

https://dspace.org/

The relationship between house prices and mortgage demand and supply in South Africa

Molefe, Tebogo

2022
https://hdl.handle.net/10539/36693

Downloaded from a DSpace repository. https://dspace.org/



Wits Business School

Sculpting global leaders

The relationship between house prices and mortgage demand and supply in South Africa

Student name: Tebogo Molefe

Supervisor: Dr Kodongo Odongo

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management specialising in Finance and Investment

Johannesburg, 2022

Contents

List of Figures iii
List of Tables iv
Abstract v
DECLARATION vi
ACKNOWLEDGEMENTS vii
Chapter 1 Introduction 1
1.1 Context of the study 1
1.2 The condition of the South African housing market 2
1.3 Purpose of the study 6
1.3.1 Research Objectives 7
1.3.2 Research questions 8
1.4 Problem Statement 8
1.5 Significance of study 9
1.6 Outline of the study 10
Chapter 2 Literature Review 11
2.1 Background 11
2.2 Theoretical Literature 11
2.2.1 The Reconstruction development Programme (RDP) housing in South Africa 11
2.2.2 Theoretical links between house prices and mortgage demand and supply 13
2.3 Empirical literature 14
2.3.1 Factors that influence housing demand and supply 14
2.3.2 The 2008 Financial crisis and impact on Housing market 15
2.3.3 Housing prices, Bank lending and Monetary Policy 16
2.3.4 Bank Lending and property prices in Hong Kong 17
2.3.5 The causal effect of house prices on mortgage demand and supply: evidence from Switzerland 17
2.4 Summary and gap identification 18
Chapter 3 Methodology 19
3.1 Introduction 19
3.2 Research Design 19
3.3 Population, sample, and data collection 20
3.4 Data analysis 21
3.5 Finance Linked Individual Subsidy Programme survey 22
Chapter 4 Data Analysis 23
4.1 Introduction 23

4.2 The relationship between housing prices and mortgage demand and supply in South Africa 23
4.2.1 Introduction 23
4.2.2 House prices and mortgage financing data 24
4.2.3 Preliminary Analysis of data 25
4.2.4 Empirical results 29
4.3 Finance Linked Individual Subsidy Programme (FLISP) survey 33
4.3.1 Introduction 33
4.3.2 Results of the survey 35
Chapter 5 Conclusion of the study 43
5.1 Recommendations 44
Bibliography 45
Appendices 49
Appendix 1: Summary of statistics Standard Bank 49
Appendix 2: ACF of Standard Bank house prices and mortgage advances time series 49
Appendix 3: Augmented Dickey Fuller t-test for Standard Bank house prices 50
Appendix 4: Testing for cointegration using the Johansen cointegration method 51
Appendix 5: FLISP survey results regarding awareness of the subsidy 52
Appendix 6: FLISP survey conducted (Google forms) 52

List of Figures

Figure 1: A geographic map of South Africa 3
Figure 2: A graphical depiction of house prices over 20 years 5
Figure 3: New mortgage loans supplied in South Africa between 2002- 2015 6
Figure 4: Classification of South African house holds 10
Figure 5: Summary of statistics for house prices and mortgage financing data 29
Figure 6: FNB and Standard Bank house prices from June 2000 to December 2015 30
Figure 7: FNB and Standard bank mortgage advances from June 2000 to December 2015 .. 30
Figure 8: ACF of FNB bank house prices and mortgage advances time series 32
Figure 9: The gender of the participants of the study 38

Figure 10: The ages of the participants of the study 39

Figure 11: The income range of the participants of the study 39

Figure 12: Results of the FLISP study performed using Google forms 40

Figure 13: House price and mortgage advances over time 41

Figure 14: Results of the FLISP study performed using Google forms 41

Figure 15: Results of the FLISP study performed using Google forms 42

Figure 16: Results of the FLISP study performed using Google forms 43

List of Tables

Table 1: The average house prices in South Africa from 2000- 2015 4

Table 2: ADF and PP t-test for FNB bank house price and mortgage advances 34

Table 3: Johansen Cointegration Test for FNB house prices and mortgage advances 36

Table 4: The cointegrating equation table 37

Table 5: Cross tabulation of income levels against FLISP awareness…….41

Abstract

South Africa has a housing problem, particularly for low-income earners who earn enough not to qualify for Reconstruction Development Programme (RDP) and ineligible to qualify for mortgage financing from the private sector. The Finance Linked Individual Subsidy Programme (FLISP) was established by the government to subsidise households earning between R3501- R22 000 as an attempt to help fix this challenge.

In this study, a survey was conducted using a sample of 385 participants with the aim of determining whether the FLISP has been successful in assisting qualifying households access mortgage financing from the private institutions. The study found that majority of the participants had no knowledge of the FLISP. Even though some of the participants had knowledge of FLISP, they did not know how to apply for the subsidy. This indicates that the subsidy might not have been successful in enabling access to finance, which would in turn assist households with accessing housing.

The cointegrating and vector error correction models was used to perform the study which found that house prices and mortgage financing have a long-term cointegrating relationship.

DECLARATION

I, Tebogo Molefe, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Tebogo Molefe



Signed at ……Pretoria East……

On the ……6th……. day of ……January…… 2022

ACKNOWLEDGEMENTS

Thank you so much to all my people for the unwavering support, encouragement, and understanding you provided from the beginning of my studies. A big thank you to my supervisor, Dr Odongo, for not giving up on me and continuously providing guidance and support. To my daughter, Kenya Naledi, aim for the stars and never stop going until you reach your dreams and goals.

Without all the support, I would not have managed to succeed! To God be the Glory.

Chapter 1 Introduction

1.1 Context of the study

Section 26 of the Constitution of the Republic of South Africa Act No 108 of 1996 stipulates that everyone has a right to sufficient housing (Government S. A., 1996). Housing is defined as a shelter, building or place of habitation by people ranging from huts to upmarket apartments (Schoenauer, 2000). The adequate supply of houses to residents of South Africa is vital and although the government provides low-cost housing to under-privileged South Africans, most residents are required to purchase their own houses.

But what cost are people willing to buy these houses for? House prices are influenced by many factors, such as interest rates, income, location, and the type of house. This study focuses on the housing market for average to high-cost housing that people purchase in their private capacity using mortgage financing. For the housing market to provide adequate housing, the availability of mortgage finance must be addressed as most households utilise financing through financial institutions when purchasing homes.

Mortgages are defined by Osterling (2017) as loans that are secured by real estate and used to fund the buying of houses. How is mortgage finance (supply and demand) impacted by the housing prices? Mortgage finance can be split into mortgage demand and mortgage supply. Mortgage demand arising from the need for housing is dependent on household formation rates and income levels (Osterling, 2017).

Mortgage supply can be defined as providing of housing finance by financial institutions (usually banks). The four major banks in South Africa that have been providing mortgage finance are Absa bank, Standard bank, First National Bank (FNB) and Nedbank with Capitec being new to the mortgage financing market. For the purposes of this investigation, data from

FNB and Standard bank were used. The aim of this study is to aim identify if there is a link between house prices and mortgage demand and supply, particularly in South Africa. Furthermore, it aims to establish if the existing housing subsidies available are helping with reducing the housing problem in South Africa by increasing possibilities of accessing mortgage finance for qualifying households.

1.2 The condition of the South African housing market

South Africa is a beautiful country that has an area of about 1.2 million square kilometers situated on the African continent and is divided into nine provinces. In each province, the population is found on either urban or rural areas. The type of dwelling that people occupy would depend on factors such as affordability, availability and could be formal or informal structures (Commission, 2013). .

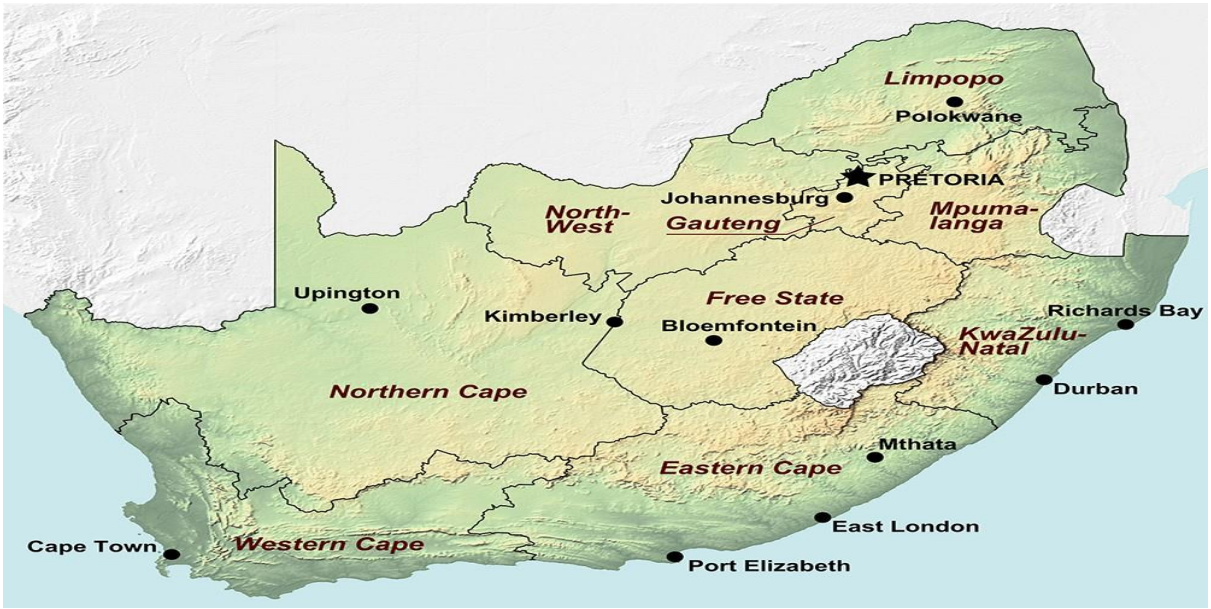


Figure 1: A geographic map of South Africa (source: greatestafrica.com)

Out of these nine provinces, Gauteng and Kwa-Zulu Natal have shown more growth in residential housing prices than other provinces (Writer, 2019). A survey performed by FNB

showed that Gauteng residential market remains the strongest in South Africa. A square meter of a house costs R9610 in Kwa-Zulu Natal and R7870 in Gauteng province (Writer, 2019).

Gauteng has the largest population with 14.7 million residents, followed by Kwa-Zulu Natal having 11.4 million people (South african Government, 2019). These two provinces account for 45.1% of the South African Population. Could the high residential prices in these two provinces be due to the high demand for housing because of most people dwelling there?

As per the First National Bank Property Index, the average house price increase in South Africa in 2017 was 3.7% (Guzman, 2018) The housing market experienced a boom between 2002 and 2007 as shown in Table 1 and Figure 1. However, there was a decline after 2007 up until 2009; then the house prices went up again in 2010 up until 2015. The increase in house prices in 2010 did not come as a surprise. South Africa hosted the 2010 FIFA world cup, and the increase in house prices could be attributed to the increased demand arising from the tournament (Guzman, 2018).

Table 1: The average house prices in South Africa from 2000 - 2015 (source: (Writer, 2019)**)**

South Africa's average house prices from 1995 to 2015 (Writer, 2019)						
	Small ($80m^2$ -$140m^{2)}$		**Medium ($141m^2$ – $220m^{2)}$**		**Large ($221m^2$ -$400m^{2)}$**	
Year	**Amount**	**% change**	**Amount**	**% change**	**Amount**	**% change**
2000	R199193	-	R249821	-	R364232	-
2001	R227061	13.99%	R287722	15.17%	R417406	14.57%
2002	R255415	12.49%	R325909	13.27%	R493069	18.13%
2003	R308642	20.84%	R397296	21.90%	R599293	21.54%
2004	R418858	35.70%	R536150	34.95%	R 779196	30.02%
2005	R502006	19.85%	R664226	23.89%	R 976994	25.38%
2006	R580525	15.64%	R772377	16.28%	R1122755	14.92%

2007	R648874	11.77%	R907094	17.44%	R1319315	17.51%
2008	R684664	5.5%	R948322	4.55%	R1387573	5.17%
2009	R667257	-2.54%	R923132	-2.66%	R1388737	0.08%
2010	R773000	15.85%	R969916	5.07%	R1447366	4.22%
2011	R736845	-4.68%	R985785	1.64%	R1487690	2.79%
2012	R702886	-4.61%	R1018147	3.28%	R1519813	2.16%
2013	R756232	7.58%	R1079560	6.03%	R1673357	10.10%
2014	R827523	9.43%	R1160599	7.51%	R1807320	8%
2015	R867014	4.77%	R1218727	5.01%	R1910334	5.70%

In 2004, the percentage increase in house prices across the housing market (small to large houses) was above 30%. It appears that in 2004, there was a boom in the housing market. In 2007, there was a sharp decline in the house prices which the global financial crisis contributed to. In 2009, the housing market was at its lowest with the small and medium houses showing a percentage change of -2.54% and -2.66%, respectively.

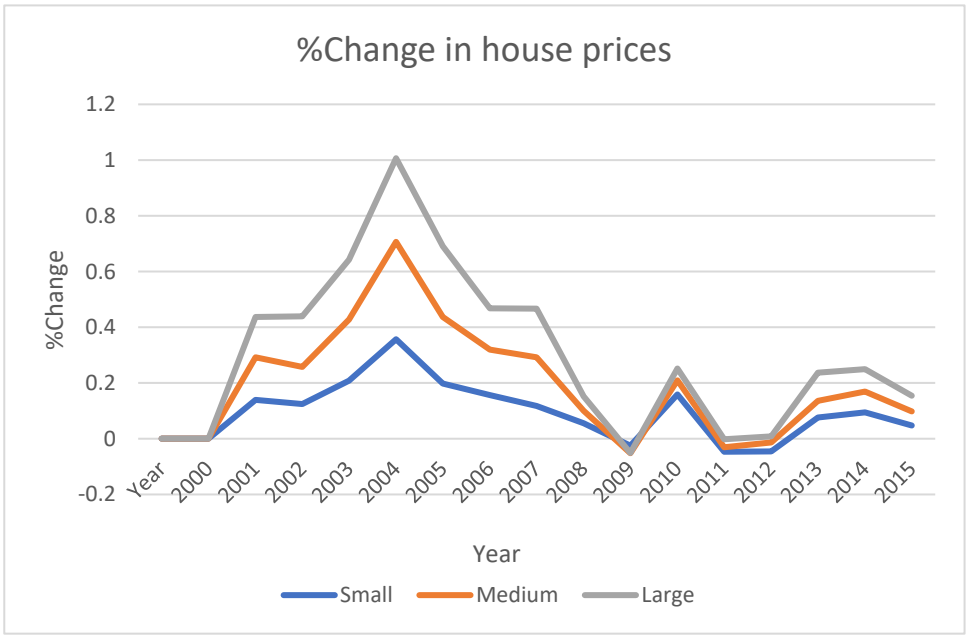


Figure 2: A graphical depiction of house prices over 20 years (source: Writer, 2019)

The mortgage loans in South Africa amounted to 36.5% of total loans and advances in December 2004 as per the reports from the Central bank. Between 1995 and 2001, mortgage loan supply was on a low, however, there was an increase from 2003. The mortgage offers were at an all-time high in 2007.

