gives an overview of the South African housing market including aspects of low income housing (considered to be critical in addressing past socio-economic imbalances in the SA economy). Secondly, the literature review discusses existing academic literature on the factors influencing housing demand. A particular spotlight is shed on the relationship among interest rates, inflation, exchange rates and housing demand.

2.2. The Theory of Housing ‘Demand’ and ‘Need’

Although there is no set definition of housing ‘need’ and ‘demand’, there is a popularly accepted definition.. This definition is as follows; “a market driven concept and relates to the type and number of houses that households will choose to occupy based on preference and ability to pay (Heath 2014).” The State of Hawaii Department of Business, Economic Development and Tourism (2015) in their research report on factors influencing housing demand, highlighted that housing demand cannot be discussed in isolation of population growth and housing supply. The report also adds that housing demand can be measured by the number of housing mortgage applicants and the mortgage loan book size in the hands of large banks.

Housing ‘need’ is defined as; “an indicator of existing deficit: the number of households that do not have access to accommodation that meets certain normative standards.” This measure mainly refers to the level of need for more or improved social housing. The term ‘housing requirement’ is sometimes used to combine these two measures to generate an overall picture of the housing market. Housing need mainly refers to issues other than a requirement for a home. It could also indicate insecurity of tenure or lack of affordability. It may also refer to housing that is unsuitable due to its type or condition (Heath, 2014).”

From the above, housing demand is a market driven concept. The next discussion will briefly unpack and break down market factors that influence housing demand.

2.3. The 2008 Financial Crisis and Housing Bubble

This research study would be incomplete without briefly discussing the factors that led to a housing bubble in the 2008 financial crisis in the United States (US) and the implications for the global housing market thereafter. In December, 2008, the National Bureau of Economic Research announced that the economy had entered a recession in December of the previous year. Real GDP increased by only 0.4 percent for the year 2008, and it decreased at annual rates of 5.4 percent in the fourth quarter of 2008 and 6.4 percent in the

first quarter of 2009. The unemployment rate increased from 4.9 percent in December of 2007 to 9.5 percent in June of 2009 (Holt, 2009).”

The consensus is that the 2008 financial crisis was linked to the housing bubble (Holt, 2009). Bernanke (2009) notes that several academics and commentators have weighed in on the drivers of the housing crisis and the resulting credit crisis. Bernanke (2009) emphasized the introduction of foreign savings into the U.S. economy and especially to the U.S. residential property market. Liebowitz (2008) additionally noted that government played a key role in weakening housing loans approval standards. The relaxed standards led to speculative behaviour, which resulted in housing loan defaults as home prices kept increasing. Holt (2009) also asserted the government’s role in creating the housing bubble. He noted that the low temporary interest rates led to the housing crisis in two primary ways. First, the low short-term interest rates caused the use of ‘variable rate mortgages’ (ARMs). As home prices overtook household incomes, many prospective home owners could not afford to pay their properties under the fixed rate mortgage regime. However, ARMs generally provided the buyer with a lesser monthly payment as short-term interest rates were lower than long-term interest rates. Secondly, the lessening of standards on home loans by the US government. Standards for home loans were less tightened because of new governmental programs aimed at growing home-ownership rates among lower-income households, more competition in the housing loan market, use of home mortgage debt as security, and the illogical excitement exhibited by all parties involved in the mortgage lending process (Holt 2009). In addition, ‘Increased state of speculative fever’ which assumed that housing prices will continue to rise worsened the housing bubble (Holt, 2009). Consequently, all the role players who contributed to the housing bubble (regulators, lenders, investment bankers, insurance companies, foreign investors, credit rating agencies, and home buyers) acted on the assumption that home prices would continue to rise.

This research further explores the link between the noticeable loosening in the terms and standards for mortgage credit and the most rapid increases in housing prices. This relationship offers some indication of a story where credit provision and the demand for housing fed on each other and helped steer and spur the housing boom (Dokko et al, 2009).

2.4. Determinants of Housing Demand

In addition to the theory of housing ‘demand’ and ‘need’, there have been several determinants of housing demand.

Arimah (2016) concurs with many academic scholars that there is limited literature on housing demand in Sub-Saharan Africa. Based on the research on the city of Ibadan, Nigeria, she notes that demand for housing is income inelastic.

Golding (2015) further concluded that the single fundamental driver of residential property demand is the number of households in a population wanting housing, as opposed to household income. The price is then determined by the number of properties and the amount of money available for households to compete for them. The three key drivers for house price growth (more than general inflation) are; a growing population base, a growing level of affluence, and limited land and/or housing supply (Golding, 2015). Relating to the element of population, Stats SA (2015) states that the South African population is currently at approximately 54 million (with an of 800 000 every year). This is driven by an unprecedented migration of people into the country from all over Africa and other parts of the world. In addition to population increases, there is a huge trend of people migrating within the country from less developed parts of the country to urban and peri-urban areas. For instance, between 1996 and 2014, Gauteng province’s population is estimated to have increased by 60% whilst that of the Western Cape increased by 50% (Pam, 2015). On the contrary, the Eastern Cape and Free State provinces’ populations decreased by approximately 20% respectively (Pam 2015).

Housing can be described within both the theoretical and empirical framework and context. The theoretical framework uses housing as a consumer good. Theory is based on three assumptions, namely; the consumer optimises utility given price and income constraints; the consumer chooses an unobservable homogenous commodity called housing and that a perfectly competitive housing market exists (Tandoh and Tewari, 2016).”

There are also a set of economic variables that may influence consumer buying behaviour for housing. These include, employment, income levels, and mortgage interest rates. For example, a higher employment and income level (in a country) results in increased housing demand and vice versa (Dua, 2004). He also further states that the demand for housing is affected by price through the effect of the inflation rate, this then in turn influences the demand for housing. As a result, an increase in the general inflation rate (partially influenced by the housing sector) decreases housing demand.

In contrast to Dua, Tandoh and Tewari (2016) suggest that high inflation rates combined with the depreciation of the currency, drives people to invest in property as a hedge against rising inflation, thus increasing the investment demand for housing. Mtantato and Churr (2015) further identified location, tenure and housing types as some of the determinants of this type of housing demand. In their research paper on the determinants of housing demand in Ghana, Tandoh and Tewari (2016) identified population growth (particularly youthful populations), increases in income per capita, higher education (tertiary) levels, economic stability and changing cultural norms as some of the determining factors for housing demand. Furthermore, Tandoh and Tewari (2016) assert that price and income elasticity also play a role in the Ghanaian housing demand. Malpezzi and Mayo (1987) argue that changes in the assumptions of income and price elasticity increase housing subsidy costs and lead to a 'deadweight' loss to society.

It is also interesting that in developed countries almost any house is tradable, this is not the case in developing countries, particularly in Ghana (Tandoh and Tewari 2016). Cultural norms also affected the tradability of certain properties. An example of this is that in instances where the house belongs or belonged to past, present and future clans (kin or relatives) of a particular family, no individual has power to trade that house for any reason. These houses have sentimental value and serve as the foundation of family unit (Tandoh and Tewari 2016). Although social relations related to housing have dwindled in the big cities, they remain in many rural towns and villages.

Tandoh and Tewari (2016) concluded that income is the main driver for home ownership in cities, while current income is the main cause for ownership in rural areas. Follain and Jimenez (2016) also established that households' willingness to pay for living space rises with income but at a less than proportional rate. The ability to pay for a house declines as household size increases and ability to pay for several quality measures (such as structural quality; wall, roof and floor quality) - is quite responsive to income.

The research findings in a study conducted by Saw and Tan (2014) revealed that 'location, financial and structural factors do affect property investors.. Kueh and Chiew (2005) reported that house buyers in Malaysia consider price as the most important factor in purchasing decision. Other factors ranked in terms of importance are location, home amenities, financing, security, developer and community amenities.

From the study of literature, physical qualities are the first characteristic to be observed by the consumer when purchasing a house. These factors were studied by different researchers who included Akalin et al. (2009), Riccardo et al. (2010) and Hofman et al. (2010). The frontage, building state, road breadth, physical qualities of roofing, physical qualities, product requirement and building design influences their perception of appropriateness related to price (Hofman et al, 2010). Macro-perspective of the development concept also influences the consumer's decision to purchase property.

From the above we can see that there are a whole range factors that influence housing demand. Although the research will narrow down to testing the level of impact of interest rates, inflation and exchange rate on demand, other variables are discussed in the literature review.

2.5. The impact of interest rates on housing demand

AAkalin et al. (2009), Tandoh and Tewari (2016), Arimah (2016), discuss compelling evidence of various determinants in housing demand, interest rates remain a crucial factor.

Inflation, exchange rate, population size (demographics), income per household, GDP per capita among others have shown to have important impact as well.

It is important to define interest rates in this discussion. Interest is charged by lenders as recompense for the loss of the use of an asset. In the event of lending money, the creditor could have invested the funds instead of lending them out. With advancing a loan for a large asset, the lender may have been able to generate income from the asset should they have decided to use it themselves. Therefore, Simple Interest = P (principal) x I (annual interest rate) x N years.

Various literature presents different perspectives on the assessment of the relationship between interest rates and housing demand. Follan (1992) demonstrated that at high interest rates, household liquidity problems tend to dampen housing demand. High interest rates reduce money available for purchasing a house and therefore tend to add to the real burden of debt repayment (Follan, 1992). Taylor (2007) agrees with Follan (1992) that low interest rates – the provision of large liquidity amounts – help foster the increased housing demand in the US.

In his assessment on the relationship between interest rates and housing in Hong Kong, Seabrooke and Wong (2003) identified two competing and conflicting scenarios. Based on the empirical evidence on the Hong Kong housing market, Seabrooke and Wong (2003) discovered that a decline in interest rates around the 90s positively influenced consumers' demand for housing ownership. This was due to the well documented lower cost of capital favourable to consumers' borrowing power. However, in huge contrast, around 2001, a decline in interest rates did not positively influence the demand for housing. As such Seabrooke and Wong (2003) concluded that low interest rates do not necessarily result in lower housing prices. Aligned to Seabrooke and Wong, in their US housing market model, Dokko et al (2009) concluded that the relationship between interest rates and housing activity is not strong enough to describe the increase in housing demand.

Pettinger (2013:10) suggests that “if interest rates rise it will have a significant effect on increasing the cost of mortgages. This will deter prospective home-buyers, but it may also force some existing home-buyers to sell. The danger is that many homeowners are protected by ultra-low interest rates. If rates rise, this will make mortgage payments too expensive and they may be forced to sell.” High interest rates increase the cost of borrowing as interest rates on credit cards and loans are generally higher. Furthermore it also increases interest on loan repayments thereby impacting on personal discretionary income. It can also result in increased incentive towards saving as opposed to spending (Pettinger, 2013). Other noticeable impacts of high interest rates include increased government debt interest as well as diminished consumer and business confidence (Pettinger, 2013).

The sum of high interest rate regime is falling aggregate demand which may result in negative economic growth and high unemployment (Pettinger, 2013). The upside of high interest rates is the improvement in the current account – with reduced spending on imports and increased competitiveness in exports.