During this period, the house prices were on the rise (2004 - 2007). Figure 2 depicts changes in mortgage loans between 2004 and 2014. Demand and house prices have a direct relationship, if demand increases, an increase in house prices can be expected. The housing demand would be depicted by mortgage requests made by individuals and the mortgage supply would be the mortgage offers.

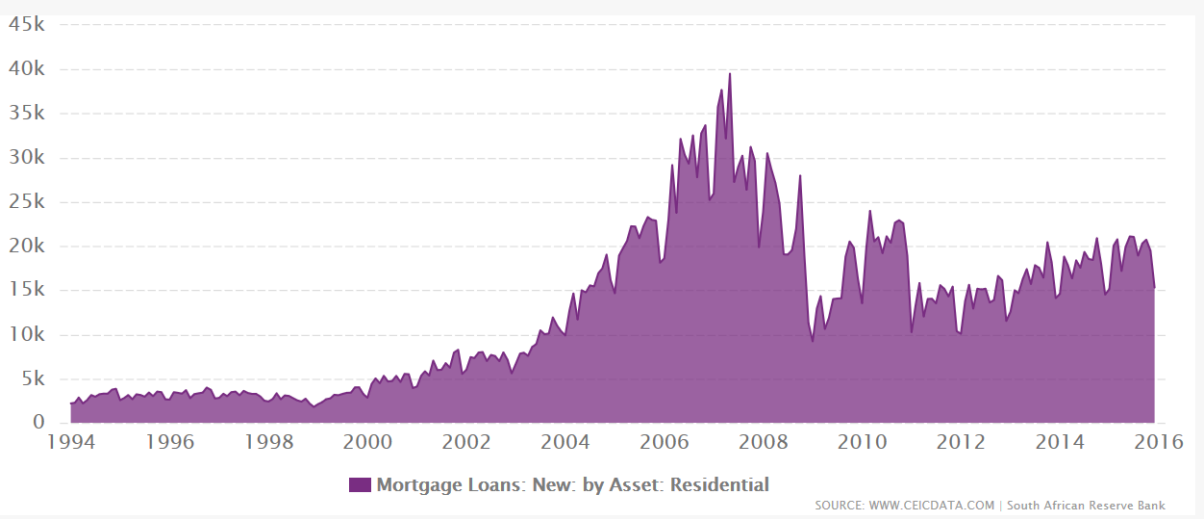


Figure 3: New mortgage loans supplied in South Africa between 2002 - 2015 (www.ceicdata.com| South African Reserve Bank)

Housing demand refers to the sort and number of homes that people will choose to live in based on their preferences and affordability. Mortgage supply is the number of houses (newly built and existing residential properties) available for occupancy in the market. If there is an oversupply of houses, the prices may go down to enable the sale of houses. One of the most cited facts about the housing market during the 2008 financial crisis is that there was a

substantial supply of houses. It has been widely conjectured that the oversupply of houses is likely to be a factor continuing to depress house prices (Conefrey & Whelan , 2013).

1.3 Purpose of the study

The main goal of this research is to determine if house prices and mortgage financing are linked, covering the period between June 2000 and December 2015. Furthermore, the study determines if the FLISP has played a role in enabling access to mortgage financing for household with less income. The government introduced FLISP to enable South Africans better access to the housing market. But how effective has this been in enabling access to housing?

This study begins in June 2002, eight years after apartheid legally ended in South Africa, until December 2015 because of data constraints. During this period, a lot happened in South Africa and within the housing market. In 2002, eight policies which are applicable to housing [1] had already been implemented by the Government since 1994 (Tissington, 2010).

With apartheid having ended in 1994, there were still housing problems that resulted from the apartheid regime. To reduce housing problems, RDP was established by the government in 1994, which included providing housing to citizens. However, this was mainly low-cost housing provided to underprivileged South Africans.

Middle class South Africans are required to buy their houses and mostly through mortgage financing. The increase in financially secure black middle class had a significant influence on the demand for housing and this contributed to the housing boom that occurred between 2000

"[1] 1) White Paper: A new housing policy and strategy for South Africa (1994), 2) Development Facilitation Act 67 of 1995, 3) Constitution of the Republic of South Africa of 1996, 4) Housing Act 107 of 1997, 5) Prevention of illegal eviction from and illegal occupation of land act19 of 1998, 6) Housing Consumers Protection Act 1995 of 1998, 7) Rental Housing Act 50 of 1999, 8) Home loan and mortgage disclosure Act of 2000".

and 2006 (Guzman, 2018). Data from Absa bank suggest that house prices peaked in 2004 having increased by 35.7%.

Citizens who saved their cash abroad during the Apartheid period could bring it back to South Africa by September 2004 of which most was invested in property (Guzman, 2018). Like any other market, the housing market also experienced challenges in this period.

The housing market crashed because of the global financial crisis in the same period. But in 2010, the house prices had an increase until 2015. Between 2002 and 2015, the housing market saw a fluctuation in prices. This study attempts to identify and analyse factors that may have contributed to these fluctuations and how the mortgage market was impacted. There is a lot of economic activities and changes that took place between the period of this study, which will allow for a better understanding of the housing prices and mortgage financing to be gained.

Monthly house prices and mortgage advances data from June 2000 to December 2015 was used to perform the study. Cointegration and VEC models are used to assess the correlation between the two variables in the long term. Because housing is more affordable when payments are spread over time, adequate housing financing must be of a longer term nature (Osterling, Housing markets and mortgage finance, 2017).

Furthermore, a survey to analyse how aware South Africans are of the subsidy available (FLSIP) to them when purchasing houses was conducted to assess how accessible is it to the residents, if residents are aware of it and how successful it has been in assisting South African have access to housing.

1.3.1 Research Objectives:

1. To ascertain the relationship between housing prices and mortgage demand and supply in South Africa.

2. To determine whether FLISP could assist the growing gap market by enabling access to mortgage finance, thereby increasing accessibility to housing.

1.3.2 Research questions

1. Could there be a relationship between property prices and bank financing?
2. Are South Africans aware of the government subsidy (FLISP) and how accessible is it?
3. Does FLISP play a role in increasing access to mortgage financing?

1.4 Problem Statement

While financing plays a huge role in a housing system that works well, to date there has not been an in-depth analysis of mortgage finance across countries (Osterling, 2017). Housing availability is determined by different factors such as demand and supply, while the availability of financing is dependent of the income the household earns. The gap market in South Africa is expanding as more people are unable to qualify for the subsidy or a mortgage bond (Commission, 2013).

The country is estimated to have housing shortages of over 2 million (Commission, 2013).. Housing and housing subsidies are in high demand due to population increase and migration to cities (Commission F. a., 2013). At the same time, the demand for mortgages has been on a decline with many households not qualifying. Mortgage market accounts for 36.5% of loans granted by financial institutions, so if they are negatively impacted, then the economy also suffers.

The FLISP was introduced to subsidise households that do not qualify for mortgage financing. However, how many South Africans are aware of this subsidy programme? How accessible is it to households? Has the Government made adequate means to ensure that the private sector participates to curb the growing gap market?

According to the department of human settlements, 13.6% of South Africans were living in the RDP houses built by the government (Government, 2019). The remaining South Africans must buy their houses depending on affordability and preference. According to world values survey, using a base of 3531 households, 56.8% of the South Africans were working class. How many South Africans qualify for houses in the private sector?

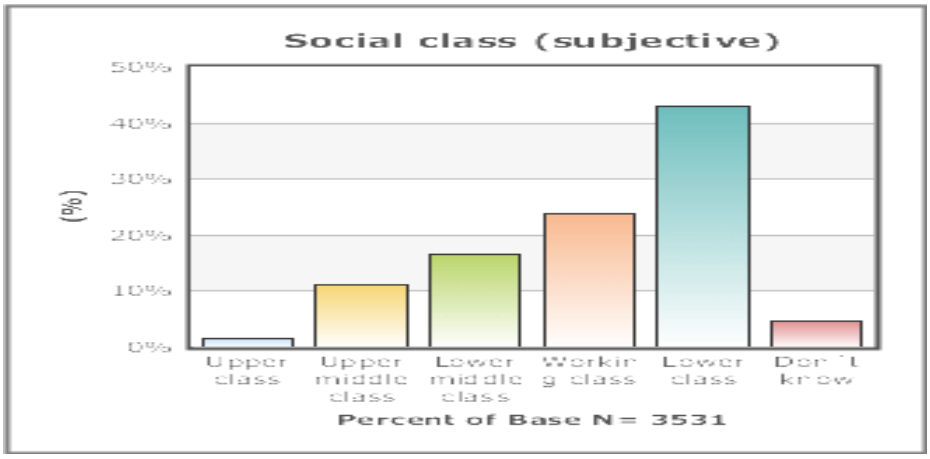


Figure 4: Classification of South African households (source: Department of housing)

For those who are not eligible for RDP houses, the Department of Housing introduced gap housing to address the shortage in the market between state-supplied housing and private sector-supplied housing (Government, 2019). Gap housing market includes South Africans earning between R3501 and R22000, which is disqualifies individuals for state assistance and excludes them from participating in the private sector (Government, 2019). It is worth asking whether FLISP has played a role in assisting the government with curbing the increasing gap market by enabling people who fall within the gap market access to mortgage financing.

1.5 Significance of study

To understand the housing market, it is important to understand how financing affects homeowner's decision. This study would lead to an understanding of whether mortgage

financing has had any impact in the increase in house prices (relationship thereof) and possibly establish the direction of causality.

Furthermore, determining how aware South Africans are of FLISP could assist in establishing other means whereby more awareness could be raised to educate people about the subsidy and possibly increase chances of accessing mortgage financing.

The survey conducted provides an indication of how much the subsidy has been utilised. It also provides recommendations of how the subsidy could reach more audience. Can the FLSIP encourage private institutions to provide mortgage financing thereby boosting the mortgage market?

1.6 Outline of the study

This paper is presented as follows:

i. First the paper provides an introduction and background of the property market in South Africa, and the Finance Linked Individual Subsidy Programme (FLISP).
ii. Secondly, a literature review and a summary of key findings is provided. This includes the review of publications, particularly peer reviewed journal articles, thesis and reflecting the work that has been conducted on how house prices and mortgage financing are linked, internationally.
iii. Thirdly, the research technique used in the examination of data and material for the study is described in the report.
iv. Finally, conclusions are drawn from the empirical results obtained.

Chapter 2 Literature Review

2.1 Background

Firstly, I look at the existing academic literature on housing prices and mortgage Finance (demand and supply). Secondly, the literature review discusses the empirical evidence on the studies carried out in other countries in the past and lastly, summarises and identifies any gaps that were identified from the review .

2.2 Theoretical Literature

It is essential to understand the status of South African housing needs and highlight some of the important projects that the South African government undertook to promote access to proper housing. In the governments' attempt to reduce the housing shortages in the country, the government introduced RDPs for households earning less and the FLISP for the gap market as part of their National Development Programme (NDP) developed in 1994.

2.2.1 The Reconstruction development Programme (RDP) housing in South Africa

Housing policies and programmes were put in place by the government to fulfil its constitutional duty and address the housing problems faced by South Africans. The National Housing Policy and the Housing Subsidy Programmes were drafted by the Department of Human Settlements. The project's goal was to give accommodation to South Africans with monthly income of less than R3500. The government has given almost three million dwellings to disadvantaged South Africans and low-income households who fit the project's standards since its inception in (Commission, 2013). However, the RDP project alone will not suffice to meet the country's housing demands.

According to The Financial and Fiscal Commission (2013) sixty percent of South Africans are potentially eligible for fully subsidised houses due to lack of jobs in South Africa. As a result, people are becoming more reliant on the government for housing (Commission, 2013). The subsidy eligibility depends on many criteria, such as marital status, income and citizenship, with the most important being South African citizenship as only South Africans qualify (McDonald, 1998).

Since the RDP project benefits South Africans earning less than R3500, those earning between R3501 and R22 000 were experiencing challenges when trying to purchase property through financial institutions, especially those in the R3501- R15 000 financial bracket. Individuals in the gap market with a total household earnings greater than R15 000 have a better chance of receiving mortgage than those earning below R15 000 (Commission, 2013). In 2005, the government introduced the FLISP for people who fall in the gap market. FLISP is a housing subsidy for first-time home purchasers to help them manage the loan and afford the loan.

The subsidy is paid to the applicants' bank or financial institution, and it lowers the monthly loan repayments, making home ownership more affordable (Government, 2019). The housing industry functions in a regulated environment that is enabled by government initiatives and this is implemented at various government levels and private organisations (Commission, 2013).

Housing in South Africa has improved since 1996 because of legislation, increasing income levels and government actions (Commission, 2013). The Financial and Fiscal Commission classified households into three categories 1) those who are unable to afford housing 2) those who can contribute and 3) those who can fund their dwelling requirements.

Household savings, government and private financing are all used to fund housing(Commission, 2013). South Africa has a thriving formal mortgage loan sector, which is dominated by banks and serves mostly the upper and middle-income housing market.