McQuinn and O’Reilly (2016) in their analysis of Irish interest rates’ role influencing housing demand, added that, ‘higher interest rates are most likely to impact new house buyers the most since they tend to be more highly leveraged in terms of their loan-to-value ratios. Individuals who already have housing equity, for instance from selling their current houses for a profit, are likely to have a much lower loan-to-value ratio and hence the impact of interest rates are likely to be smaller and have a less amplified effect on demand.’ They further argue that new house buyers have the option of stretching the mortgage term over a longer time such as 40 years.

Therefore, one of the fundamental questions that the research will establish is as follows; "Is there a causal relationship between housing prices and interest rates, exchange rate and inflation - and if interest rates are a major factor affecting house prices, is the impact the same in inflationary or deflationary period?"

2.5.1. Interest rates and financial crisis – UK and Irish case study

Ireland and the UK unpredictably experienced consumer-driven as well as debt-financed economic growth trajectories in the early 1990s. In both instances, this growth was tenable and sustained by low interest rates regime over the years (Hay, 2008). Thus, this expanded access to and improved affordability within the housing market, in that way driving a house price bubble. The bubble was then maintained by low interest rates. Not only did low interest rates serve to expand the bubble, but crucial to that too, was the liberal and highly securitised character of the mortgage market in both Ireland and the UK (see, Schwartz 2008; Schwartz and Seabrooke 2008; Watson 2008a). In view of that, ‘banks and building societies acted decisively as financial intermediaries, redesigning new loans as mortgage-backed securities (MBSs) for many institutional investors including pension funds (Hay 2008). A larger portion of the related income was generated, not from the interest rate spread between deposits and loans, but from transactional fees. Consequently, the banks then had a strong incentive to become more energetic and “innovative in offering new mortgage instruments to potential borrowers, confident in the knowledge that they could pass on any interest rate risk they might otherwise bear to buyers of MBSs (Hay 2008).” In that rapidly growing housing market, they also became a key source of capital to fuel consumption for borrowers, keen to issue the equity they had built up in their property. As Herman Schwartz suggests, “the disinflation of the 1990s combined with the operation of global capital markets increased aggregate demand in countries characterised by widespread home-ownership, prominent level of mortgage debt relative to GDP, early refinancing of those mortgages and mortgage securitisation” (Hay, 2008).

Hay concludes that, both the UK and Irish economies have relied on a personal debt driven economy which is highly reliant on “equity release, easy access to credit and, in turn, low interest rates.” Yet the specific constellation of domestic and, indeed, regional factors contributing to low and stable interest rates is unique and different in each case; as, of course, is the institutional context in which the bursting of the bubble has played out (Hay 2009).

2.5.2. Impact of interest rates and housing prices on housing demand – UK case study

Pettinger's (2013) review of the interest rates and housing prices in the UK presents an interesting narrative. Over the past 40 years, property prices in the UK have been on an upward course, while interest rates remain low (Pettiger, 2013). According to the Economist (n.d.) survey of global house prices, UK property market is overvalued by 31%. Pettiger (2013) further highlights the negative effects of high housing prices namely, making property acquisition for young people unaffordable, and increasing inter-generational wealth inequality (between home owners and renters). Furthermore, the unsustainable boom in house prices could lead to an eventual fall in prices, with matching bank losses and negative wealth effect. High housing prices also create social change where people are forced to leave neighbourhoods in which they grew up to more affordable areas. In contrast, Pettinger (2013) also highlighted some the benefits of increases in housing prices. Firstly, it encourages homeowners to spend and have greater confidence in the economy. In times of recession, this encourages consumer confidence and spending and in the process of helping the economy to recover. The implication would then be that declining house prices would delay the economic downward spiral. In addition, "escalating house prices helps to limit negative equity and therefore limits potential bank losses from home repossession. This improvement in house prices may encourage banks to resume more normal lending practises (Pettiger, 2013)." Theoretically, high house prices should act as an incentive for homebuilders to increase supply and meet the rising demand as they make it more profitable to build new house prices. Lastly, with high house prices, homeowners can re-mortgage and gain equity withdrawal to spend in other areas of the economy (Pettinger 2013).

2.5.3. Interest rates hedging and impact on housing demand

Management of interest rate risk has taken prominence in recent years particularly in corporate UK (Dhanani et al, 2007). The first reason for interest rate hedging is related to the volatility of interest rates, for example in the past few years, interest rates in the

UK fluctuated from 15% to 4% (Dhanani et al, 2007). Secondly, as most corporates finance their funding requirements through short term and long-term borrowings, the fluctuation in interest rates becomes a critical and pressing issue (Dhanani et al. 2007). Guay and Kothari (2003) argue that all risk management strategies can be reduced to the management of three risk exposures: the volatility of cash flows, the volatility of income and the volatility of firm value. Most companies therefore use derivatives as a hedge against interest rate risk.

2.6. Impact of Inflation on housing demand

In relation to inflation, housing is generally viewed as a good asset as it rises in line with the inflation rate, in part because it is a leveraged asset. When one buys a property, they normally make a down payment of approximately 20 to 30 percent of the house price (Home Guides, 2016). The house price generally grows by the rate of inflation multiplied by the cost of the house, not by the cost of the down payment. So, in the event of inflation doubling the value of the house, it may have magnified the value of the buyer's deposit. Taking out a fixed-rate mortgage, is a better option because one will be making a payment that in the event of a drop in inflation-adjusted rand-they are paying way less for the loan than they did when you took it out (Home Guides 2016).

Supply and demand tend to affect prices. Even in times of high inflation, an excess supply will bring home prices down. Interest rates tend to go up with inflation. Mortgage rates reflect interest rates. If mortgage rates go up too high, demand will decrease; home prices will fall (Home Guides 2016).

Using the US Federal Reserve empirical evidence, Taylor (2007) observed that increased demand in housing led to a surge in housing price inflation, which was already high since the 1990s. Taylor (2007) adds that when housing prices increased, defaults and foreclosures on sub-prime mortgages also fell. This resulted in accelerated demand for housing. There appears to be a positive relationship between inflation and interest rates, that is, high inflation tends to result in high interest rates (Seabrooke 2003; Harris 1999).

Tsatsaronis and Zhu, 2004 add that “historically (that is, up to 2003), inflation explained a larger proportion of Spanish house prices than even in the US. This finding reinforces the argument for an inflation-based approach to reducing the debt overhang in that country. A concern about inflation is that it comes with its own costs. Yet, there is no clear-cut evidence that moderate inflation, at and below 5%, has sizable social cost.” The well-known study of Bruno and Easterly (1998) richly illustrated the risk of approaching two digits inflation levels, yet targeting inflation at or below 5% leaves ample room for stabilising inflationary bursts when inflation reaches a range above 5% and below 10%. Of course, the case of Spain is more problematic, as the inflation there is controlled more by the ECB than by Spain. Yet, Fisher’s debt deflation concerns are as applicable in the Eurozone as in the US. Chances are that, with a lag, a moderate inflation in the US would change the mind-set in Europe, and that hastening global recovery would generate positive effects between the euro and the dollar zones.”

2.6.1. Inflation targeting and interest rates in South Africa

Monetary authorities have come to realise the importance of maintaining price stability (Mitchells-Innes 2006). A lot of countries including South Africa have adopted inflation-targeting as part of the monetary policy framework. This subchapter attempts to find the relationship between inflation targeting and the broader impact on the demand side of the economy. Inflation-targeting is a monetary policy framework in which the Central Bank stipulates an explicit inflation target and implements policy that achieves this target directly. The distinguishing feature of inflation targeting is that there is a pre-announced target for inflation that defines the goal of monetary policy and provides a benchmark for the accountability of an operationally independent central bank (Kahn and Je Jager, 2011). Many empirical studies have established the correlation between inflation and interest rates as being positively linear i.e. of increase in inflation (CPI) results in increase in interest rates. Woodford (2003:2) argues that “banks around the world have committed themselves more explicitly to relatively straightforward objectives regarding the control of inflation, and have found when they do so that not only is it easier to control inflation than previous experience might have

suggested, but that price stability creates a sound basis for real economic performance as well.”

In the 1990s, the South African Reserve Bank (SARB) monetary policy was characterised by monetary aggregate guidelines (Kahn and Je Jager, 2011). In 2000, the then Finance Minister introduced inflation targeting which was then regarded as a global trend. From 25 February 2009 the inflation target ranged of 3% to 6% for the year-on-year increase in the headline CPI (CPI for all urban areas) on a continuous basis (SARB, 2016).

“Since the introduction of the inflation-targeting framework in February 2000, the specification of the target has been reviewed on several occasions. The initial target measure was the consumer price index (CPIX), which was restricted to metropolitan and other urban areas, excluding the interest cost on mortgage bonds. This variant of the CPI was chosen because the total CPI was at that time influenced directly by changes in the bank’s monetary policy. However, following revisions to the methodology employed to compile the CPI, which resulted in, inter alia, a change in the treatment of housing, mortgage interest costs are no longer excluded from the CPI when evaluating the effects of monetary policy (SARB Website, 2016).”

When inflation targeting was introduced in South Africa, the first target was specified using the average annual rate of inflation (for 2002) for consumer price index (CPIX) inflation. Successive targets were also specified in terms of an average for a calendar year. In November 2003, the Minister of Finance proclaimed that the annual averaging would fall away and that the target would apply on a continuous basis (SARB 2016).

The critics of inflation targeting argue that it is inflexible, particularly within the context of emerging markets (Kahn and De Jager 2011). Inflation targeting is viewed to be at the expense of long-time economic growth and/or short-term output variability. More recently, in the wake of the international financial crisis, some critics also argued that

the excessive focus on inflation by central banks contributed to the crisis as they ignored the build-up of credit-induced asset market bubbles under low inflation conditions. Critics further argue that inflation targeting unnecessarily constrains growth because of its narrow focus and lack of discretion, while others argue that because it allows too much discretion, it cannot be expected to anchor expectations (Kahn and Je Jager 2011).

Proponents of inflation targeting argue that there are four main reasons for continuing with this policy. Firstly, with the 'eclectic' monetary policy, the public was unable to judge SARB's monetary policy stance openly (Mitchells-Innes, 2006). Secondly, inflation targeting allows for better coordination between monetary policy and other economic policies. Thirdly, it increases accountability of SARB regarding monetary policy. Lastly, if the public believe that inflation targeting is credible, this should have the effect of an actual reduction in inflation (Mitchells-Innes 2006).

2.7. Relationship between interest rates and inflation

Fisher (1930) hypothesised that the nominal interest rate consists of two components, namely; the expected rate of inflation and the real rate of interest. The symbols below denote this equation.

$$I = r_t + \pi_t^e$$

The equation is founded on the premise that rationale economic agents, that is . investors and savers, require compensation for lost purchasing power on their money due to price level increases. The famous *Fisher effect* assumes a one-for-one relationship between inflation and nominal interest rates and the real interest rate which is constant. However, other studies have found nominal interest rates to adjust by less than one-for-one to the expected inflation or alternatively by more than one-for-one (Mitchells-Innes, 2006). In contrast Mitchells-Innes (2006), Crowder and Hoffman (1996) found nominal interest rates to adjust by more than one-for-one to the expected inflation. They confirmed that a '1 percent increase in inflation produces a 1.34 percent increase in the nominal interest rate'. After adjusting for tax effects, this *Fisher effect* is different from unity as implied by the *Fisher relation*. Furthermore, Michells-Innes (2006) highlights that interest rates tend to erode wealth and this prompts economic agents to increase their holdings on assets resulting

in a less than one-for-one adjustment of nominal interest rates to expected inflation. Central banks also play a role in influencing the relationship between interest rates and inflation in the short term (Mitchells-Innes 2006). In contrast to Fama (1975), Crowder and Hoffman (1996) discovered that short-term interest rates may not be a good predictor of future inflation. In fact, some researchers have found the opposite to be true in many cases. (Crowder and Hoffman, 1996) Add to that, it may take several years before the effect of inflation shocks are fully reflected in nominal interest rates as evidenced by the variance de-composition analysis.

2.8. Impact of monetary policy and housing demand

Arimah (2016), asserts that “monetary policy consists of the activities of a central bank, currency board or other regulatory committee that control the scope and rate of growth of the money supply, which consequently affects interest rates. Monetary policy is maintained through actions such as modifying the interest rate, buying or selling government bonds, and varying the amount of money banks are required to keep in the bank reserves.” Broadly speaking, there are two types of monetary policies, expansionary and contractionary. Expansionary monetary policy increases the money supply to lessen the rate of unemployment, This is done through an increase private-sector borrowing as well as consumer spending, thereby stimulating economic growth. Often referred to as "easy monetary policy," this has been applied by many central banks since the 2008 financial crisis as interest rates have been low and in many cases near zero (Arimah, 2016). Contractionary monetary policy decelerates the money supply growth rate to control inflation. Contractionary monetary policy can sometimes slow economic growth, increase unemployment and decrease borrowing and spending by consumers and businesses. An example would be the Federal Reserve's intervention in the early 1980s to curb inflation of nearly 15%, the Federal Reserve if the US increased its benchmark interest rate to 20%. This hike resulted in a recession, but kept spiralling inflation in check (Investopia, 2016).

The relationship between monetary policy and asset prices continues to be monitored in academic research (Costello et al, 2014). Several recent studies acknowledge the importance of the housing–monetary policy relationship. Ellis (2011) highlights the role

played by housing “in the operation of business cycle and transmission of monetary policy influences”. She also highlights the complex role of housing in a sophisticated financial system.

Söderlind (2001) uses a lively and balanced context with staggered price setting to understand the impact of monetary policy on the relationship between nominal interest rates, inflation and real interest rates. Söderlind (2001) discovered that ‘stricter inflation targeting and robust monetary policy weakens the adjustments of nominal interest rates to changes in expected inflation.’

Debating the role of monetary policy on housing prices, Bernanke (2010) argued that the most rapid house price gains between 2004 and 2005 (when the annual rate of house price appreciation was between 15 and 17%) were in part linked to monetary policy. Bernanke (2010) in the same vein acknowledged that in line with most economists who have investigated the issue based on historical relationships, only a small proportion of the increase in house prices in recent decades can be attributed to the thrust of U.S. monetary policy. He added that this conclusion was reached using both econometric models and statistical analyses that make no use of economic theory.

After the global financial crisis, Australia emerged relatively unscathed compared to other developed countries due to its structural and institutional monetary fortitude. The country has a unique system of land ownership and development acts which shield the economy from unsold construction. From a broader international perspective, Kuttner and Shim (2012) provide comprehensive analysis of previous studies to suggest the perceptible that the impact of monetary policy on house prices is complicated by numerous macroeconomic factors which concurrently influence the demand for housing and interest rate movements. In an interesting portent to the GFC, Ahearne et al. (2005) suggested that many international housing markets appeared overpriced at that time and that historical record suggests that low interest rates tend to precede housing price peaks with a lead of approximately one to three years.

Costello et al. (2014) argues that monetary policy cannot in isolation work in managing cycles, asset prices and leverage. He suggests that other non-monetary interventions such as fiscal policy and prudential regulations are also important.

Ferrero (2012) highlights the inverse relationship between housing prices and current account deficits in the US and rest of the global economies. For example, countries that experienced house price booms (i.e. Greece, Iceland, Ireland, Spain and the US) also experienced a higher degree of turmoil during the financial crisis (Ferrero, 2012). Taylor (2008) provided evidence that government actions and interventions prolonged the 2008 financial crisis, in that they focused on liquidity instead of risk. In his analysis of the US housing market, Ferrero (2012) further concludes that “progressive relaxation of borrowing constraints can generate a strong negative correlation between house prices and the current account.” Ferrero further argues that the inverse relationship between housing prices and current account deficit can be reconciled by “considering accommodative monetary policy shocks as departures of the nominal interest rate from a conventional monetary policy rule. An exchange rate regime based on foreign pegs to the dollar exports U.S. monetary policy to the rest of the world, amplifying the effect of domestic shocks.”

2.9. Impact of exchange rate on housing demand

Ito et. al. (1999), states that “the relationship between the exchange rate and economic development is without doubt an important subject, from both a positive (descriptive) and a normative (policy prescription) perspective. Several developing countries that have implicitly or explicitly fixed their exchange rates to the currency of another country (say, the U.S. dollar) and whose inflation rates are higher than that of the specified foreign country (the United States) often experience persistent current account deficits and eventual devaluations of their own currencies. Devaluation often leads to an inflation induced recession and thus pushes the economy into an inflation-devaluation spiral. This spiral usually cause serious setbacks in economic development. Other developing countries grow exceptionally fast and often face the opposite pressure on their currencies. A high economic

growth rate is usually accompanied by a high investment rate, as well as high export growth. Successful exports produce current account surpluses, resulting in nominal appreciation pressure on the currency unless the central bank intervenes in the foreign exchange market and accumulates foreign reserves. Even if the intervention maintains the fixed exchange rate, unsterilized intervention results in inflation, and the real exchange rate appreciates anyway.” In the world of free capital mobility, another channel for appreciation exists (Ito, Isard and Symasky, 1999). The researchers further add that “the positive relationship between economic growth and real appreciation is a hallmark of the Balassa-Samuelson hypothesis found in Japan; among the four “tigers,” or newly industrialized economies (NIEs); and, to a much lesser extent, in Chile. One can also point out that a similar positive correlation was found in two other countries, Mexico and Papua New Guinea (PNG), in terms of negative growth (again relative to the United States) and depreciation.”

Exchange rates are determined by interest rates, confidence, current account on balance of payments, economic growth and relative inflation rates (Economics help 2016). Countries with lower inflation experience appreciation in the value of their currency whilst higher interest rates have the same positive effect on the exchange rate (Economics help 2016). A weaker rand results in increased local housing demand as well increased foreign demand. By contrast, a stronger rand decreases local property demand.

Using China as empirical evidence, Xu (2000) concluded that domestic prices and exchange rates tend to move together in the long-run, that is stability in the exchange rate tends to stabilise the domestic prices. Xu (2000) also identified the relationship between currency depreciation and domestic inflation.

Most economists agree that the exchange rate movements are the most difficult to predict. Edison and Pauls (1991) argue that the relationship between real exchange rate and real interest rate provides an invaluable framework in determining exchange rate movements. In their model, Edison and Pauls (1991:21) concluded that “real interest rates and real exchange rates are nonstationary and not cointegrated” meaning that there is no systematic relationship between the two variables.

2.10. Demographics impact on housing demand

Changes in population dynamics and structure have also been shown to have a huge effect on housing demand. In addition, changes in demand for housing due to changes in families are expected because housing demand is mainly determined by the number of household members, household organisation, and age of the household head (Lim and Lee, 2013). Although Heath (2014) concurs with the view that population growth has a key part to play in driving demand, she however argues that, measuring demand for housing is complex as it involves an assessment of economic, cultural, social and demographic factors. This influences the type and tenure of housing that will be attractive and affordable and in which areas. The 2011 Institute of Public Policy Research (IPPR) report also commented on the wider factors affecting household development including generational changes such as tendency to form separate households later in life due to spending longer in education and marrying later. The report observed the recent trend of people living in shared housing in their 20s and delaying home ownership until their 30s. The report states; “it is not clear if these changes are temporary responses to problems with affordability, or longer-term shifts because of lasting social change.”

Hassanudin and Chandra (2016) add that, urban migrations have caused an increasing demand for residential property in the city, and the scarcity of land for development of landed residential properties in major urban areas. Based on their research on the Malaysian housing market, Hassanudin and Chandra (2016) suggest that urban migration has only resulted in an increase in housing prices, particularly in the capital Kuala Lumpur due to increased demand. Housing prices in Malaysia rose by 8% in the first quarter of 2014 compared with the same period in the immediate preceding year based on figures from the Ministry of Finance Valuation and Property Services Department. The house price increase occurred across all types of properties.

Quigley and Raphael (2004) made an interesting discovery that although international immigration into the USA results in internal demographic changes, it does not necessarily

impact the home ownership market, but has rather put upward pressure on the demand for low quality rental units (especially in metropolitan areas). They further suggest that an ageing population relieves the demand side of both rental and home ownership.

Finally, important generational issues, that affect the demand for housing are; “Ageing and Asset Prices.” Population ageing affects asset prices. The State of Hawaii Department of Business, Economic Development and Tourism (2015) concludes that ageing will lower house prices substantially over the next forty years, both internationally and in the United States. This assumes that, as older households downsize, there will not be sufficient demand from younger households to replace them. The growth rate of the working-age population plays a critical role in explaining household demand and house prices over extended periods - higher growth in working-age population increases housing demand (Agnello and Schuknecht 2011).

2.11. Relationship between mortgage financing and economic development

Some of the key drivers of economic growth include international trade and capital movements that led to financial system developments such as banking, foreign exchange and credit markets (Maddison 2001). Maddison (2001) also adds that “financial systems development of credit markets leads to financial intermediation, which, ultimately drives economic growth. Thus, the need to develop mortgage markets in Africa simply cannot be overstated. While mortgage markets are slowly emerging in many African countries, substantial barriers still hinder their growth and expansion.” For instance, a recent study by the World Bank based in Kenya listed several constraints, which include; affordability, absence of data for risk valuation, lack of long-term funding and title deeds. World Bank (2011) argues that “while policymakers have been promoting the expansion of Africa’s nascent mortgage markets as a logical stimulus to economic growth and development there are no empirical studies on the direct link between the level mortgage financing and economic development for Africa.” Connected to this is one of the objectives of this study, that is to demonstrate the need for mortgage markets by empirically showing the link

between economic development and mortgage market development with specific reference to Africa.