Banks are either unwilling to finance affordable housing or there are insufficient houses in the market (Commission, 2013). Most households fund their housing needs using mortgage loans from the banks. When do people approach banks for mortgage loans? Does the number of mortgage loan applications banks receive depend on house prices?

2.2.2 Theoretical links between house prices and mortgage demand and supply

In their paper, Basten and Koch (2015) discussed the relationship between house prices and mortgage financing in Switzerland. They displayed yearly growth rates for residential rent, apartment unit prices and standalone property prices and mortgage quantities for the years 1971 to 2013. Basten and Koch (2015) indicated that mortgage volumes fell behind house prices. Reduced mortgage industry requirements have corresponded with a considerable surge in real property prices in Organisations for Economic Co-Operation and Development (OECD) countries (Andrews, 2010).

Basten and Koch (2015) hypothesised that there is a positive causal impact through property prices to the mortgage market through the demand in mortgage, whereby when house prices increase at a rapid rate than the housing wealth, consumers require more mortgage because they cannot cover the increasing costs with their savings. Greater demand for mortgages leads to higher equilibrium mortgage levels (Basten & Koch, 2015).

Moreover, Basten and Koch (2015) mentioned that property prices may have a positive impact on mortgage supply, in that financial institutions may be willing to borrow consumers more if they believe higher house prices are sustainable with higher collaterally value. Finally, according to Basten and Koch (2015), the third probable link between house prices and mortgage volumes is that financial institutions provide mortgage loans, allowing more people to penetrate the housing market and, as a result, driving up house prices.

It is important to mention that both house prices and mortgage volumes are affected by other factors such as interest rates. The demand for mortgage financing may increase when the interest rates are low. In recent years, changes in laws in OECD countries that permitted financial flexibility and mortgage innovations have been linked to an increase in effective demand for property and, as a result, actual property prices (Andrews, 2010). The responsiveness of new home supply to price fluctuations is a key aspect in how well housing markets work (Andrews, 2010).

Differences in supply dynamics are significant because they impact the amount to which rising housing leads to higher prices in higher prices (Andrews, 2010). It has been inferred that the oversupply of houses is likely to be a factor continuing to depress house prices (Conefrey & Whelan , 2013). Increases in housing demand are far more likely to be reflected in house prices in restricted supply conditions than they are to be reflected in increased housing supply (Andrews, 2010).

2.3 Empirical literature

In this section, a review of studies conducted on mortgage finance and house prices on an international level is presented. There has been little work done on the housing market in African countries and very few on an international level. The studies were conducted in United States of America, Canada, and Switzerland. The first study was carried out by Albert Saiz in the USA. In the next discussion, the factors influencing the housing demand and supply are briefly explained.

2.3.1 Factors that influence housing demand and supply

In his study, Golding (2015) stated that the number of households in the population that require housing is the primary driver of housing demand. He further stated that the house prices would be determined by the number of properties available in the market (Golding, 2015). In their

paper Conefrey and Whelan (2013) stated that housing inventory comprises of existing houses for sale, newly built homes, and even vacant land. The abundance supply of any form of housing would result in a decrease in the prices of houses.

Other factors such as employment, income levels and mortgage interests influence housing demand and supply (Larkin, et al., 2019). For example, low mortgage interests may stimulate the selling of houses, reducing the supply thereby ultimately increasing the prices (Conefrey & Whelan , 2013). Many factors such as low interest rates, deregulation in the mortgage markets and rising income played a role in the housing booms (Gonzalez & Ortega, 2009). Real house prices increase together with real household incomes while structural unemployment and real interest rate declines are linked to greater real house prices (Andrews, 2010).

In this paper, the focus is not on factors that influence housing demand or supply but to establish if there is any relationship between the house prices and mortgage financing. South African housing market does not operate in isolation; therefore it is important to highlight some of the crisis that occurred and affected the housing market. The global financial crisis caused the property market in South Africa to fall in 2008.

2.3.2 The impact of the 2008 Financial crisis on the Housing market

In 2008, the United States experienced a financial crisis which affected global housing markets. The housing market and the United States' economy both weakened in 2008, resulting in a drastic decline in house prices (Conefrey & Whelan , 2013). The consensus was that the recession was linked to a housing bubble (Conefrey & Whelan , 2013). A bubble refers to the increase in price of asset beyond the level required by economic fundamental (Lansing, 2007). Economists believe that movements in the housing markets are not just consequences of movements in the economy but provide important impulses to business cycles (Sonali, Gupta, & Kanda, 2011).

2.3.3 Housing prices, Bank lending and Monetary Policy

According to De Greef and de Haas (2000), the Dutch housing market grew at a rapid rate and mortgage lending doubled during the same period. Strong economic growth and low interest rates were the driving forces behind the simultaneous rises in property prices and mortgage lending, as they increase households' borrowing power dramatically.

To investigate the impact of mortgage lending on house prices as well as the opposite relationship, housing prices and mortgage lending were modelled. In the long run, house values are predicted to be closely linked to factors such as income and interest rates. However, due to backward-looking expectations and inelastic housing supply, short-run variations from this long-run equilibrium may arise (de Greef & de Haas, 2000). Since it integrates information regarding short-term dynamics (formulated in initial variations), with the adjustment process towards the long-run connection, an Error connection model framework appears to be a well-suited instrument to model this. The Engle-Granger approach was used to determine their model in two steps by first estimating the cointegrating regression, a long-term equation that relates the level of house prices to various variables such as income and interest rates (de Greef & de Haas, 2000).

After the Engle-Granger approach was used, a short-term equation in terms of initial differences was calculated, which included an error correction term made up of lagged residuals of the estimated long-term equation's lagged residuals (de Greef & De Haas, 2000)

De Greef et al. (2000) concluded the following from their study:

- Mortgage market is affected by asymmetric information issues.
- House prices may be influenced by available credit.
- House prices are influenced in the long run by factors such as income, interest rates and housing available.

- Mortgage lending is determined by house prices and disposable income.

2.3.4 Bank Lending and property prices in Hong Kong

There is causation in two directions between borrowings from the bank and house values in theory (Gerlach & Peng, 2005). Changes in property values have an impact on household borrowing capacity and credit demand. Property prices have an impact on a bank's capital position and, as a result, lending ability. Property values increased by 20% while bank lending growth fluctuated in real terms. According to the econometric research, changes in bank loans were influenced by factors on the demand side, such as output and housing prices (Gerlach & Peng, 2005).

The paper by Gerlach and Peng (2005) analysed only residential property prices and bank credit for Hong Kong using data on total lending. They determined the order in which the different time series were integrated and used Dickey-Fuller unit root test statistic. According to a multivariate analysis of the long-term relationship between lending, GDP, and property prices, the three variables are integrated of order one. Gerlach and Peng (2005) concluded that the strong association between credit development and bank lending is due to bank lending adapting to house values, rather than the other way round.

2.3.5 The causal effect of house prices on mortgage demand and supply: evidence from Switzerland

The impact of house prices on mortgage financing was investigated by Basten and Koch (2016) and they used immigration as an exogenous factor that plays a role on the house price booms. In identifying the relationship between house prices and mortgage demand and supply, two techniques were used to obtain the changes in property prices that is external to the mortgage market (Basten & Koch, 2015). They looked at house prices with immigration and then, they controlled for precise applicant and object characteristics using year-by-month and canton

effects. They looked at data on individual requests and offers to see how demand and supply were affected. This allows for the influence of mortgage demand to be separated from the effect on mortgage supply. Year-to-month and canton fixed effects affect the mortgage supply, whereas request specific supply has little effect on mortgage demand.

The study concluded that:

- There is substantial evidence that increasing property prices have resulted in increased demand for mortgages.
- Over time, the positive and negative marginal influence of property prices on mortgage demand and supply, respectively, has increased.

2.4 Summary and gap identification

The review of studies performed in Netherlands, Hong Kong and Switzerland indicates:

- That there are possible links between property prices and mortgage financing.
- Mortgage financing is dependent on house prices and disposable income.
- The error correction model suggest that bank lending appears to impact property values, but property prices do not appear to influence bank lending.

Most of the studies that have been conducted in other continents (Asia, Europe). However, no study has been conducted in Africa thus the studies reviewed were not from Africa.

There has never been a study conducted in South Africa to determine the relationship between house prices and mortgage financing. The previous studies carried out in South Africa focused on low-cost housing (RDP) houses provided by the government to South African. Furthermore, the government introduced a FLSIP to subsidise households to qualify for mortgage finance and no study has been carried out to determine if the subsidy has had an impact on the housing market and banks extending financing to households.

Chapter 3 Methodology

3.1 Introduction

The methods used is presented in this section and the process followed in conducting this research. The amount of credit taken out by households is determined by house prices, income and mortgage rates (de Greef & De Haas, 2000). Only residential property prices were considered for house prices, while financing related to residential properties will be considered for mortgage financing.

Cointegration and vector error correction models are utilised to assess the relationship between house price and mortgage finance in the long run. Furthermore, to establish the impact Finance Linked Individual Subsidy Programme (FLSIP) has had on mortgage financing, a survey was conducted to determine if FLSIP has had any impact on the number of mortgage loans extended to households.

3.2 Research Design

For this study, two approaches were followed. Firstly, secondary data of house prices and mortgage financing were collected. The data were collected from the sources detailed in Section 3.3, analysed using cointegration methods to inform inferences and conclusions. The main source of data was Statistics South Africa, Easy Data by Quantec and the South African major banks (i.e., FNB and Standard Bank).

Lastly, to establish whether FLSIP has an impact in the housing market, a survey was conducted to determine how many people are aware of the FLSIP. A qualitative approach was followed as no previous studies around FLSIP were conducted and obtaining secondary information would be impossible. From this survey, quality data from a limited number of people was obtained. According to statistics South Africa, there are 59 622 350 people living

in South Africa (Statistics South Africa, 2020). Of the 59 622 350, only 9 640 464 are employed.

The level of precision, confidence or risk and the degree of variability in the qualities being measured must be described in order to establish the proper sample size (Miaoulis & Michener, 1976). In this study, it is assumed that a p=5%, 95% level of confidence and precision of $\pm$5%. (Cochran, 1963) formulated the equation below for large populations to yield sample size:

$$n_0 = \frac{z^2pq}{e^2}$$

Where n_0 *is the sample size,* Z^2 is given by 1-α which represents the desired confidence level, e represents precision level, while p gives the estimated proportion of an attribute that is present in population and q=1-q $n_0 = \frac{z^2pq}{e^2} = \frac{(1.96)^2\,(0.5)(0.5)}{(0.05)^2}$ = 385 people.

Convenience sampling which occurs when participants of the are available with regards accessibility, place and willingness (Lopez & Whitehead, 2012) was used in this study.

3.3 Population, sample, and data collection

The research population for this study comprised of house price index data, mortgage finance granted data and survey responses for FLSIP information. Annual house price index data and annual mortgage number granted were analysed for the purposes of the study. Data and information from the study was from Statistics SA and SARB. Data from the house price indexes from FNB and Standard Bank, OECD Data, Easy data by Quantec, Absa Homeowner Sentiment Index (HSI), CEIC were also used to perform an analysis.

Due to data availability, analysis of data from June 2000 to December 2015 was covered. During the period of this study, the housing market experienced a boom and recession. The government introduced the FLISP in 1997 to assist South African with mortgage repayments.

Furthermore, citizens who saved their money abroad before 1994 could bring it back to South Africa by September 2004 of which most was invested in property (Guzman M. D., 2013).

For this study, it was observed as to how much higher price influences mortgage amount, if any. On the demand side, new mortgage offers made within the period under review were looked at. For supply, t what banks offer/approved was considered. Part of the study is to exploit exogenous factors to mortgage market that may affect the mortgage financing and in housing prices by using FLSIP.

3.4 Data analysis

The cointegrated VAR method combines differences in variables with cointegration between them, allowing the user to investigate both long-and short-run impacts in the same model, and this model is given:

$$X_t = B_1 x_{t-1} + \cdots + B_k x_{t-k} + \mu + \delta\tau_t + \varepsilon_t$$

whereby X is the vector of endogenous variables comprising the log of real mortgage finance or housing prices and μ is the vector of constants, while τ and ε represent deterministic time trend and vector of noise error terms, respectively.

The VAR model is rewritten in a vector error correction form:

$$\Delta X_t = C_1 \Delta X_{t-1} + \cdots + C_{k-1} \Delta X_{t-k+1} + C_0 X_{t-1} + \mu + \varepsilon_t$$

whereby C_0 represents the number of long-run correlations between the system's endogenous variables.

To gather data on the FLSIP, a survey was conducted, and results analysed using various methods such as excel, for analysing survey questionnaires and Strata to establish if FLSIP has played any role on accessibility to mortgage financing.

3.5 Finance Linked Individual Subsidy Programme survey

The FLISP survey, as shown on Appendix 6, has a total of 3 sections with a total of 13 questions. The survey comprises of close ended questions that aims to understand the background of participants and the awareness each participant has of FLISP.

The survey is designed not to take more than 10 minutes on an online survey platform known as Google Forms[2].It consequently ran for a duration of 30 days to enable the minimum number of participants enough time to participate.

[2] "(https://docs.google.com/forms/d/e/1FAIpQLSc632i6SBaWVmTDhjrGXEkgMvKzmyoRI4LC1gxAfk0CxARH7A/viewform?usp=sf_link)".

Chapter 4 Data Analysis

4.1 Introduction

The results of the study, which are divided into 2, sections are described in this section. Each section of the chapter focuses on an objective and aims to respond to corresponding research questions. There are two objectives: 1) to ascertain the relationship between housing prices and mortgage demand and supply in South Africa and 2) to determine whether FLISP could assist the growing gap market by enabling access to mortgage finance thereby increasing accessibility to housing.

The data obtained were analysed to identify any trends and existence of any relationships and were used to respond to research objectives and questions. The three (3) questions this study attempts to address are: 1) If house prices and mortgage financing have any relations in South Africa 2) If South Africans are aware of FLISP and how accessible it is; and 3) if FLISP plays any role in enabling access to mortgage financing. Section 4.2 addresses objective one and responds to research question one related to housing prices and mortgage financing while section 4.3 addresses objective number two and research question two and three , both related to the FLISP.