Atje and Jovanovic (1993) found a significant effect of stock markets on economic growth, but no significant effect on bank lending. Atje and Jovanovic (1993) analysed '40 countries in 1990 for GDP per adult and growth in GDP per adult relative to investment as a per cent of GDP averaged from 1960 to 1985, the per cent of the employed age population in secondary school, the value of stock traded in the stock market relative to GDP, claims on the private sector by the monetary authority and bank deposits as a per cent of GDP.' Alternatively, Harris (1997) argued that Atje and Jovanovic's findings are not supported by empirical data. Harris analysed data for 49 countries from 1980 to 1991 for growth in GDP per unit of effective labour, investment as a percentage of GDP, the growth of total employed labour and the total value of shares traded on the stock market as a percentage of GDP.' Harris concluded that the level of stock market activity has little explanatory relevance from both a developing country perspective and a developed country perspective.

2.12. Relationship between household income and housing demand

Among the possible indicators of economic welfare, household income is commonly used and estimated in a reasonably consistent manner in many countries. In general, 'net' or 'disposable' household income is derived by combining all individual income sources within each household, after the deduction of payments of direct taxes (Smeeding and Weinberg, 2001). This definition allows for accounting for the various circumstances of all household members, including those without labour market earnings, and all other sources of income: investment income, social security benefits and other forms of non-labour income, in addition to earnings (Jenkins et al 2012).

McQuinn and O'Reilly (2016) in their research on the Irish housing market concluded that there is a direct correlation in the increase of household income, housing demand and consequently housing prices. Additionally, many previous studies have also suggested long-term equilibrium between house price and income. In their model, they stated that, house prices depend on how much individuals can borrow from financial institutions. The

amount borrowed is ultimately a function of disposable income and the current mortgage rate. However, Chang, Tsai and Chen (2007) using the Taiwan housing market as empirical evidence, argue that the rapid growth in housing prices does not translate directly to the same rate of growth in household income, as income has been found to be relatively gradual. For example, the average house price growth in Taipei between 1973 – 2002, has been 7% compared to the growth in household income of 4.4% during the same period. This scenario results in an affordability problem. This long-term un-equilibrium between house price and income is largely caused by inefficiencies in the housing market (Gallin 2003). Chang, Tsai and Chen (2007) suggests robust monetary policy interventions to bring about the long-term equilibrium between house prices and income.

Rady and Magne (2001) argue that there is direct correlation in changes between in interest rates and income on housing demand. For example, a drop-in interest rates results in an increase in housing prices and transactions, while an increase in interest rates has the opposite effect. Household income tends to follow a similar pattern. Rady and Magne (2001) also observed that in times of rising housing prices, first time buyers (consisting of mainly of younger households) have an incentive to cut down on non-housing consumption to get a foot in the housing market before the starter properties become too expensive. On the contrary Quigley and Raphael (2004) argue that affordability is a challenge for many young households. On the other hand, wealthy first-time buyers cause a significant increase in housing prices, whilst increases in immigration by not so well-off households does not have a material impact (Rady and Magne, 2001). Quigley and Raphael (2004), also suggests that household income can be a misleading measure of household affordability i.e. most pensioners have low annual income yet they own houses.

2.13. Housing Finance in Africa

Housing financing dynamics differ across countries, and in addition, housing finance is a very topical issue in the housing academia. In the developed countries, such as USA and the UK, housing financing is identical to mortgage financing. In developing markets, such as Africa, housing finance is ‘largely informal, contributing to over 90% of housing

purchases through self-help approaches of incremental housing. Perhaps regarded as a more effective instrument in the provision of housing resources' (World Bank, 1993), mortgage financing is insignificant in Africa. The impact of mortgage financing is inhibited by various factors that discourage investment in mortgage financing. A plethora of literature on housing asserts that countries with poor property rights, and other investor protection laws as measured by the value of their property rights, are likely to be less financially developed (Billmeier and Massa, 2009; Claessens and Laeven, 2003; Beck et al., 2003; La Porta et al., 1997, 1998). In its assessment of access to housing finance in Africa, the CAHF (2013) found that land title insecurities (most of which communally held in the context of Africa and other emerging markets, causes weak property rights regimes, which has an adverse impact on securitised lending. Other factors such as low, uncertain and lop-sided income levels, lack of risk management mechanisms and the highly volatile macro economy, driven by huge and volatile movements in inflation rates, interest rates and exchange rates, have dis-incentivised savings (needed to meet down payment requirements) and long-term housing financing (CAHF, 2013; Chiquier and Lea, 2009; Boamah, 2011; Allen and Johnsen, 2008; Kalema and Kayiira, 2008; Tomlinson, 2007; Karley, 2003, 2002). These restrictive factors tend to enlarge affordability problems.

Thus, financial innovation plays a critical role in broadening, deepening and stimulating mortgage markets in Sub-Saharan Africa. The search for alternative collateral instruments and savings mobilization mechanisms has been on the research radar for some time, with the aim of improving and stimulating investment in housing, particularly on the African continent. Pension-backed housing finance (PBHF) states, "a housing finance concept that has its origins from pension fund capitalism and involves a shift in the design and investment of pension funds from defined benefit (DB) pay-as-you (unfunded) social insurance pension schemes to defined contribution (DC) (funded) individual schemes. Since the 1970s, pension funds have been major financiers of mortgages and have traditionally participated as secondary lenders using the capital markets. In Sub-Saharan Africa, there is growing activity of PBHF in countries such as South Africa, Botswana, Namibia, Mauritius and Zambia (CAHF, 2013:22)." Jones and Data (2002) assert that deregulation and reforms which have been instituted in the industry have stimulated innovation and a wider interpretation of the concept of collateral. Advocates of pension-

backed housing finance assert that housing finance mechanisms give the low and middle-income households an opportunity to access housing which they would otherwise not be able to afford under the conventional housing loan regimes.

2.14. Housing Market Overview – South Africa

Before deliberating on the specifics of academic literature on housing demand, it is important to highlight the current overview of housing in South Africa (both informal and formal housing). This provides context and scope on the key issues in housing demand dynamics.

The residential property market in South Africa constitutes the largest component of the South African property market (CAHF, 2015). CAHF (2015) further suggest that the South African deeds registry has a total of 6.7 million properties in its registry and is worth R5.2 trillion. A total of 86% of these properties are considered residential, ranging from sectional title and freehold properties, to estates; (including state-sponsored homes). Approximately 60% of the housing market is concentrated in eight metro municipalities (CAHF, 2015:10). As per the deeds registry, Figure 1 illustrates the various residential property market segments, that is properties worth under R300 000, between R300 000 and R600 000, between R600 000 and R1.2 million and over R1.2 million.

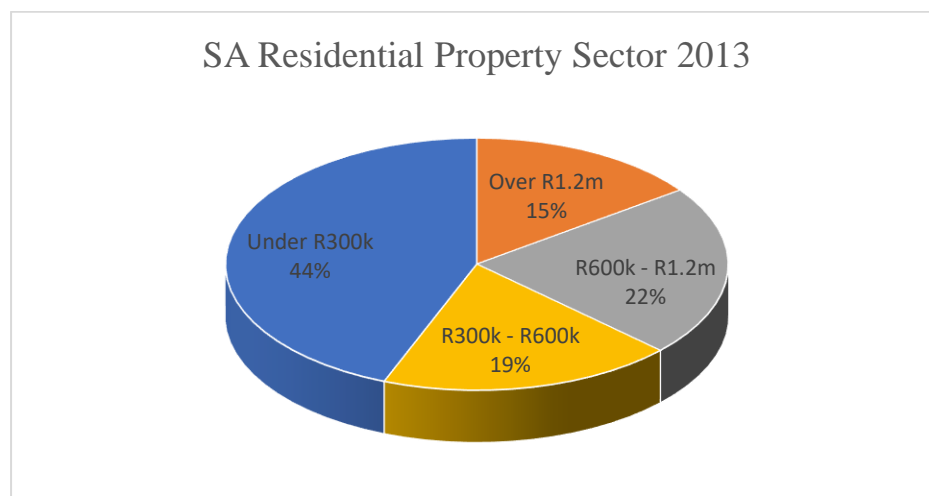


Figure 1 Source: Centre for Affordable Housing (2015)

CAHF, 2015 asserts that of the 5.8 million registered residential properties in South Africa, about 3.8 million (63%) were estimated to average up to R600 000 in 2013. The low-income market segment, which constitutes properties valued at less than R300, 000 exhibited the fastest growth. This unequivocally and clearly demonstrates the impact of the government's subsidised housing programme and points to a key change occurring in the South African property market. The share of low valued residential properties had increased comparatively to the rest of the market. The view holds true given the income distribution of the population and the need to address past socio-economic imbalances and reflects good policy focus on the low-income market.

South Africa has undergone a housing boom in which national house prices rose by an average of 20% annually between 2000 and 2006, (Global Property Guide, 2016). The rise in house prices reached a peak in October 2004 with 35.7% annual growth (Global Property Guide 2016). Global Property Guide (2016), further asserts that the housing demand boom between 2000 and 2006 was firstly, driven by the growth of the black middle class which had a major impact on housing demand, and by individual tax reliefs, in the backdrop of a growing economy. Secondly, South Africans who had transferred money offshore (mostly invested in properties) during the apartheid era were then allowed to bring it back by September 2004. Thirdly, better economic stability and security helped the cause. The Apartheid-era held back economic growth potential due to the escalating political violence. Furthermore, the Financial Sector Charter in 2003 boosted mortgage loan growth. "Most financial institutions committed to provide ZAR 42 billion (US\$5.45 million) of housing finance to the low-income market. Then in 2006, the capital gains tax (CGT) exemption on primary residences was raised from ZAR1 million (US\$127,129) to ZAR1.5 million (US\$190,694). Transfer duties on properties were lowered too. For example, no transfer duty is payable on properties valued at ZAR500, 000 (US\$63,565) or less (Global Property Guide 2016)."

However, in the first quarter of 2008 the housing boom came to a halt, following the global financial crisis. It is also important to highlight the sequence of events during and post 2008 financial crisis in a South African context;

“In 2008, house prices fell by 0.5% (-9% in real terms). In 2009, house prices rose by 0.3% (-5.4% in real terms). In 2010, house prices rose by 2.3% (-1% in real terms) which was encouraged by South Africa hosting the 19th FIFA World Cup. In 2011, house prices rose by just 1% (linked to lower economic growth, rising inflation, and political corruption concerns). In 2012, the housing market bounced back (house prices rose by 9.2%). In 2013, house prices rose by 3.6%. (Property Guide, 2016)”.

2.15. Housing problems in South Africa and Low-Income Housing Trends

Although low income housing is not the focus of this research, a brief discussion on this topic helps to provide context of the South African housing market. Fifty-two percent (52%) of South Africans live in informal settlements (Housing Development Agency, 2016). Therefore, affordability remains a key factor driving housing demand. Table 1 shows the housing gap ratio by major SA municipalities.