4.2 The relationship between housing prices and mortgage demand and supply in South Africa

4.2.1 Introduction

While mortgage finance plays a crucial role in a well-functioning housing market, no comprehensive examination of the depth of mortgage finance across a wide range of nations has been conducted so far (Osterling, 2017). Most studies focus on either mortgage financing

or house prices individually. The first step in achieving this objective is to obtain data that will be used to perform the analysis.

4.2.2 House prices and mortgage financing data

Monthly house prices and mortgage financing data from FNB and Standard Bank covering the period between June 2000 to December 2015 were used because of data availability. The data was collected from the Easy data by Quantec database. The variables used are house price index data and mortgage financing granted within the period of review.

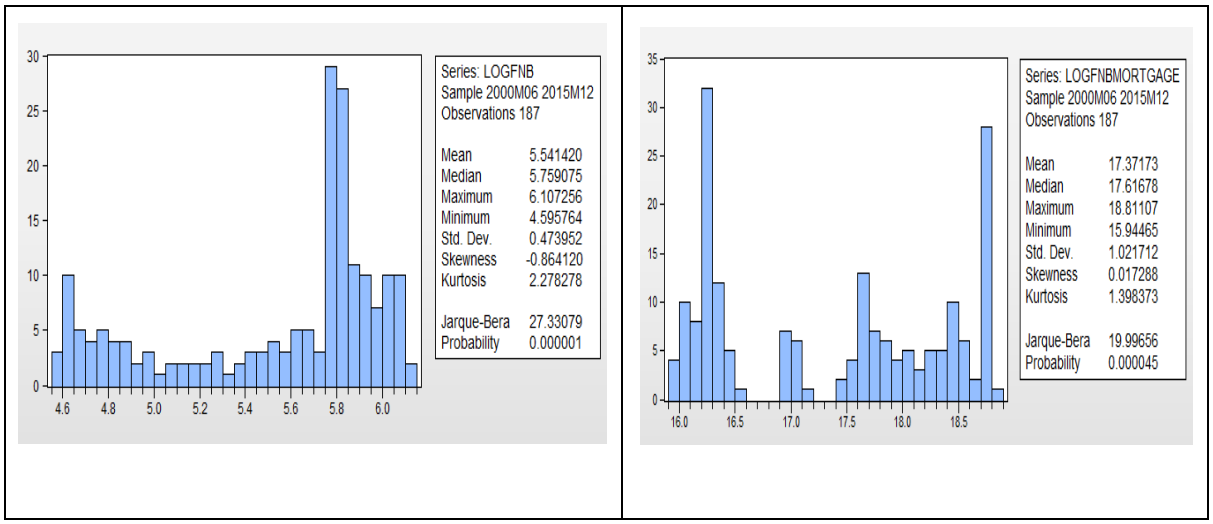


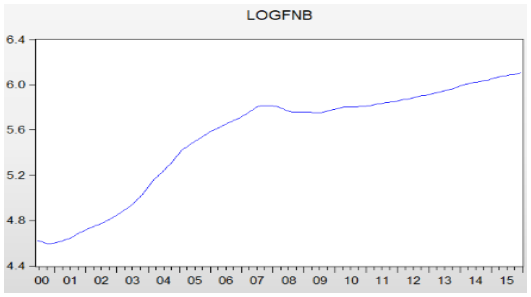
Figure 5: Summary of statistics for house prices and mortgage financing data

The mean house price and mortgage financing is around 5.54% and 17.37%, respectively, while the median is a bit higher at 5.76% and 17.62%. The highest monthly house price increase was 6.11% with the biggest decline at 4.60%, while mortgage financing had 18.82% and 15.94% as the highest monthly increase and lowest monthly, respectively.

The standard deviations for the house prices and mortgage financing are 0.47% and 1.02%, respectively, which reflect the consistency of house prices over time. Because the housing price series has a negative skew, the lower tail is slightly longer than the upper tail. The series has thicker tails than a normal distribution with the same mean and variance because the kurtosis

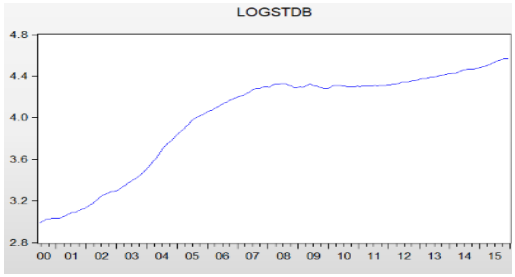
is 2.28. The presence of skewness and kurtosis forces the reporting of robust errors of estimations.

4.2.3 Preliminary Analysis of data



Time (months)

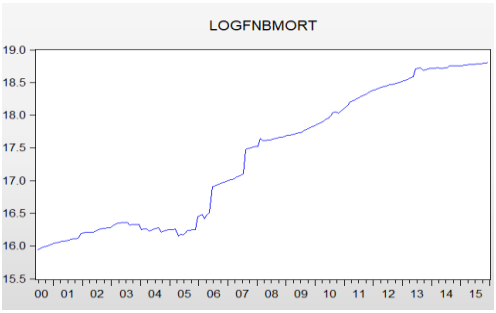
Log of FNB house prices



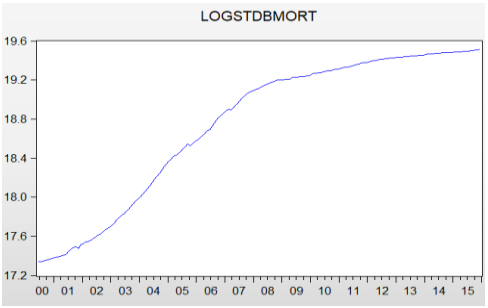
Time (months)

Log of STDbank house prices

Figure 6: FNB and Standard Bank house prices from June 2000 to December 2015



log of FNB mortgage loans



log of STDbank mortgage loan

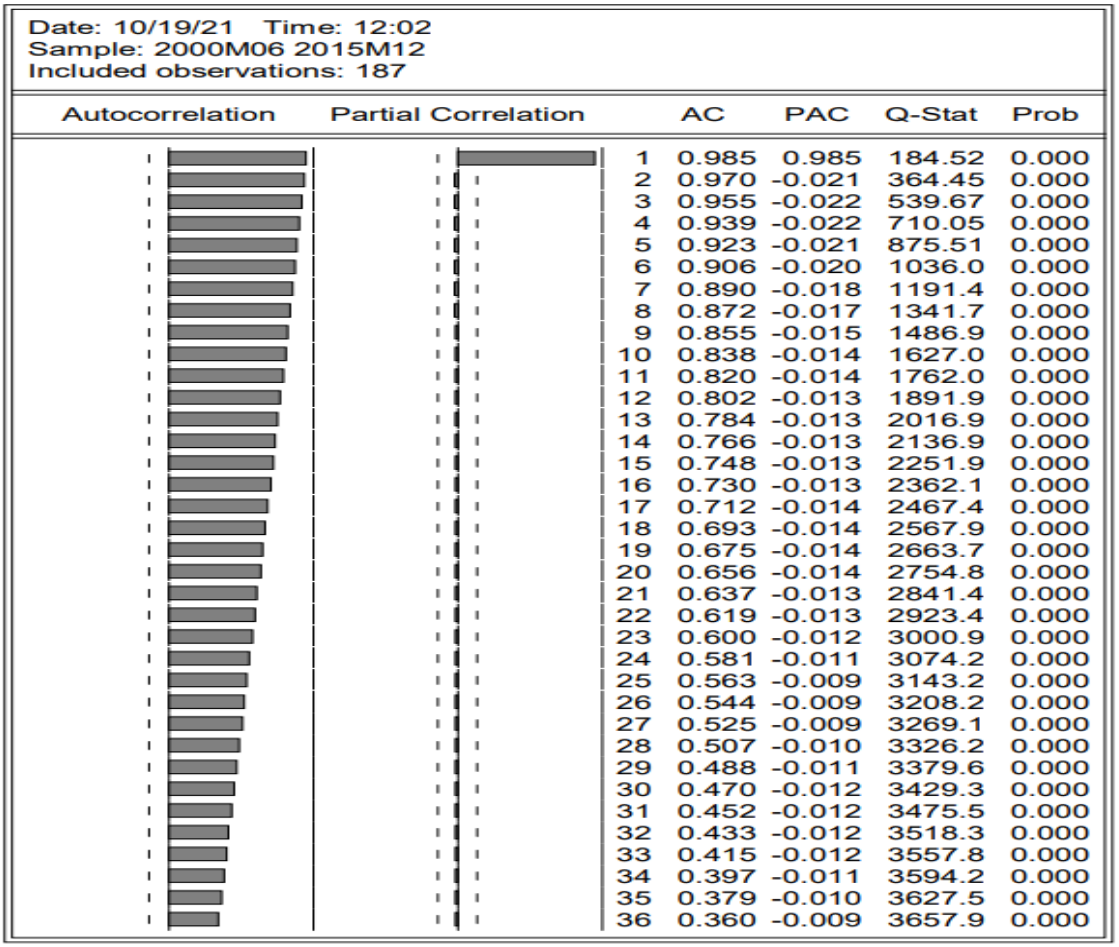
Figure 7: FNB and Standard bank mortgage advances from June 2000 to December 2015

The time series for both figures 6 and 7 above were logged to decrease the variability of data (skewness) and make data conform to normal distribution. Figure 6 shows house prices in the period 2000:6 to 2015:12. The graphs indicates that house prices were on the rise between 2000 to 2007, which may have been because of emergence of black middle class who increased the demand for housing. The Financial Sector Charter introduced in 2013 also boosted the mortgage market whereby financial institution pledged to provide financial assistance to the value of R42 billion to low-income earners (Delmendo, 2021).

From the year 2008, there was a decline in house prices which may have resulted from the global financial crisis that the world was facing. In addition, the National Credit Act (NCA) was introduced mid 2007, which aimed at regulating the amount of money that may be borrowed to an individual as a way of protecting people from over-indebtedness. The increase in house prices may have also been affected by the decrease in interest rates (Gimeno & Martnez-Carrascal, 2006). The NCA also affected the mortgage market through reducing mortgage financing extended to people. Mortgage financing experiences an increase from 2000 to 2008 and starts flattening through to 2015.

Correlogram of FNB_PRICES

Date: 10/19/21 Time: 12:02
Sample: 2000M06 2015M12
Included observations: 187

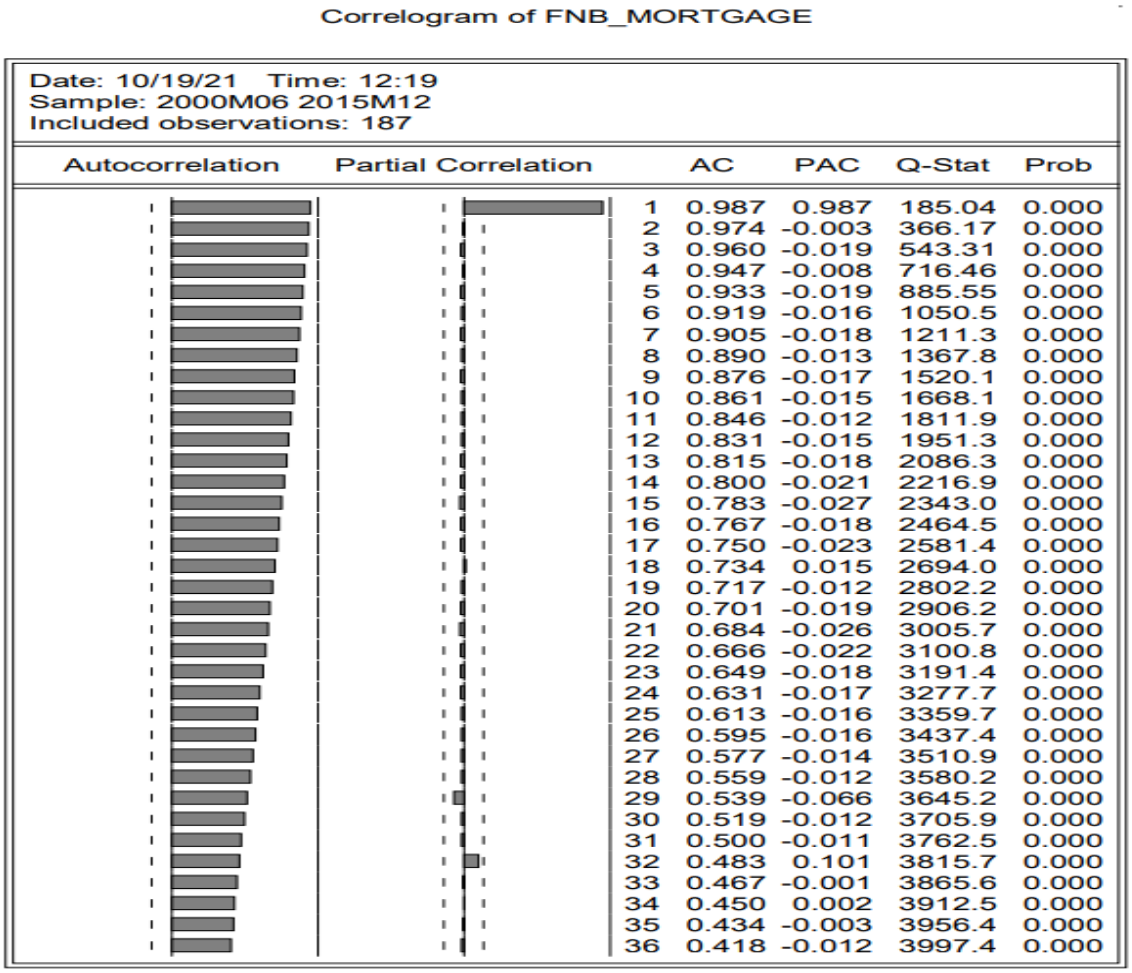


Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.985	0.985	184.52	0.000
		2	0.970	-0.021	364.45	0.000
		3	0.955	-0.022	539.67	0.000
		4	0.939	-0.022	710.05	0.000
		5	0.923	-0.021	875.51	0.000
		6	0.906	-0.020	1036.0	0.000
		7	0.890	-0.018	1191.4	0.000
		8	0.872	-0.017	1341.7	0.000
		9	0.855	-0.015	1486.9	0.000
		10	0.838	-0.014	1627.0	0.000
		11	0.820	-0.014	1762.0	0.000
		12	0.802	-0.013	1891.9	0.000
		13	0.784	-0.013	2016.9	0.000
		14	0.766	-0.013	2136.9	0.000
		15	0.748	-0.013	2251.9	0.000
		16	0.730	-0.013	2362.1	0.000
		17	0.712	-0.014	2467.4	0.000
		18	0.693	-0.014	2567.9	0.000
		19	0.675	-0.014	2663.7	0.000
		20	0.656	-0.014	2754.8	0.000
		21	0.637	-0.013	2841.4	0.000
		22	0.619	-0.013	2923.4	0.000
		23	0.600	-0.012	3000.9	0.000
		24	0.581	-0.011	3074.2	0.000
		25	0.563	-0.009	3143.2	0.000
		26	0.544	-0.009	3208.2	0.000
		27	0.525	-0.009	3269.1	0.000
		28	0.507	-0.010	3326.2	0.000
		29	0.488	-0.011	3379.6	0.000
		30	0.470	-0.012	3429.3	0.000
		31	0.452	-0.012	3475.5	0.000
		32	0.433	-0.012	3518.3	0.000
		33	0.415	-0.012	3557.8	0.000
		34	0.397	-0.011	3594.2	0.000
		35	0.379	-0.010	3627.5	0.000
		36	0.360	-0.009	3657.9	0.000

Whether or not a series is stationary is important for statistical inference and unit root tests are used to identify possible non-stationarity. The influence of linear trend can be important in unit

root testing (Skrobotov, 2014). Non-stationary series tends to be volatile and in order to build models, consistency is required whereby the process does not change over time. For the time series to be considered stationary, figures 6 and 7 should not exhibit a discernable trend. There is a trend in house prices and mortgage advances over time which indicates that the series is non-stationary.