<i>Housing Price Gap by Municipality</i>					
<i>Municipality</i>	<i>Average monthly income</i>	<i>Target affordable house price</i>	<i>Average sales price</i>	<i>Housing price gap</i>	<i>Affordability ratio</i>
Buffalo City	R8 714	R222 000	R663 000	R441 000	3.0
City of Cape Town	R13 164	R336 000	R1 031 000	R696 000	3.1
City of Johannesburg	R14 777	R377 000	R1 024 000	R648 000	2.7
City of Tshwane	R15 566	R97 000	R683 000	R286 000	1.7
Ekurhuleni	R10 694	R273 000	R726 000	R454 000	2.7
eThekweni	R9 759	R249 000	R909 000	R661 000	3.7
Mangaung	R8 368	R213 000	R786 000	R573 000	3.7
Nelson Mandela Bay	R9 582	R244 000	R950 000	R706 000	3.9
Msunduzi	R8 482	R216 000	R649 000	R433 000	3.0
<i>Metro Average</i>	<i>R11 012</i>	<i>R280 746</i>	<i>R824 720</i>	<i>R543 974</i>	<i>3.0</i>

Table 1: Relative Housing Gap by Municipality, Centre for Affordable Housing Finance, 2015

However, Pettersen (2016:10) argues that the number of households living in formal dwellings across the country has increased ‘from 76% in 2002 to 80% in 2014’. Even

though the South African government has built more than three million Reconstruction and Development Programme (RDP) houses since 1994, it appears that the number of informal dwellings are still on the rise (Pettersen 2016). It is still not clear whether the RDP system has helped alleviate poverty and whether the beneficiaries are actually better off. The main objective of the South African government in respect of its housing policy is defined as creating ‘worthwhile, socially and economically cohesive communities located in areas allowing suitable access to economic opportunities as well as health, educational and social amenities’ (Ndinda et al, 2011).

Although policy makers highlight ‘affordability’ as the main reason behind lack of access to housing, economists are very circumspect in the implications of this direct correlation between affordability and access to housing (Ndinda et al. 2011). According to the United States Government Accountable Office (2010), the general definition of ‘affordable’ is limited to paying no more than thirty per cent (30%) of one’s income on housing and thus, families who pay more than 30% of their salary on residential housing are deemed cost burdened. Most economists argue that ‘affordability’ brings about many aspects including, without limitation; the distribution of housing prices, distribution of housing quality, income distribution, the ability of the consumer to borrow and the choices people make on how much housing to consume relative to other goods (Quigley and Raphael, 2004).

Approximately 40% of the South African workforce earns less than two hundred dollars (USD 200) per month (Stats SA, 2010). This implies that many South Africans cannot afford or qualify for housing finance. One of the measures implemented by the South African government to address housing shortage and backlog is through subsidised or low-cost housing. Affordable or low-cost housing refers to housing for the low income customer segment measured by living standards measures (LSM) of 1-4 (Statistics SA, 2010).

According to Turner (1998), the eradication of poverty is one of the biggest challenges facing urban policy makers. Turner (1998) argues that the high number of poor families in dilapidated neighbourhoods is not related to ‘free market forces’ but to a larger extent racism. Turner (1998) further advocates for establishment of low-cost houses in poverty

stricken areas. He further notes relocating families from high-poverty areas to low-poverty areas results in economic development for many poor families. Turner (1998) also suggests that most people subsidised by the state live in poverty stricken areas whilst by contrast privately owned subsidised housing developments tend to be in low-poverty neighbourhoods. MdSani (2012) argues that housing affordability is difficult to establish and measure given that there are many methods to measure housing affordability, which include: “price to income ratio (PIR) measure, rent to income ratio (RIR) measure and housing expenditure to income ratio measure (MdSani, 2012).” Variables that drive housing affordability include without limitation, household size, disposable income, family income, location, interest rates and marriage. In addition, MdSani (2012) also discusses various motivations for owning a house as a factor of gender. For the majority of men owning a house signifies status and social class, whilst for women it is a symbol of security.

2.16. Chapter Summary

This chapter covered a review of available literature on formal housing and factors influencing it. The author started with establishing a theoretical framework as well as presenting the empirical evidence found on factors influencing housing demand. The chapter then concluded with a focus on the African and South African housing market and related demand. The next chapter discusses research methodology that was used to establish the findings of the study.

3. RESEARCH METHODOLOGY

This section describes the research methodology that was undertaken to answer the research questions. It consists of seven subsections which are; the research approach and strategy, research design, data collection methods including the research instruments, sampling, research criteria, econometric data analysis methods and limitations.

3.1. Theoretical Framework

Golding 2015

Golding argues that regardless of economic variables such as interest rates, exchange rate, and inflation; population growth remains the biggest driver of housing demand. In his analysis population growth in South African cities is largely driven by urban migration thereby reducing the supply of housing. Golding (2015) also noted that growing affluence plays a huge part in housing demand.

Tandoh and Tewari, 2016

In their theoretical framework of housing, Tandoh and Tewari (2016) identified housing as a consumer good. Their theory suggests that the consumer optimises utility (of housing) given price and income constraints. Furthermore, Tandoh and Tewari (2016) believe that a perfectly competitive housing market exists. Aligned to their views, Jimenez (2016) suggests that there is a correlation between household size and the ability to pay for housing. That is; the bigger the household size the less the likelihood to afford housing.

Dua, 2004

Dua (2004) identified employment, income levels, inflation and mortgage interest rates as the drivers of housing demand. Dua (2004) views inflation and interest rate factors as the main drivers of housing prices and consequently impacting supply and demand of housing. Dua (2004) also noted that an increase in the rate of inflation decreases housing demand. This view is totally at odds with Tandoh and Tewari (2016) who suggested that high inflation rates combined with the depreciation of the currency, drive people to invest in property as a hedge against rising inflation, thus increasing the investment demand for housing.

Based on the above divergent theories around housing demand, the author through a regression analysis would like to test the null hypothesis. i.e. the identified factors such as interest rates, inflation and exchange rate do not significantly affect housing demand. The

author believes in the alternative hypothesis i.e. interest rates, inflation and exchange rate significantly affect housing demand.

3.2. Research Ethics

This research was conducted in a transparent and ethical manner. As the research is largely quantitative, the data was obtained from publicly published data on the South African Reserve Bank website. Data access confidentiality agreements were signed prior to the information being given.

3.3. Research Approach and Strategy

This study uses a deductive approach based on a quantitative strategy (Bryman and Bell 2007). This is because the research is based on economic theory and involves trying the distinctive characteristics of the econometric model that seeks to explain the empirical relationship between various economic variables i.e. interest rates, exchange rate, inflation rate in relation to housing demand. Therefore, quantitative information that defines the characteristics and relationship dynamics of different macroeconomic and financial factors was used to answer questions stipulated in 1.2. The study is therefore based on deductive research methodology. Macro-economic and financial theory from the review of literature was used to formulate the hypothesis. Furthermore, the research study is a longitudinal study which comprises of a collection of time series data.

According to Marczyk, DeMatteo and Festinger (2005), quantitative research uses statistical analysis to obtain findings on the relationship between dependent and independent variables. Quantitative research is a technique ideal for studies where data is systematically collected, measured and analysed in a clearly defined manner. Quantitative research is used in almost every sphere of life, such as in clinical, biological, epidemiological, sociological and business research (Adams et al 2007). Secondary data will also be used. This approach is widely used in business research as it produces results more rapidly. The application of a quantitative approach is in line with the comparable

studies that have been undertaken (Bryman and Bell, 2007). Quantitative data in this study was collected from SARB website and includes CPI from 1995 - 2015. The data follows a time series study - given that the measurement of both independent and dependant variables will be monthly from 1995 to 2015.

3.4. Research Design

The researcher had the option of using either cross-sectional or longitudinal research. Cross-sectional research compares variables at a single point in time whilst longitudinal make a comparison over time (Institute of Work and Health 2015). Both cross-sectional and longitudinal data are used to measure development and are observable. In this research study, longitudinal was used. The institute of work and health states the following about the longitudinal approach; “The benefit of a longitudinal study is that researchers are able to detect developments or changes in the characteristics of the target population at both the group and the individual level. The key here is that longitudinal studies extend beyond a single moment in time. As a result, they can establish sequences of events.” (Institute of work and Health 2015).

The study seeks to empirically determine the impact of interest rates, exchange rates and inflation on housing demand in South Africa. The data looks at the date between 1995 and 2015.. The data will be monthly in line with previous studies. “A time series is a chronological sequence of observations on a particular variable. Usually the observations are taken at regular intervals (days, months, years), but the sampling could be irregular (DTREG n.d.)” Examples of time series are the interest rates, exchanges rates, Dow Jones Industrial Average, Gross Domestic Product, unemployment rate and airline passenger loads.

Correlation is only able to find, and simple regression and multiple regression are only able to describe, linear relationships (Business Expert Press, 2011). A regression based on a single variable is called linear regression. A regression analysis that compares the

relationship between multiple variables is called multiple regressions (Keller 2012). A positive linear relationship exists when a change in one variable causes a change in the similar direction of another variable. For example, an increase in advertising will generally cause a corresponding increase in sales. When we describe this relationship with a line, that line will have a positive slope (Business Expert Press 2011). A negative linear relationship exists when a change in one variable causes a change in the opposite direction of another variable. For example, an increase in competition will generally cause a corresponding decrease in sales.

3.5. Research Methodology/Data Collection

To understand the relationship between interest rates, exchange rate and inflation in relation,.. secondary data collected from the online time-series databases of the South African Reserve Bank was used.. Tabled below in Table 2 is an outline of the proposed indicators to be collected.

Table 2: Description and source of variables

Dependent Variable	Indicator	Source
Housing demand	Mortgage loans (Million)	SARB
Independent Variable	Indicator	Source
Interest rates	Monthly interest rates data	SARB
Inflation	CPI data	SARB
Exchange rate (cents)	Rand/Dollar exchange rate	SARB

The indicators were selected based on their relevance and use in prior studies. Databases that housed the information were also readily accessible for the proposed study. All these figured were sourced using the internet.

3.6. Research Criteria

The research aims to assess and validate the identified three variables' (interest rates, exchange rate and inflation rate) impact on housing demand. Although there is prior literature on the relationship between these variables and housing demand, the research aims to validate the theoretical framework and add to the body of knowledge.

3.7. Data Analysis

Similarly, to the literature reviewed, the starting point of the data analysis was to treat and normalize the data. The second step was to determine the strength of association between independent variables (interest rates, CPI and exchange rate) and housing demand (measured by the number of housing loan applications and or mortgage loans). Therefore, applying Pearson's Coefficient of Correlation will indicate whether there is a positive, negative or no relationship between the variables (Keller, 2012). A multiple linear regression is a useful statistical technique that helps to analyse the relationship between a dependent variable (housing demand), and several independent variables (interest rates) as shown in the following equation (Keller, 2012). The technique looks at the relationship between dependent variable (Y-value which is the variable to be forecast) and independent variable (X-value which is the variable believed to be related to the dependent variable) and is calculated by a line of best fit (Keller 2012). In the case of the data provided by the SARB, the exchange rates, inflation and interest rates are regarded as the independent variable. The formula is shown below;

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \dots + b_k x_k + \varepsilon$$

where \hat{y} is the dependent variable – housing demand; $x_1 \dots x_k$ are the independent variables, which would be interest rates.