Figure 8 illustrates the sample ACF of FNB house prices and mortgage loans time series in raw form. The AC shows that there are high positive autocorrelations which decay gradually as the lag length increases which indicates non-stationary. The real estate market reacts to changes in the overall economy, which can be influenced by the amount of funding available.



	AC	PAC	Q-Stat	Prob
1	0.987	0.987	185.04	0.000
2	0.974	-0.003	366.17	0.000
3	0.960	-0.019	543.31	0.000
4	0.947	-0.008	716.46	0.000
5	0.933	-0.019	885.55	0.000
6	0.919	-0.016	1050.5	0.000
7	0.905	-0.018	1211.3	0.000
8	0.890	-0.013	1367.8	0.000
9	0.876	-0.017	1520.1	0.000
10	0.861	-0.015	1668.1	0.000
11	0.846	-0.012	1811.9	0.000
12	0.831	-0.015	1951.3	0.000
13	0.815	-0.018	2086.3	0.000
14	0.800	-0.021	2216.9	0.000
15	0.783	-0.027	2343.0	0.000
16	0.767	-0.018	2464.5	0.000
17	0.750	-0.023	2581.4	0.000
18	0.734	0.015	2694.0	0.000
19	0.717	-0.012	2802.2	0.000
20	0.701	-0.019	2906.2	0.000
21	0.684	-0.026	3005.7	0.000
22	0.666	-0.022	3100.8	0.000
23	0.649	-0.018	3191.4	0.000
24	0.631	-0.017	3277.7	0.000
25	0.613	-0.016	3359.7	0.000
26	0.595	-0.016	3437.4	0.000
27	0.577	-0.014	3510.9	0.000
28	0.559	-0.012	3580.2	0.000
29	0.539	-0.066	3645.2	0.000
30	0.519	-0.012	3705.9	0.000
31	0.500	-0.011	3762.5	0.000
32	0.483	0.101	3815.7	0.000
33	0.467	-0.001	3865.6	0.000
34	0.450	0.002	3912.5	0.000
35	0.434	-0.003	3956.4	0.000
36	0.418	-0.012	3997.4	0.000

Figure 8: ACF of FNB bank house prices and mortgage advances time series

Shocks in the unit root remain in the system indefinitely; however, the ACF unit root decays gradually. The sample ACF for standard bank behaves as shown in appendix 2 and can also be concluded as being non-stationary. Using non-stationary data may result in spurious regressions (Brooks, 2014).

Table 1: ADF and PP t-test for FNB bank house price and mortgage advances

		ADF		PP	
Variable		t_α	Prob*	t_α	Prob*
House Price	At level	-1.023449	0.7446	-0.575065	0.8719
	1st difference	-2.675674	0.0803	-2.530103	0.1100
	2nddifference	-4.533205	0.0002	-4.881430	0.0001
Mortgage Advance	At level	2.571458	1.000	2.349889	1.000
	1st difference	-12.12559	0.0000	-4.881430	0.0001

	Critical Values		
Test	1%	5%	10%
ADF	-3.466786	-2.877453	-2.575332
PP	-3.465585	-2.876927	-2.575051

The term stationary series refers to a series with a constant mean, variance, and autocovariances (Brooks, 2014). To test for stationarity, the logarithmic form is used to express all variables. To ensure robustness and avoid the criticisms of any individual testing techniques, the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) Unit root test were used in this paper. The Schwarz Info Criterion (SIC) was used to determine appropriate lag length for ADF and Bartlet Kernel for PP. The unit root test' findings are listed in table 1 above.

The Augmented Dicker Fuller (1979) and the Philips Perron (1988) unit root tests were used in this study. The null hypothesis is that house prices and mortgage advances have a unit root. If the null of the root is accepted, this means that shocks house prices and mortgage advances will be permanent and if the null is rejected, this suggests that the shocks will be temporary and that, over the long term they will cointegrate.

At level form, the Prob value is greater than 0.05 for both ADF and PP root tests. Thus, the null hypothesis was not rejected and it can be concluded that the variables are non-stationary. Using the ADF test, the house prices and mortgage advances are stationary at 10%, however, they are non-stationary per PP test.

The FNB price is stationary at 10% with first differencing, I (1). The mortgage advances are also stationary at first differencing. The null hypothesis can therefore be rejected. The results in Appendix 3 for Standard Bank house price index indicate non-stationarity at level. Table 1 indicates that the variables are integrated on order 1 for house prices and mortgage advances during the sample period, according to ADF unit root tests presented in Appendix section.

4.2.4 Empirical results

The relationship between house prices and mortgage finance is analysed based on the cointegrating VAR model:

$$\Delta X_t = C_1 \Delta X_{t-1} + \cdots + C_{k-1} \Delta X_{t-k+1} + C_0 X_{t-1} + \mu + \varepsilon_t$$

We estimate the econometric model comprising of log of mortgage advances and log of house prices. The sample period for the analysis is monthly, starting from 2000:06 to 2015:12, due to availability of data. Since quarterly data was used, VAR (5) model is assumed to be overfitting the data and start the sequential testing method with this specification. Furthermore, three centred variables are allowed in addition to an unlimited time series.

Mortgage advances is the independent variable, and house prices is the dependent variable, in order to analyse the long-run link between house prices and mortgage finance using cointegration and vector error correction models. Lending as a factor of real GDP and real interest rates was approximated in the long run. Johansen's multivariate technique to cointegration testing is used to examine the long-run link between the two variables. (Gerlach & Peng, 2005). These JTs are derived from the eigenvalues of the data, and they represent linear combinations of the data with the highest correlation. The following null and alternative hypothesis are tested

H_0: There is no cointegration

H_1: There is cointegration

Table 2: Johansen Cointegration Test for FNB house prices and mortgage advances

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**
None*	0.091587	22.59144	15.49471	0.0036
At most 1*	0.027682	5.109140	3.841466	0.0238
Unrestricted Cointegrating Rank Test (Maximum Eigenvalue)				

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob**
None*	0.091587	17.48230	14.26460	0.0150
At most 1*	0.027682	5.109140	3.841466	0.0238

	β	α
Real mortgage advances	-2.067562 1.410969	0.009221 -8.60E-0.5
Real house prices	5.073854 -0.309257	-0.005717 -3.51E-05

1 Cointegrating Equations	Log likelihood	1499.961

	LOGFNB
LOGFNBMO 1.0000	-2.45028 (0.30251)
Adjustment coefficients (standard error in parentheses)	

D(LOGFNBMo)	-0.019066 (0.00709)
D(LOGFNB)	0.000178 (5.4E-05)

Table 2 shows that the trace statistic (22.59144) is greater than critical value at 5% (15.49471) and the max eigenvalue statistic (17.48230) is greater than critical value (14.26460), therefore the null hypothesis of no cointegration and that of at most one cointegration vector can be rejected. The results of trace statistics and max eigenvalue indicate the existence of a cointegrating equation. This means that the matrix C_0 can be factorised as C_0 equals to $\alpha\beta^{'}$ where α is a two-by-two vector of cointegrating coefficients. In the long term, the cointegration coefficients, β, represent the link between the endogenous variables. These variables factors' dynamic adjustment to the long-run equilibrium represented by $\beta^{'}x$.

Table 3: The cointegrating equation table

Cointegrating equation	CointEq1	
LogFNBMORT (-1)	1.00000	
LogFNB (-1)	-0.303322 (0.44782) [-0.67728]	
c	-15.69650	
Error correction	D(LOGFNBM)	D(LOGFNB)
CointEq1	-0.006087 #	-0.000196
	(0.00473)	(5.5E-05)
	[-1.28614]	[-3.55859]
D(LOGFNBMORT)	-0.018052	-0.001035
	(0.07498)	(0.00087)
	[-0.24077]	[-1.18927]
D(LOGFNBMORT)	0.042574	-0.000662
	(0.07521)	(0.00087)
	[0.56607]	[-0.75788]
D(LOGFNB(-1))	-5.594601	1.819761
	(2.99564)	(0.03478)
	[-1.86758]	[52.3172]
D(LOGFNB(-2))	4.858563	-0.857224
	(2.99564)	(0.03478)
	[1.66610]	[-25.3167]
C	0.021277	0.000348

is the coefficient
The standards errors are shown in ( ) & the t-statistics in [ ]
The error correction model gives the speed of adjustments within which the model will restore its equilibrium following any disturbances. The coefficient of ECT with LogFNBMort as dependent variable is negative and statistically significant indicating that there is convergence from short dynamics towards long run equilibrium.

In the long run, house purchase loans are influenced by house prices (Gimeno & Martnez-Carrascal, 2006). The results in Table 2 confirms the rejection of the null hypothesis (there is no cointegration) in that F-value equals 22.59144 and is greater than the lower bound critical value). Mortgage financing and house prices have a positive relation, whereas Mortgage financing and interest rates have negative correlation. Interest and income are determinants of mortgage amount that households would qualify for.

Estimated error correction model:

$$ECT_t = Y_{t-1} + n_j X_{t-1}$$

$$ECT_t = 1.000 LogFNBMort_{t-1} - 0.303322_j LogFNB_{t-1} - 15.69650$$

$$\Delta y_t = \sigma + \sum_{i=1}^{k-1} y_i \Delta y_{t-i} + \sum_{j=1}^{k-1} n_j \Delta X_{t-j} + ECT_{t-1} + u_t$$

$LogFNBMort_t$ as the target variable:

$$\Delta LogFNBMort_t = -0.006087 ECT_{t-1} - 0.018052 \Delta LogFNBMort_{t-1} + 0.042574 \Delta LogFNBMort_{t-2} - 5.594601 \Delta LogFNB_{t-1} + 4.858563 \Delta LogFNB_{t-2} + 0.021277$$

The previous periods deviation from long-run equilibrium is corrected in the current period as an adjustment speed of 0.67%. A percentage change in house prices is associated with a 4.86% increase in mortgage financing on average ceteris paribus in the short run.

In their paper, (Pillay & Naude, 2006), argued that house prices and mortgage financing have a positive relationship with the household income. This means that the higher the income, the higher the house prices and mortgage financing households could qualify for. The relationship between the three variables (house prices, financing, and income) puts low-income earners at a disadvantage.

From the above results, it is evident that house prices and financing move together, if income has a positive relationship with the two variables, where does this leave low-income earners with regards to access to financing? Pillay and Naude (2006) indicated in their paper that 67%

of potential homeowners had been declined by financial institution due to indications of lack of affordability.

4.3 Finance Linked Individual Subsidy Programme (FLISP) survey

4.3.1 Introduction

One of the greatest development concerns facing South Africa is ensuring that the increasing population has access to affordable and suitable housing (Scheba & Turok, 2018). Financial institutions such as banks accommodate for middle and upper-income earners while leaving low-income earners on their own (Limba, 2018). To increase access to mortgage financing, the government introduced the FLISP in terms of Housing Act 1997 to provide relief to low-income earners. The housing act 107 of 1997 highlights the duties of all levels (National, Provincial, and local) of government with regards to access to housing.

For this study, a survey of 385 participants was conducted to understand if the subsidy programme introduced by the government had achieved its intended mandate. In this section of the study, the demographics of the participants of the study is first discussed to provide background and then lastly, the results of the survey are discussed.

Respondents' demographic profile

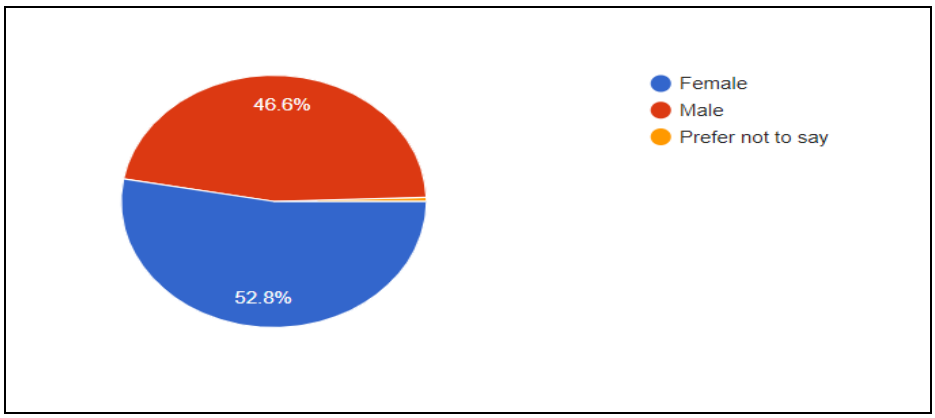


Figure 9: The gender of the study's participants

Figure 9 shows that 52.8% of the study's respondents were female, 0.6% preferred not to disclose their gender while 46.6% were male. It is important to note that the gender of respondents does not affect the outcome of the survey.

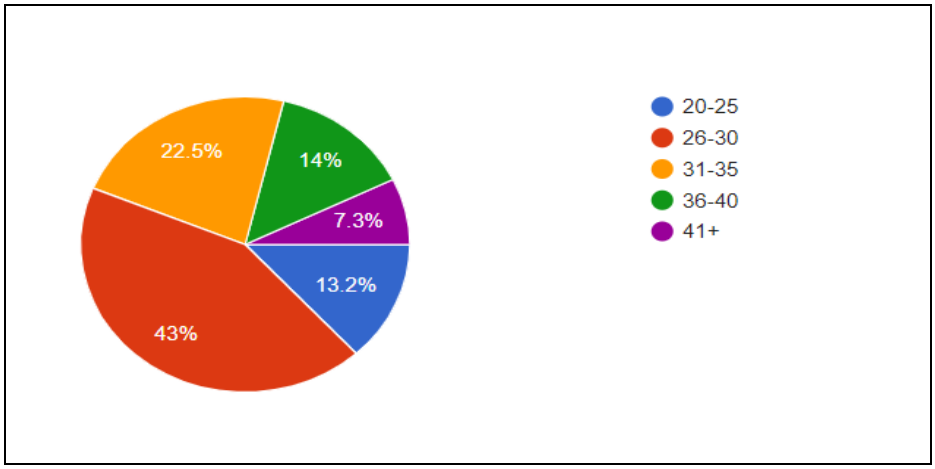


Figure 10: The ages of the participants of the study

Figure 10 shows the age range of respondents of the study with the top 2 highest number of participants, being between the ages of 26-30 (43%) and between the ages of 31-35 (22.5%). At these ages, an individual is mostly likely to have completed their studies, already within the job market and aiming to own property. To qualify for FLISP, one needs to be older than 18 years, so age plays an important role in determining whether a person qualifies for funding or not.

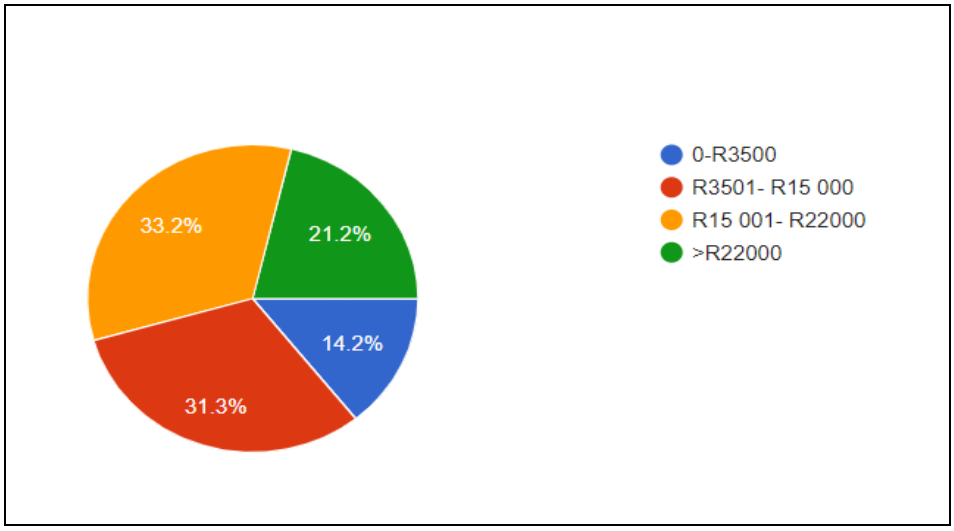
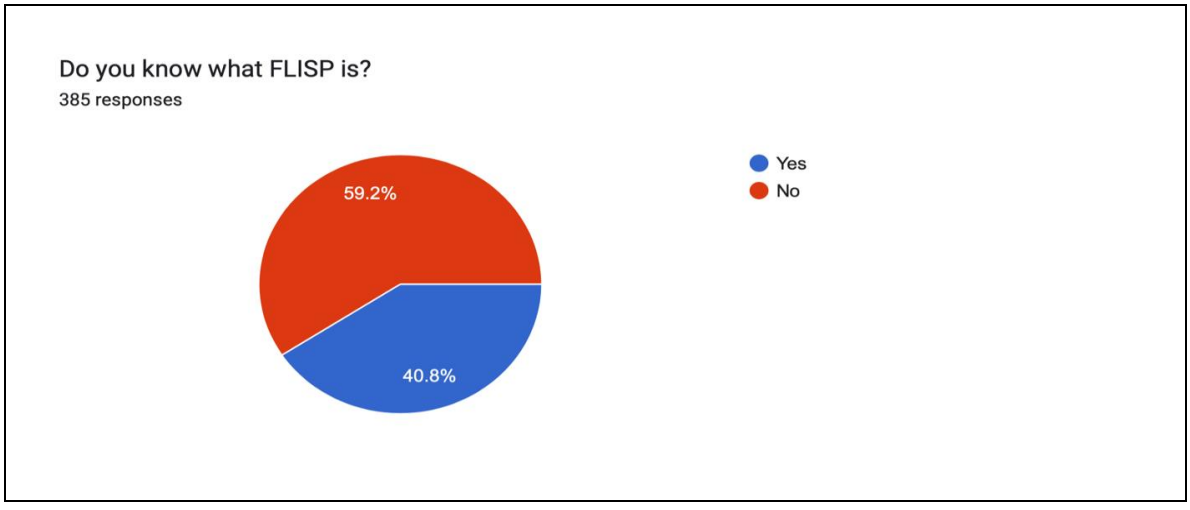


Figure 11: The income range of the participants of the study

As shown in figure 11, 64.5% of the respondents fall within the salary range of R3501- R22 000 per month, which is a qualifying criterion to receive the FLISP. Participants earning between 0- R3500 were 14.2% and there is a possibility that some of the participants are university students who will at some point fall within the qualifying income brackets. Income plays a major role in determining whether an individual will access mortgage financing. It is considered when calculating how much an individual affords. Housing affordability is determined by three factors: household income, house price, and loan repayment time (Limba, 2018).

4.3.2 Results of the survey



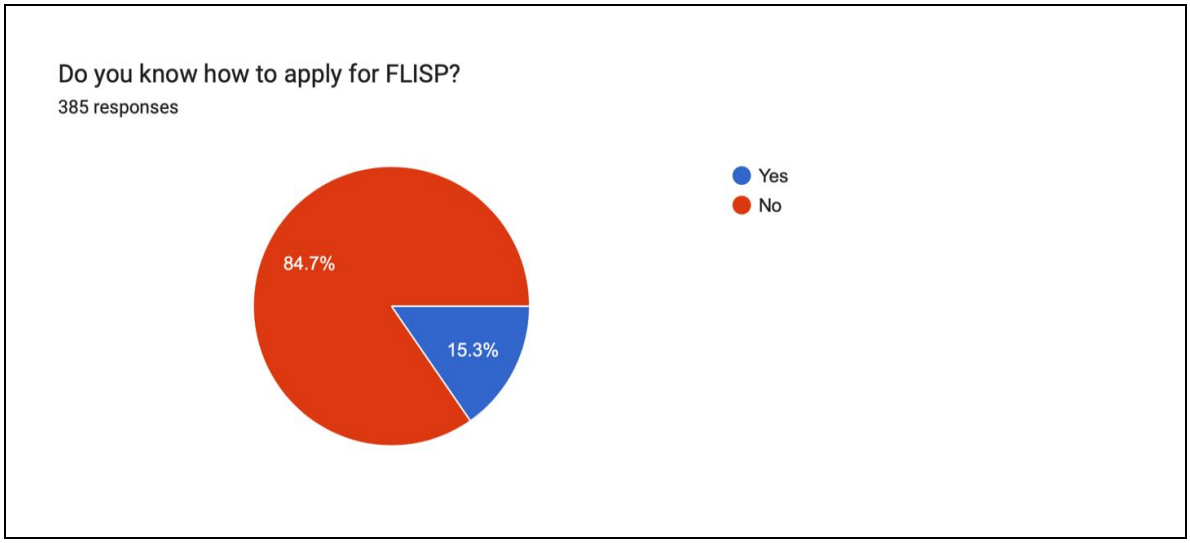


Figure 12: Results of the FLISP study performed using Google forms

Fifty-nine percent (59.5%) of participants of the study indicated that they had no knowledge of the FLISP and although 40.5% of participants indicated that they had knowledge about what the FLISP is, only 15.1% know how to apply for the subsidy. Income plays a big role in determining access to housing market and so far, earning low income has created a barrier for many individuals (Moss, 2003).

Low-income earners have lower chances of obtaining mortgage financing from the commercial banks. Osterling (2017) argues that because housing is more affordable when payments are spread over time, adequate housing financing must be of a longer term nature (Osterling, 2017). The fact that low-income earners do not qualify for mortgage financing from banks excludes them from accessing and affording housing.

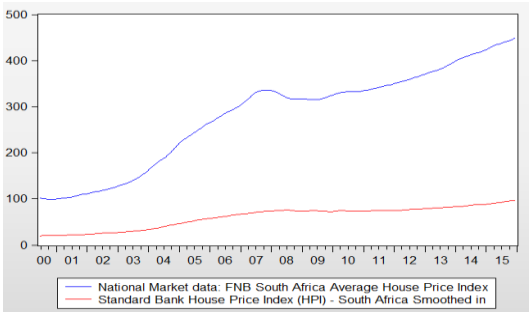
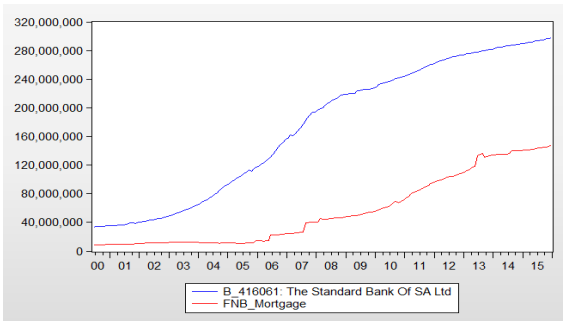
House prices	Mortgage advance
	

Figure 13: House price and mortgage advances over time

From figure 13, it is evident that house prices increased over time. This price change affects the banking sector in either a positive or negative way. The IMF (2000) suggest that a decline in house prices played a role in the banking crisis. Ironically, lower house prices would mean an increase in demand for housing as more people might qualify for funding, considering that earning below R22 000 is already a hurdle when trying to obtain financing for housing and the house prices continue to increase.

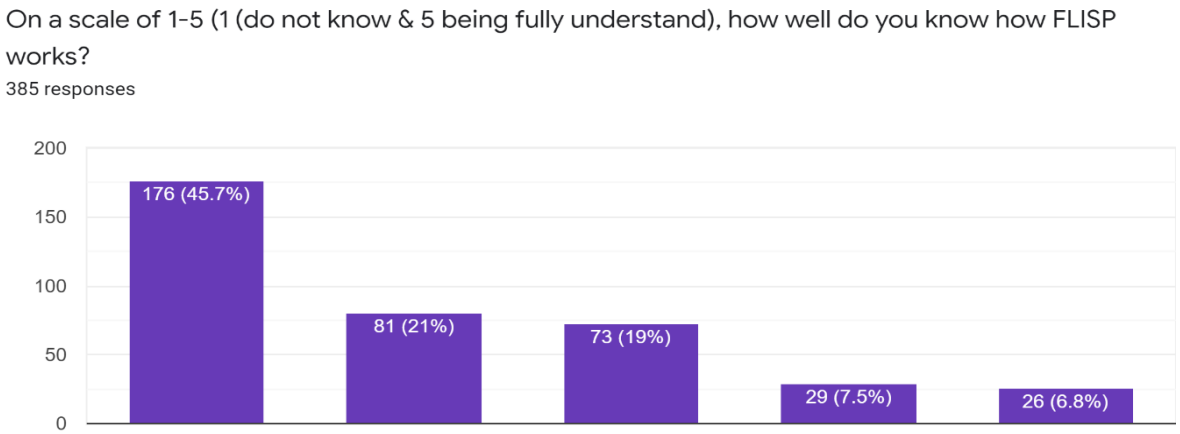


Figure 14: Results of the FLISP study performed using Google forms

The FLISP is meant to relieve the middle class from high mortgage repayments by subsidising the mortgage. However, as shown on figure 6, 66.7% (45.7% with a rating of 1 and 21% with a rating of 2) of the participants do not have an idea of how FLISP works. This information

asymmetry prevents them from accessing the subsidy and possibly accessing housing finance, which they would otherwise access if they had knowledge of the aid they had at their disposal.

The financial institutions (biggest mortgage lenders) signed a Financial Services Charter in 2003 committing to extend R70 billion in development finance of which R42 billion was directed at low-income earners (The Banking Association of South Africa, 2021). The government should have clear policies regarding access to finance using the FLISP, and how other role players, particularly commercial banks can be encouraged to participate.

In 1994, South Africa published a white paper outlining a new housing and strategy with the aim of introducing a measure which would encourage the fulfilment of its mandate which is to enable sufficient housing (Bengnwi, 2016). Since the introduction of the policy in 1994, twelve (12) more policy instruments were introduced with Social Housing Act 16 of 2008 being the latest policy.

The challenges faced by low-income earners in addition to limited access to financing are banks requiring deposits when purchasing and high interest costs. Furthermore, the process of applying for the subsidy does not favour the targeted beneficiaries in that the individual must first apply to the bank and only once they have been approved, can they apply for FLISP. The chances of being approved are very low due to affordability. It would be more beneficial if the qualifying individuals submit the application for the subsidy first and approach the commercial banks with an approved subsidy offer to increase the chances of being approved.