3.8. Research Assumptions

In this research, there are a few assumptions to be noted. Firstly, the methods used to calculate the interest rates, CPI and exchange rates are in line with the generally accepted international standards. The researcher further assumes that the databases used to source information for econometric analysis contain accurate data; are properly maintained and of similar quality to the data utilised in international research. The researcher assumes that the SARB online data (interest rates, CPI and statistics on mortgage loans) is readily available and reliable to the wider general public.

3.9. Research Limitations

Firstly, the results of the study might be impacted by the macroeconomic events that occurred in South Africa during the sample period, 1995 to 2015. The research also limits the scope to the South African residential property market (formal housing). The availability of data has constrained the research to focus on formal housing demand. The study was only limited to South Africa and it might not be applicable to other countries as each country has a distinct set of macro-economic dynamics

Furthermore, the research is limited to testing only three variables that affect housing demand (interest rates, exchange rates and inflation) and exclude of many other variables which could be significant, such as household income, GDP factors, demographics and unemployment rates.

3.10. Chapter Summary

The chapter discussed various research methodologies for this research including making a choice between longitudinal and cross-sectional studies. The author concluded that longitudinal research fits the research study. Also, regression analysis was used to find the relationship among housing demand (dependent variable) and interest rates, exchange rate and CPI. The next chapter goes into data analysis using regression tools.

4. EMPIRICAL RESULTS, DATA ANALYSIS AND FINDINGS

4.1. The Regression Model

The model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where β_0 , β_1 , β_2 and β_3 are the coefficients and ε is the error variable. The Y (mortgage loans) term is the dependent variable while the X terms represents the independent variables (i.e. foreign exchange, prime overdraft and inflation, respectively). According to Keller (2011), the independent variables may also be functions of other variables. For the proposed model to be valid, the following conditions for a multiple regression model should hold and will be tested later in this chapter. These conditions are as follows:

- The probability distribution of the error variable ε should be normal.
- The errors are independent.
- The mean distribution of the error variable is 0.
- The standard deviation of ε is σ_ε and should be a constant.

Should these conditions not hold, then the proposed model may not be valid in estimating the joint relationship between the dependent and independent variables.

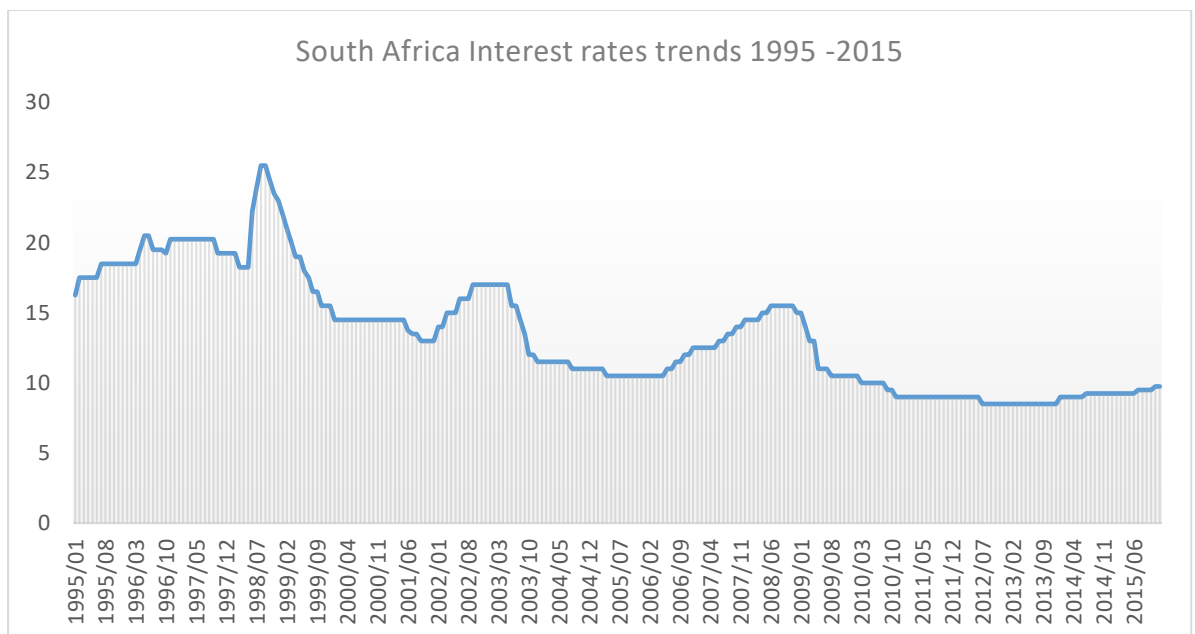
4.1.1. Descriptive Analysis

It is important to comment on the raw data trends and attempt to establish factors influencing the data before discussing the descriptive statistics. The data depicts trends on interest rates, inflation rates, exchange rates and mortgage loans between 1995 and 2015. According to the IDC report (n.d), “the South African economy recorded its fastest growth rate since the 1960s over the period 2004 to 2007, with real GDP growth averaging 5.2% per annum. From a global perspective, this period was characterized by a strong bull-market and booming commodities markets.”

4.1.2. Interest Rates

Prior to the 90s, interest rates were extremely high and in some instances US interest rates were around 17%. Since 1950 South Africa has experienced a significant variation in rates over the past 60 years. The prime rate fluctuated from a low of 5% in January 1950 (prime rate was down at 4.5% in 1949) to a high of 25.5% in 1998 (stanlib n.d). South Africa continued to experience high interest rates in the 90s with the highest interest rate being 25%. These high interest rates in the 90s were driven by currency and inflation volatility. The sharply negative real rates in the early and late 1980s (especially after the Rubicon speech in 1985) mostly reflected the influence of political conditions, while the high of 18% in 1998 reflected the Reserve Bank's efforts to fight the weakening exchange rate. Fortunately, the real prime rate has been relatively well behaved for the past 7 years, influenced mostly by the implementation of sound monetary policy and the desire to keep inflation inside the target range of 3% to 6% (Stanlib n.d).

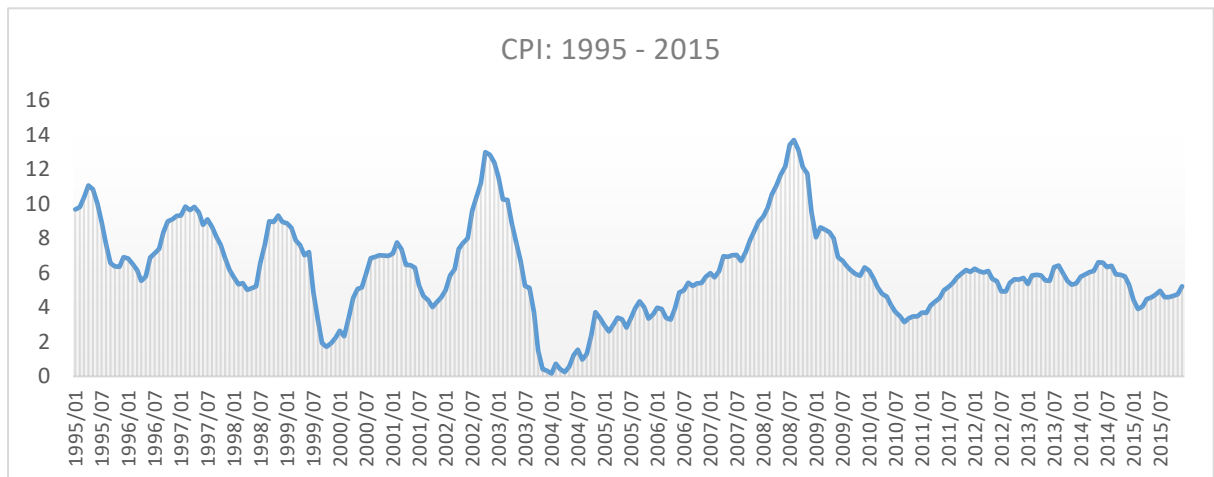
Graph 1: SA Interest rates data, Source: SARB



4.1.3. Inflation Rate

As per Global Rates Website (www.global-rates.com), inflation in South Africa, refers to the rate of inflation based on the consumer price index, or CPI. The South African CPI shows the change in prices of a standard package of goods and services which South African households purchase for consumption. To measure inflation, an assessment is made of how much the CPI has risen in percentage terms over a given period compared to the CPI in a preceding period. If prices fall, it is called deflation (negative inflation). The inflation chart below features an overview of the South African monthly inflation rate from 1995 to 2015. According to the Industrial Development Corporation (2013), “consumer price inflation embarked on a generally declining trend over the period 1995 to 2001. Consumer price inflation (headline inflation) averaged 9% in 1994, falling gradually to 5.7% by 2001. Since 2002, the South African Reserve Bank embarked on inflation targeting to ensure that the level of inflation remains between 3% and 6%. The rate of inflation initially exceeded the upper band of 6% as the rand weakened significantly in 2001 and 2002, in the aftermath of the 9/11 events in the United States.” The interest rate and inflation graphs 1 and 2, show that there is a positive relationship between the two variables. The period 1995 to 2015 witnessed a number of external shocks as depicted in Graph 2 below, with the most pronounced being the 1998 East Asian crisis, the period spanning the “dot.com crisis” (2000), the 9/11 events in the United States (2001) and the subsequent corporate scandals in 2002/03 and more recently, the global financial crisis which started manifesting itself in late 2007, intensified in 2008 and resulted in the global recession of 2009 (IDC, n.d). Therefore, the spike in inflation in 2002 and 2008 was linked to corporate scandals in the US and the recession respectively.

Graph 2: SA Interest rates data, Source: SARB



4.1.4. Exchange Rate

The rand was established as the official South African currency on 14 February 1961 – and has since developed into a liquid emerging market currency, most commonly traded against the US dollar (BusinessTech, 2013). Prior to the introduction of the rand, South Africa as a British colony, was using the British pound and sterling. According to Business Tech (2013), “In June 1974 the South African authorities decided to delink the rand from the dollar, and introduced a policy of independent managed floating. At the time, the Rand was trading at 87 cents to the dollar.” In the 1980s, with the boom in the value of gold, which strengthened the rand’s value – however, the same was true when the value of gold declined thereafter. In 1983, the apartheid government under pressure to change course from the international community, abolished the financial rand exchange rate system and key international banks refused to renew credit lines for South Africa. This resulted in the temporary closure of the foreign-exchange market in the country. Post-apartheid, with South Africa being accepted back into the community of nations resulted some normality being returned, but the rand/USD exchange rate remained in a downward trend started in the 80s. The rand/dollar exchange rate was then largely impacted by national and international political, social and economic events. Due to uncertainty about the new African National Congress (ANC), the rand/dollar plummeted to R3.55 in 1994 (BusinessTech, 2013). At the next presidential elections in 1999, the election of Thabo Mbeki as president sent the rand’s value to an average of R6.11. As per Business Tech (2013), “The 2001 September 11 attacks on

the World Trade Center in the USA caused the rand to skyrocket to R13.84 to the dollar (year average of R8.60) — with a recovery period happening the following year.” Since 2002, local events such as rising debt, socio-economic unrest and energy challenges have kept the rand largely devalued. Eskom’s issues (power cuts) around 2007 further weakened the rand and the 2008 financial crisis did not make things better for the rand either. The 2012 mining sector challenges highlighted by the Marikana massacre impacted hugely on investor confidence thereby weakening the rand further.