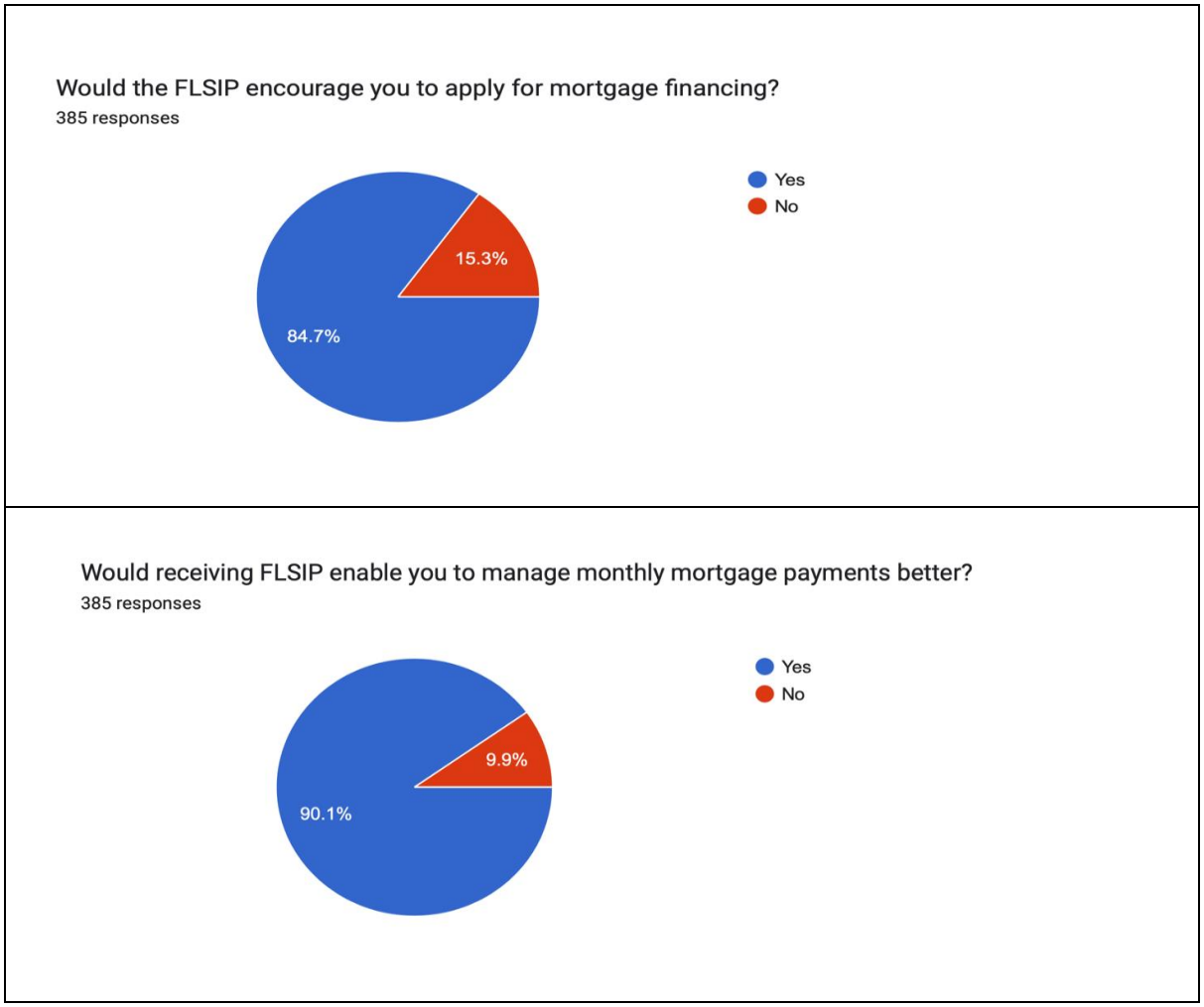


Figure 15: Results of the FLISP study performed using Google forms

The FLISP was introduced to assist the gap market manage mortgage payments and figure 15 above showed that over 80% of participants would be encouraged to apply for financing if they could receive the subsidy from the government, which would help manage the monthly repayments better. Because of lack of budgetary commitment, FLISP was barely implemented in its early stages and was revised in 2012 including the enlargement of the target market (Cirolia, December 2016). According to the results of this study, 84.4% of participants will apply for mortgage financing if they receive the subsidy.

If the government raised enough awareness regarding the subsidy programme available, then perhaps more people would apply, get approved and ultimately impact the mortgage market in

a positive manner. Residential real estate is one of the most valuable assets and most families' largest asset owned (Osterling, 2017).

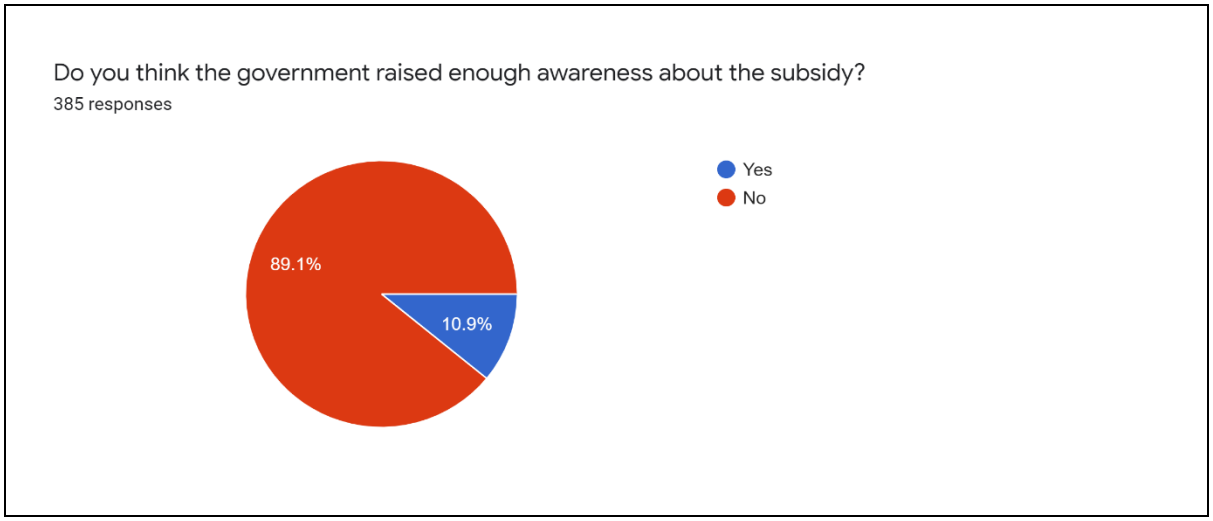


Figure 16: Results of the FLISP study performed using Google forms

Figure 16 shows that 89.1% participants indicated that the government did not raise enough awareness regarding the subsidy. Perhaps banks and the government should raise awareness in educating people about the options they have when applying for mortgage loans. If the FLISP information was displayed on banks' home loan application screen, to make people aware that there is a subsidy they can apply for to assist them with mortgage repayments by reducing their loan amounts, then information would reach a wider audience.

Table 5: Cross tabulation of income levels against FLISP awareness

Salary Range	**Participants**	**Aware of FLISP?** **Yes or No**	**Own residential property** **Yes or No**
0-R3500	56 participants (15%)	Yes: 5.71% No: 8.80%	Yes:1.30% No: 13.25%
R3501- R15 000	119 participants (31%)	Yes:14.03% No:16.90%	Yes: 2.10% No: 28.83%

R15001- R22000	128 participants (33%)	Yes:13.24% No:20.00%	Yes:4.94% No:28.31%
>R22 000	82 participants (21%)	Yes:7.27% No:14.00 %	Yes:8.05% No:13.25%

Out of the 64% of participants who qualify for FLISP, only 27.27% indicated that they were aware of what FLISP is and a small percentage (7.04%) indicated that they own residential property. From the four salary ranges sample, the participants earning greater than R22 000 had a higher percentage (8.05%) of owning residential properties as compared to those earning below R22 000.

Test of reliability on data

Kudser-Richardson formula is an estimate of reliability that is essentially equivalent to the average of the split-half reliabilities computed for all possible halves. For the purpose of this study, a test of reliability was performed on section b and c covering nine questions.

Kudser-Richardson KR-20 (Allen and Yen,1979):

$KR\text{-}20 = n/(n-1)[1 - \text{Sum}(Pi\ Qi)/\text{Var}(X)]$

Where: n = Total number of items

Sum (Pi Qi) = Sum of the product of the probability of alternative responses

Qi = 1- Pi Var(X) = Composite variance.

And to calculate coefficient alpha (a):

$\alpha = n/(n-1)[1 - \text{Sum Var}(Yi)/\text{Var}(X)]$.

Where:

n = Number of items

Sum Var(Yi) = Sum of item

Table 6:

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Total**
Yes (p)	63	294	155	127	57	170	325	346	41	1578
No(q)	322	91	230	258	328	215	60	39	344	1887
Total	385	385	385	385	385	385	385	385	385	3465
p	0.16	0.76	0.40	0.33	0.15	0.44	0.84	0.90	0.11	
q	0.84	0.24	0.60	0.67	0.85	0.56	0.16	0.10	0.89	
pq	0.14	0.18	0.24	0.22	0.13	0.25	0.13	0.09	0.10	1.47

K=9 pq= 1.47 var= 4.10 p=0.72

P= (9/ (9-1))*(1-1.47/4.10)

=1.125*0.64

=0.72

The value P_k =0.72 shows that the test has high reliability.

Chapter 5 : Conclusion of the study

In the long run, house prices and mortgage advances have a relationship. There is correlation between property prices and mortgage advances, which means that the variables move closer together in the long run. Cointegrating analysis shows that house prices are weakly exogenous. The ECM indicates that house prices determine mortgage financing. However, mortgage financing does not seem to affect house prices (Gerlach & Peng, Bank lending and property prices in hong kong, 2005). It can be deduced that house prices and mortgage financing cointegrate.

A survey of 385 employed people across South Africa was conducted starting from the 20th of July 2021 to the 18th of August 2021, to establish if people are aware of the subsidy programme introduced by the government to subsidise mortgage payments to qualifying citizens. Based on the results of the Finance Linked Individual subsidy programme survey, the majority of targeted beneficiaries are not aware of the assistance available to them, which results in losing out on qualifying for financing from the commercial banks. Banks are not aligned to the subsidy market despite two decades of attempts to encourage banks to the market (Cirolia, December 2016).

A study was conducted by (Scheba & Turok, 2018) arguing that the FLISP subsidy and enrolling potential applicants in a rent-to-own programme would increase their chances of receiving a home loan and subsequently increasing the provision of private mortgage finance, which would result in a strong effective demand for affordable housing, which private developers could capitalise on.

5.1 Recommendations

The government and private sector must come together to ensure the success of the FLISP to achieve the goals both Government and The Banking Association have regarding low-income earners' access to housing. The government should increase awareness around the subsidy programme by using different media platforms such as radio, television, newspapers, and social media. This should encourage qualifying people to make use of the subsidy and assist with qualifying for mortgage financing. An increment in mortgage advances would boost both the housing market and the mortgage market and in turn boost the economy.

Furthermore, the process of applying for FLISP should be revised to enable the those earning less to have better access to the housing market. It is challenging for those earning less to obtain access to financing, so perhaps if the individual is approved to receive a subsidy and approaches the bank with an amount they will receive from the Government then banks may be willing to extend financing to such individuals. The current process being followed does not enable access to financing but assists with managing loan repayments better.

Bibliography

Accetturo, A., Manaseri, F., Mocetti, S., & Olivieri, E. (2014). Don't stand so close to me: the urban impact of immigration. *Journal of Urban Economics*, 45- 56.

Akbari, A. H., & Aydede, Y. (2012). Effect of immigration of house prices in Canada. *Applied economics 44*, 1645- 1658.

Andrews, D. (2010, December 13). Real house prices in OECD Countries: The role of demand shocks and structural and policy factors. *OECD Economics Department Working papers No.831*, p. 87.

Basten , C., & Koch, C. (2015). The causal effect of house prices on mortgage demand and supply: evidence from Swirtzeland. *Journal of Housing Economics*, 1-22.

Bengnwi, W. (2016). *Evaluation of the Gauteng Department of Housing's Housing Programme 2004-2010.* University of Jonannesburg.

Braakmann, N. (2013). Immigration and property pricess: Evidence from England and Wales. *Real estate economics, 47, Issue 2*, 509-533.

Brooks, C. (2014). *Introductory Econmetrics for Finance.* Cambridge, United Kingdom: Cambridge University Press.

Cirolia, L. (December 2016). Reframing the "gap market": lessons and implications from Cape Town's gap market housing initiative. *Journal of housing and the built environment Vol.31 No.4*, 621-634.

Cochran, W. G. (1963). *Sampling Techniques.* New York: John Wileys & Sons Inc.

Commission, F. A. (2013). *Exploring alternative Finance and policy options for effective and sustainable delivery of housing in South Africa.* Johannesburg: Financial and Fiscal Commission.

Conefrey, T., & Whelan , K. (2013). *Supply, Demand and Prices in the US Housing Market.* Dublin: University College Dublin. School of Economics.

Crocher, L. H., Nowak, A., & Stuart , R. S. (2015). Housing price bubbles, new supply and within-city dynamics. *Journal of Urban Economics 96*, 55-72.

de Greef, I. J., & De Haas, R. T. (2000, October 6 2000). House prices, bank lending and Monetary Policy. Groningen.

Delmendo, L. C. (2021, June 05). *Global Property Guide*. Tratto da Global Property Guide: https://www.globalpropertyguide.com/Africa/South-Africa/Price-History

Dwyer, G. P. (2015). *The Johansen Tests for Cointegration.*

Fischer, A. M. (2012). Immigrant language barriers and house prices. *Regional Science and Urban Economics 42*, 389-395.

Gazman, M. D. (2019, May 31). *Global Property Guide*. Tratto da Global Property Guide: https://www.globalpropertyguide.com/Africa/South-Africa/Price-History

Gerlach, S., & Peng, W. (2005). Bank lending and property prices in hong kong. *Journal of Banking Finance*, 461-481.

Gimeno, R., & Martnez-Carrascal, C. (2006). The interaction between house prices and loans for house purchase. The spanish case. *Documntos te trabajo*.