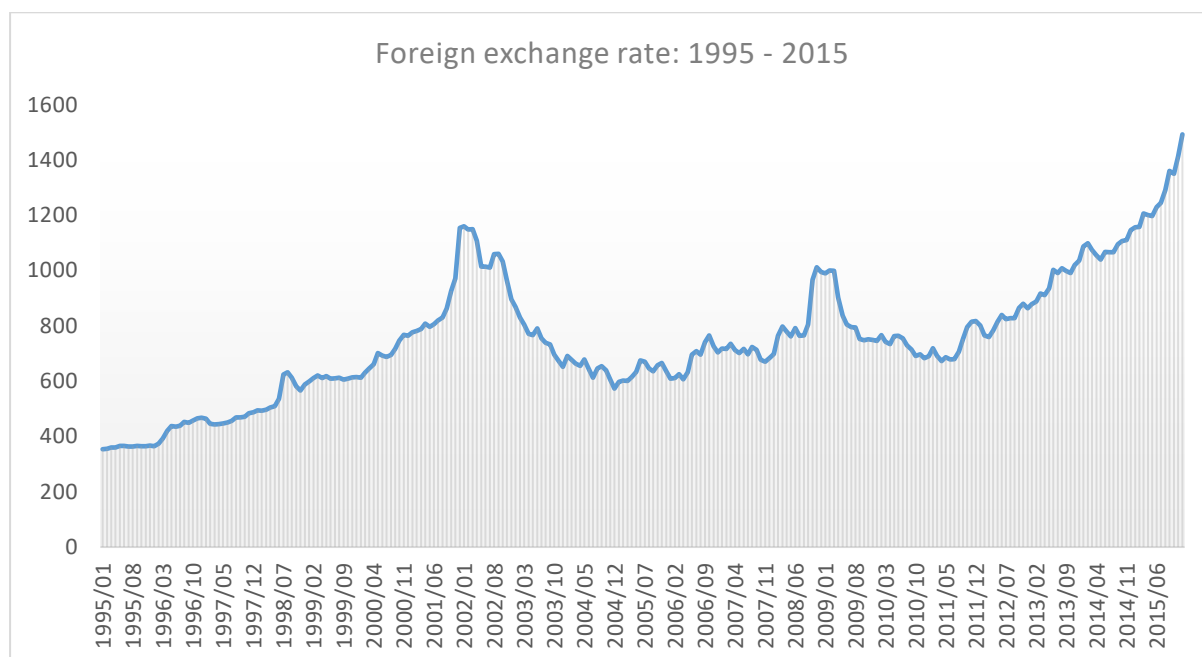
However, per Global Property Guide (2014) the recent fall in the rand did not attract much foreign investment in the property market despite properties being less expensive. The drivers that affected the drop-in house buying by foreign investors included but are not limited to:

- I. Negative investor sentiment towards South Africa, reflected by the weaker rand;
- II. Weaker performance of residential property globally, influencing its popularity as an asset class.

“Since July 2011 the Trade-Weighted Rand Index fell 47.8% to December 2015. The rand fell from US\$ 1 = ZAR 6.76 in ??, to US\$ 1 = ZAR 15.02 in December 2015 (see graph below). The drivers of the falling rand include; falling export commodity prices, frequent Emerging Market fears in an uncertain global economic environment, the arrival of US interest rate hiking and a well-documented myriad of domestic structural constraints on economic growth (Global Property Guide, 2014).”

A devalued rand has many knock-on effects for SA consumers. As the rand weakens, interest rates rise, hurting small businesses, home owners and indebted citizens. The price of oil, and therefore the price of petrol also increases, which has an additional inflationary effect that includes higher food prices. Graph 3 shows the rand versus the dollar (annual averages) from 1995-2015.

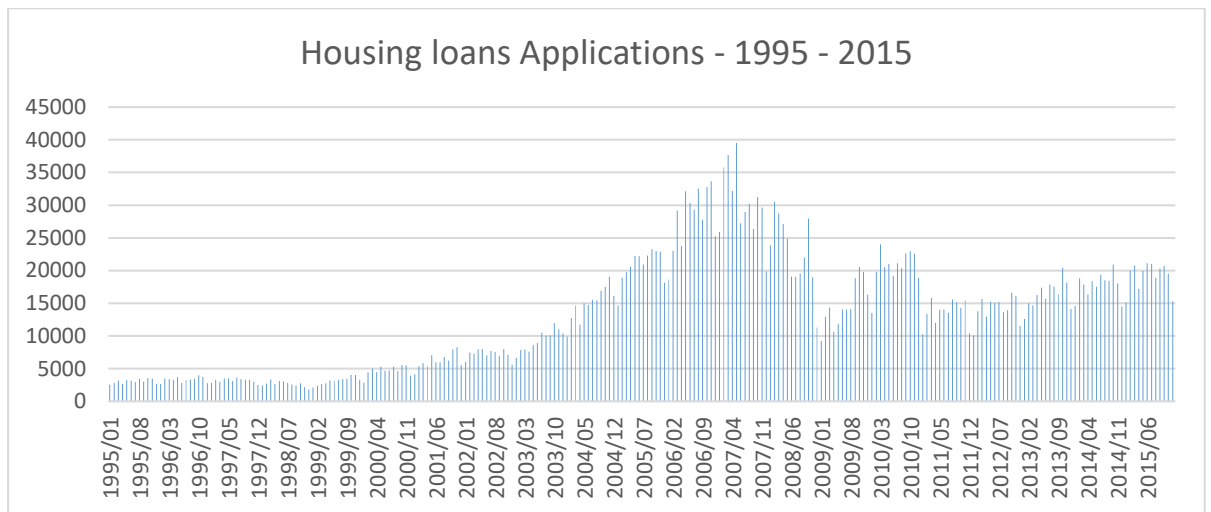
Graph 3: SA Exchange rates data, Source: SARB



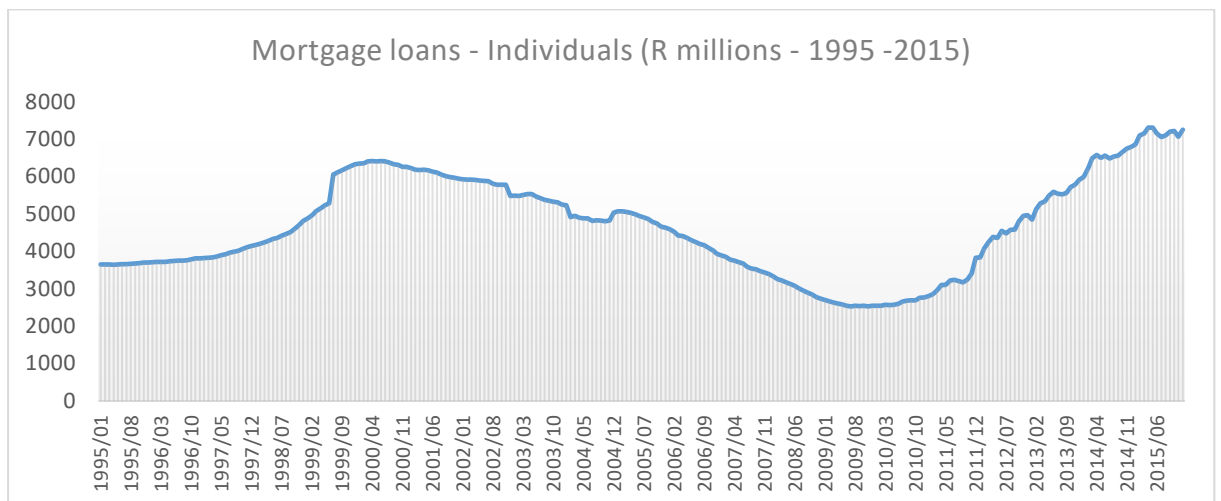
4.1.5. Mortgage Loans

South Africa experienced a housing boom from 2000 to 2006 (refer to Graph 4). During this period, national house prices rose by an average of 20% annually (Global Property Guide n.d). The rise in house prices further peaked in October 2004 with 35.7% annual growth (32.5% in real terms). According to the Global Property Guide (n.d), during the 2000-2006 boom which was largely driven by the following; (i) Emergence of the financially astute black middle class, (ii) South Africans who transferred money (which was invested in property funds) offshore during the Apartheid era were allowed (and required) to bring it back by September 2004, (iii) better economic security and stability, (iv) changes in the Financial Sector Charter in 2003 allowed financial institutions to provide mortgage loans to low income market. The Global Property Guide (n.d) suggests that 'successive slowdown of house prices in 2008 can be attributed to the full implementation of the National Credit Act in mid-2007, interest rate hikes, and to the global financial crisis.' (refer to graph 5).

Graph 4: SA Housing loans applications data, Source: SARB



Graph 5: SA Mortgage loans data, Source: SARB



4.1.6. Descriptive Statistics

Before the analysis of the data, the first step is to explore the descriptive statistics of the data and test for normality of the data by looking at the Kurtosis of each data series considered in this analysis. Time series data has been used in this analysis and Table 3 indicates the descriptive statistics of the data obtained from SARB. If the Kurtosis of the series is sufficiently close to three, therefore; the data is normally distributed. From Table 3, it can be observed that all the series have a Kurtosis that is sufficiently close to three and therefore we can assume, for this analysis, that all the series are normally distributed. Further, the probability values for all the variables are less than 5%, where

the null hypothesis was non-normality. Therefore, if all the null hypothesis is rejected, it can be concluded that there is enough evidence to support that the series are normally distributed.

The mean for the CPI is slightly higher than the 3 – 6% inflation targeting band of the SARB. The prime overdraft rate is calculated as the repo rate, which is decided upon by the SARB, plus a 3.5% that is added on by the commercial banks in South Africa; these banks include: First National Bank, Standard Bank of South Africa, Nedbank and ABSA (Barclay’s Bank). The skewness values show that the whole series is marginally positively skewed meaning that a relatively large number of the values per series are less than the mean value.

Table 3: Descriptive Statistics of the Variables

	MORTGAGE LOANS	FOREIGN EXCHANGE	PRIME OVERDRAFT	CPI
Mean	4663.4127	748.3224	13.5188	6.1671
Median	4595.0000	717.7800	13.0000	5.9195
Maximum	7310.0000	1492.6000	25.5000	13.7147
Minimum	2528.0000	353.8000	8.5000	0.1645
Std. Dev.	1311.3862	224.7730	4.1503	2.6531
Skewness	0.1201	0.5571	0.6338	0.3516
Kurtosis	1.9838	3.2358	2.4922	3.2836
Jarque-Bera	11.4483	13.6171	19.5790	6.0357
Probability	0.0033	0.0011	0.0001	0.0489
Sum	1175180.0000	188577.2500	3406.7500	1554.1064
Sum Sq. Dev.	431653165.0794	12681243.5144	4323.4730	1766.8074
Observations	252	252	252	252

4.2. Correlations

The correlations between the dependent and the independent variables are given in Table 4. From the table, the results indicate that there is a negative relationship between interest rates and housing demands. This result is in line with the research findings of Seabrooke

(2003), which also discovered that a decline in interest rates had a positive effect on consumer demand for housing as mortgage loans become more affordable to the consumer. It can also be observed from the results that demand for housing (as measured by the mortgage loans to individuals) is negatively correlated to prime overdraft rate and positively correlated to foreign exchange rate. This implies that as the foreign exchange rate increases, the housing demand increases too, while as the demand for housing also increases with a decrease in inflation (as measured by CPI). This positive correlation between inflation and interest rates variables is perhaps the reason why there are similar relationships between the individual variables with housing demand.

Table 4: Correlations for the Variables

	Mortgage loans - Individuals (R millions (End of period))	Foreign exchange rate	Prime overdraft rate	CPI
Mortgage loans - Individuals (R millions (End of period))	1			
Foreign exchange rate	0.503199692	1		
Prime overdraft rate	-0.116657431	-0.558584884	1	
CPI	-0.252964348	-0.038606746	0.509353213	1

Table 4: Descriptive Statistics

4.3. Regression and Stability Tests

After the correlations were considered, the multiple linear regression model for the analysis is run for the paper. Table 4 shows the output, which includes the t-statistics and the p-values that are used to test for the significance of the individual variables for this analysis. The results for these hypothesis tests are indicated on Table 5. The joint significance of this regression is tested using the F-statistic from the analysis.

$$H_0 : \beta_1 = \beta_2 = \beta_3 = 0$$

$$H_1 : \text{At least one } \beta_i \text{ differs from 0}$$

Summary Output

Table 5: Regression Analysis

<i>Regression Statistics</i>	
Multiple R	0.693052348
R Square	0.480321556
Adjusted R Square	0.474035124
Standard Error	951.0623199
Observations	252

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	207332320.1	69110773.36	76.40605934	4.94553E-35
Residual	248	224320845	904519.5363		
Total	251	431653165.1			

The F-statistic from the regression is given as: 76.4061 (p-value: 0.0000). Since the p value is less than 5%, we reject the null hypothesis. This implies that there is sufficient evidence supporting that the independent variables in the analysis are jointly significant in explaining the dependent variable. From this analysis, the multiple R is given by 69.31%, which means that 69.31% of the variation of the housing demand is explained by interest rates, exchange rates and inflation while 30.69% remains unexplained. These results jointly give some validity to the proposed regression model.

The stability tests for this analysis include the test for serial correlation, using the Durbin-Watson test statistic. If a model is not correctly specified, it may be mistakenly identified as suffering from serial correlation. The test for homoscedasticity does not have to apply in this case because the F-test conducted confirms that the independent variables are jointly significant. Therefore, the null hypothesis of homoscedasticity can be rejected. The tests that have been run as shown in Table 4 above confirms that the four conditions for the error

variable have been satisfied and therefore, there is some validity in using a regression model to study the relationship between the dependent and the independent variable.

The different t-tests to study singular relationships of the independent variable to the dependent variable is illustrated below:

$$H_0 : \beta_i = 0$$

$$H_1 : \beta_i \neq 0 \text{ for } i = 1,2,3$$

Table 6 below shows that results of the above tests:

Table 6: Regression Output

	t-Stat	P-value	Significant:
Intercept	0.083362333	0.933630686	No
Foreign exchange rate	14.09201051	1.5923533	Yes
Prime overdraft rate	9.072793976	3.6788917	Yes
CPI	-9.467271285	2.3606718	Yes

Table 4 indicates that the three independent variables are each significant in this analysis and because of the enormous size of the sample considered, the problem of multicollinearity can be discounted. Therefore, from this analysis, our results reveal a negative relationship between housing demand and interest rates, and housing demand and inflation respectively. A positive relationship is identified between housing demand and exchange rates. The regression is jointly significant in explaining the variation of the dependent variable and each of the variables are significant in explaining the variation in housing demand.

4.4. Interpretation of coefficients

Intercept – the intercept is $\beta_0 = 36.1743$. This implies that the average housing demand (as measured by mortgage loans) is 36.1743 when all the independent variables are zero. However, this interpretation has no value in our model because the intercept coefficient is not significant in this model.

Foreign exchange rate – $\beta_1 = 4.8334$. The relationship between income and life insurance demand is described by this coefficient value. This implies that an increase of a unit of foreign exchange rate in this model, the housing demand on average increases by 4.8334 million rand, all other independent variables held constant.

Prime overdraft rate – $\beta_2 = 195.6937$. Similarly, this implies that an increase of a unit of prime overdraft rate in this model, the housing demand on average increases by 195.6937 million rand.

Inflation – $\beta_3 = -265.1520$. Similarly, this implies that an increase of a unit of inflation in this model, the housing demand on average decreases by 265.1520 million rand.

It is quite evident from the coefficients above that, of the three independent variables, the housing demand is more sensitive to the inflation than it is to the other two variables. It is also quite significantly sensitive to the prime overdraft rate relative to the foreign exchange rate. The greatest impact on the housing demand will be when the change in prime overdraft rate and the inflation rate will move in opposite directions i.e. prime overdraft rate increases while inflation decreases or a decrease in prime overdraft rate while inflation increases. The latter will result in a significant decrease in the housing demand while the former will result in a substantial increase in housing demand. While the housing demand is still sensitive to the foreign exchange rate, is quite small relative to the other two variables and from a policy perspective, more would have to be done to monitor or control the direction of the other two variables since they have a massive impact to the housing demand.

The prime overdraft rate and the inflation rate are both monetary policy issues and can be easily managed since they are monitored by the Reserve Bank in South Africa. Generally, a decrease in prime overdraft rate will be followed by an increase in inflation rate because as prime rates decrease, there will be a higher incentive for consumers to borrow money

from banks and hence there will be more spending resulting in a higher economic activity. A high economic activity will eventually result in an increase in prices (i.e. increase in inflation). Similarly, an increase in prime rates would be followed by a decrease in inflation. So basically, the two variables would generally move in opposite directions, although the effect on the inflation would be on a lagged basis. This is crucial to the policy makers as this has a direct impact on the housing demand in South Africa.

5. RECOMMENDATIONS AND CONCLUSIONS

5.1. Recommendations and Policy Implications

The policy implications of this research are transformational and far reaching. Given that the findings suggest strong relationship between interest rates, exchange rates and inflation to housing demand, it is imperative for policy makers, that is government and monetary authorities to manage interest rates by managing inflation.

Policy makers also need to understand the drivers of inflation and interest rates. In that way, they can influence housing demand. If the drivers of inflation are external i.e. rise in oil prices, stock market volatility, global macro-economic conditions, to counter these factors by raising interest rates they will be working to decrease housing demand. If the drivers are internal i.e. rise in consumer expenditure, increasing interest rates to curb credit extension will impact on consumer disposable income (household income) which will ultimately affect the ability to afford credit.

Given that most governments, including the South African Reserve Bank, use inflation targeting as a monetary policy tool, regulators should be very cautious as this may influence housing demand negatively or positively. This view is well positioned by (Mitchells-Innes 2006) when he mentions that central banks play a role in influencing the relationship between interest rates and inflation in the short term.

As the population size increases through urban migration, immigration, and an increasing young population it puts pressure on housing demand thereby impacting the supply side of housing. This in turn puts pressure on the government's ability to provide social services including housing. Policy makers will need to manage the independent variables i.e. interest rates and inflation regimes to balance the demand and supply side of housing.

The literature also underpinned the positive relationship between housing demand and economic development (Maddison 2001). The need to develop mortgage markets in Africa simply cannot be overstated. The development of financial markets i.e. credit markets is a catalyst for economic growth. Although Sub-Saharan Africa financial markets including credit lending are still underdeveloped, policy makers, governments should promote and inculcate a culture of savings and banking.

5.2. Recommended Areas for Further Research

For further research on this topic, it is suggested that household debt be included as a variable to ascertain the impact of household debt on housing demand. In the methodology used, another method that can be considered is lagging the housing demand variable as housing demand tends to remain constant over time. House prices tend to be stable in the short to medium term.

It is also recommended that future studies investigate the one-for-one relationship between interest rates and inflation in the South African context. The relationship has been assessed in the context of developed markets but not in the developing world. What justifies the research on this topic is that the literature on the relationship of these two variables is conflicted. For example, Mitchells-Innes (2006) argues that nominal interest rates adjust by less than one-for-one to the expected inflation whilst Crowder and Hoffman (1996) suggest that nominal interest rates adjust by more than one-for-one to the expected inflation. This research is quite critical as these two variables are influential in any form of demand on the economy.

Another area of research will be to establish a quantitative relationship between stock market development and housing demand in South Africa. This research could unpack the impact of developed financial markets (in Sub-Saharan Africa) on housing demand.

Another area that will be relevant for research in the South African housing market context is to explore the complementarity between low cost housing and financial inclusion. The biggest part of SA housing is low cost, subsidized or free housing ('RDP') due to disparity in wealth amongst the citizens. Therefore, a research project that assesses whether low cost housing drives financial inclusion i.e. access to financial services, will inform policy makers on whether to invest in low cost housing in the future.

5.3. Conclusion

The overarching purpose of this paper was to assess whether market variables such as interest rates, exchange rates and inflation have affected the demand for housing in South Africa over the timeline of January 1995 to December 2015 using monthly data. In this study, a multiple linear regression methodology was applied and the descriptive statistics as well as the correlations between the dependent variable, housing demand, and the independent variables, interest rates, exchange rates and inflation, are included in testing the initial hypothesis of whether they affect housing demand.

The results of this paper confirmed other scholars' findings, that housing demand is negatively correlated to interest rates. Therefore, an increase in interest rates will result in a decline in housing demand for the economy of South Africa. Based on the estimated outcome, this paper proposes some notes to aid in the understanding of the factors affecting housing demand in South Africa.

The inference that can be drawn from the outcome of this paper is that inflation and exchange rates also play a role in influencing housing demand in the economy. It can also be concluded that financial deregulation leads to the spike in interest rates and that is the reason why most central banks including SARB do inflation targeting. If exchange rates are pegged or fixed against major currencies i.e. South African rand/ USD, this results in shocks in the domestic market.

The research also confirms ‘cointegrated’ relationship exists between exchange rate and interest rates and inflation. By implication although exchange rate and the other two variables (interest rates and inflation) may be not directly related in the short-run, there is a tendency that they may be related long-term.

The implications of this study show that monetary policy is essentially effective in affecting housing demand and therefore central banks need to consider this when making interest rate decisions. The global financial crisis of 2008 was caused by an asset bubble in the USA that spread throughout the global financial system through a contagion effect. Therefore, from this, it can be concluded that central banks play a major role in controlling the existence or growth of asset bubbles. This study also indicates that exchange rate volatility plays a crucial role in influencing the housing market in South Africa.

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