Golding, P. (2015, ovember 2015 5). *Review of South African residential market*. Tratto da Pam Golding Properties: https://www.pamgolding.co.za/property-news/2015/11/5/review-of-south-africa-s-residential-property-market

Gonzalez, L., & Ortega, F. (2009). Immigartion and Housing Booms: Evidence from Spain. *Journal of Regional Science*, 1167.

Government. (2019, June 26). *Government Housing*. Tratto da Government Housing: https://www.gov.za/about-sa/housing

Government, S. A. (1996). *The Constitution of the Republic of South Africa.*

Government, S. A. (2004, July 1). *Lawyers for Human Rights*. Tratto da Lawyers for Human Rights: http://www.lhr.org.za/policy/immigration-act-13-2002-amended-2004

Government, W. C. (2019, July 02). *Western Cape Government*. Tratto da Western Cape Government: https://www.westerncape.gov.za/service/finance-linked-individual-subsidy-programme-flisp

Guzman, M. D. (2018, February 13). *Global Property Guide*. Tratto da Global Property Guide: https://www.globalpropertyguide.com/Africa/South-Africa/Price-History

Jaegar, D. A. (2018, January). Shift-Share Instruments and the Impact of Immigration. *IZA Instutute of Labour Economics*. Tratto da National Bureau of Economic Research: http://www.nber.org/papers/w24285

Knudsen, D. C. (2000). Shift-share analysis: further examination of models for the description of economic change. *Socio-Economic Planning Sciences* , 177- 198.

Lansing. (2007). Asset Price bubbles. *FRBSF Economic letter 32*, 25-9.

Larkin, M. P., Askarov, Z., Doucouliagos, H., Dubelaar, C., Klona, M., Newton, J., . . . Vocino, A. (2019). Do house prices ride the wave of immigration? *Journal of Housing Economics*, 1-8.

Limba, E. (2018). *Barriers Access to Housing Finance by the Low Income Group: National Housing Finance Corporation in South Africa.* Cape Town: University of Cape Town.

Lopez, V., & Whitehead, D. (2012). *Sampling data and data collection in qualitative research.* Scheinder: Elsevier and typesetter.

McDonald, D. A. (1998). Hear no housing, see no housing Immigration and homelessness in the new South Africa. *Cities Vol 15, No. 6*, 449- 462.

McDonalds, C. (2013, December). Migration and housing market. *Reserve Bank of New Zealand Analytical Notes*.

Miaoulis, G., & Michener, R. D. (1976). *An introduction to sampling.* Dubuque: Kendall//Hunt Publishing Company.

Moroke, T. (2009, November). An analysis of housing need in South Africa particularly in North West Province. North West, South Africa.

Moss, V. (2003). *Preview of Housing Finance Systems in Four Different African Countries: South Africa, Nigeria, Ghana and Tanzania.*

O'Malley, P. (1994). *The Reconstruction and Development Programme.* Nelson Mandela Centre of memory.

Osterling, A. (2017). *Housing Markets and Mortgage Finance.* Stockholm: Department of Economics, Stockholm University.

Pillay, A., & Naude, W. A. (2006). Financing low-income housing in South Africa: Borrower experiences and perception of banks. *Habitat International 30*, 872- 885.

Property24. (2016, June 1). *Property24*. Tratto da Property24: https://www.property24.com/articles/foreigners-guide-to-buying-property-in-south-africa/24160

Saiz, A. (2007). Immigration and housing rents in American cities 61. *Journal of Urban Economics*, 345-371.

Scheba, D., & Turok, P. (2018). *Review of rent to buy with a particular focus on the Institutional Housing Programme.* Western Cape: Human Science Research Counsil.

Schoenauer. (2000). *6000 years of housing (Worldwide view encyclopedia).*

Skrobotov, A. (2014). Trend and Initial Condition in Stationarity Tests:The Asumptotic analysis. *Oxford Bulletin of Economics and Statistics*, 305-9049.

Sonali, D., Gupta, R., & Kanda, P. T. (2011). Bubbles in South African House prices. *Journal of Real Estate Literature Vol 19, No 1*, 71-92.

South african Government. (2019, May 19). Tratto da South African Government: https://www.gov.za/about-sa/south-africas-people

Staff, G. (2017, June 20). *Groundup*. Tratto da Groundup: https://www.groundup.org.za/article/everything-you-need-know-about-government-housing/

Statistics South Africa. (2020, July 9). *Easy data by Quantec*. Tratto da Easy data by Quantec: https://0-www-easydata-co-za.innopac.wits.ac.za/dataset/P0302/

team, T. C. (2017, June 4). *The Conversation*. Tratto da The conversation: http://theconversation.com/south-africa-urgently-needs-to-rethink-its-approach-to-housing-78628

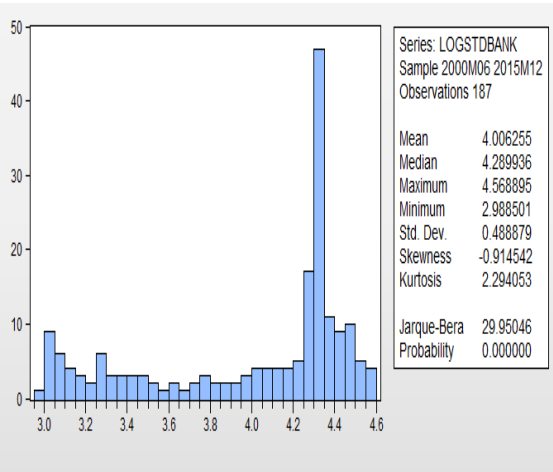
The Banking Association of South Africa. (2021, October 06). *The Banking Association of South Africa.* Tratto da The Banking Association of South Africa: https://www.banking.org.za/consumer-information/consumer-information-legislation/financial-sector-charter-code/

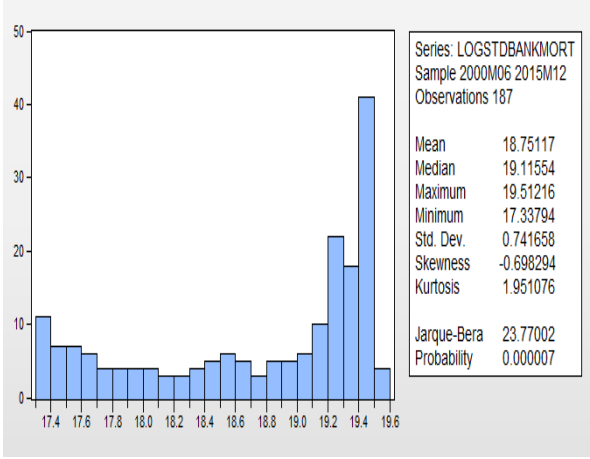
Tissington, K. (2010). *A review of housing policy and development in South Africa since 1994.* Studies in Poverty and Inequality (SPII).

Writer, S. (2019, May 19). *Business Tech*. Tratto da Business Tech: https://businesstech.co.za/news/property/287320/3-things-you-need-to-know-about-south-africas-property-market-heading-into-2019/

Appendices

Appendix 1: Summary of statistics Standard Bank

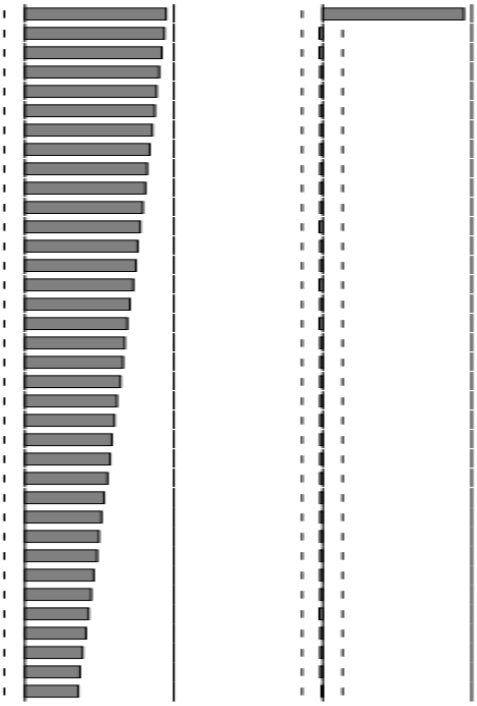




Appendix 2: ACF of Standard Bank house prices and mortgage advances time series

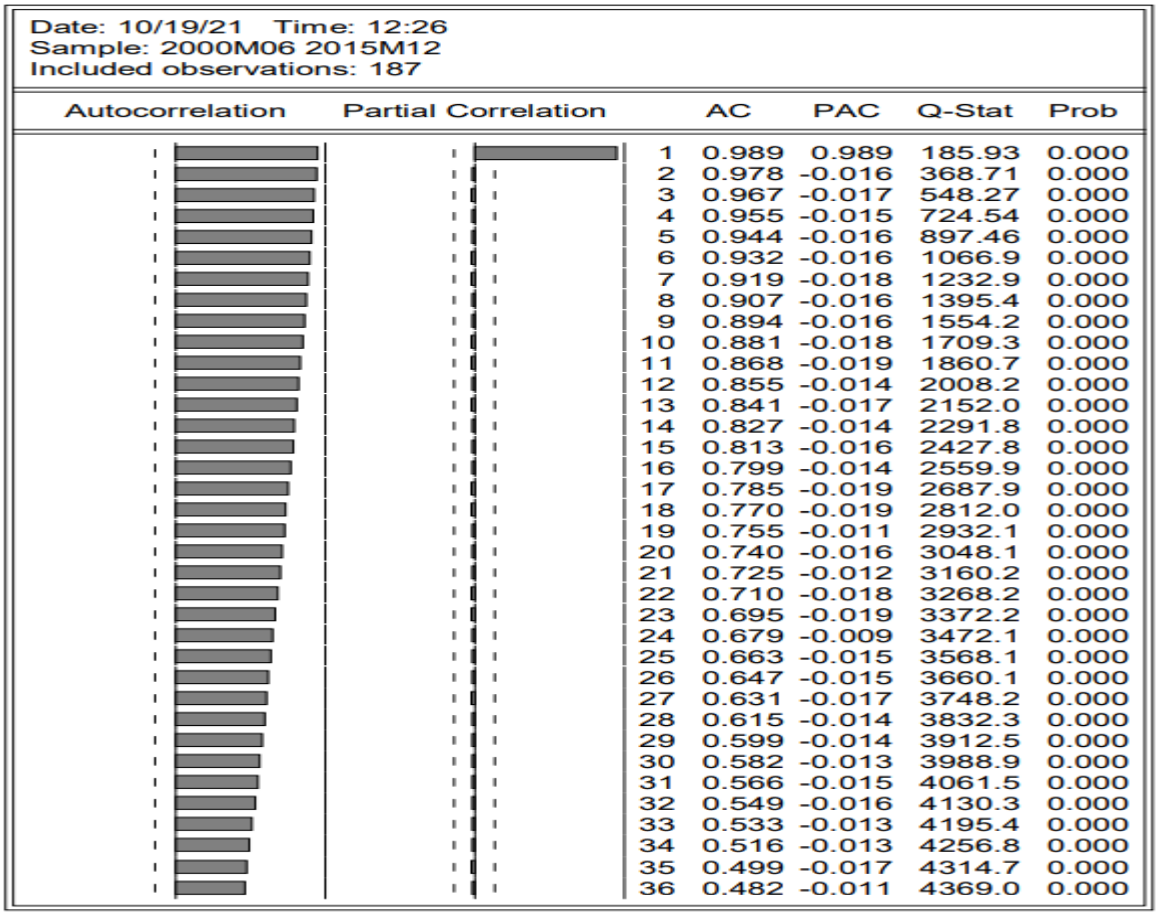
Correlogram of STANDARD_BANK_HOUSE_PRIC

Date: 10/19/21 Time: 12:23
Sample: 2000M06 2015M12
Included observations: 187



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.985	0.985	184.36	0.000
		2	0.970	-0.018	363.99	0.000
		3	0.954	-0.021	538.79	0.000
		4	0.938	-0.014	708.74	0.000
		5	0.922	-0.015	873.81	0.000
		6	0.906	-0.009	1034.0	0.000
		7	0.890	-0.009	1189.4	0.000
		8	0.873	-0.011	1340.1	0.000
		9	0.857	-0.013	1485.9	0.000
		10	0.840	-0.015	1627.0	0.000
		11	0.824	-0.012	1763.2	0.000
		12	0.807	-0.018	1894.7	0.000
		13	0.790	-0.013	2021.4	0.000
		14	0.773	-0.015	2143.4	0.000
		15	0.755	-0.020	2260.6	0.000
		16	0.737	-0.016	2373.0	0.000
		17	0.719	-0.018	2480.6	0.000
		18	0.701	-0.016	2583.4	0.000
		19	0.683	-0.010	2681.6	0.000
		20	0.665	-0.011	2775.3	0.000
		21	0.647	-0.010	2864.4	0.000
		22	0.629	-0.009	2949.1	0.000
		23	0.611	-0.013	3029.5	0.000
		24	0.593	-0.013	3105.6	0.000
		25	0.574	-0.013	3177.6	0.000
		26	0.556	-0.009	3245.5	0.000
		27	0.538	-0.016	3309.4	0.000
		28	0.520	-0.012	3369.4	0.000
		29	0.501	-0.012	3425.6	0.000
		30	0.483	-0.014	3478.1	0.000
		31	0.464	-0.015	3527.0	0.000
		32	0.446	-0.017	3572.3	0.000
		33	0.427	-0.012	3614.2	0.000
		34	0.409	-0.010	3652.9	0.000
		35	0.390	-0.015	3688.3	0.000
		36	0.372	-0.006	3720.7	0.000

Correlogram of STD_BANK_MORTGAGE



Date: 10/19/21 Time: 12:26
Sample: 2000M06 2015M12
Included observations: 187

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.989	0.989	185.93	0.000
		2	0.978	-0.016	368.71	0.000
		3	0.967	-0.017	548.27	0.000
		4	0.955	-0.015	724.54	0.000
		5	0.944	-0.016	897.46	0.000
		6	0.932	-0.016	1066.9	0.000
		7	0.919	-0.018	1232.9	0.000
		8	0.907	-0.016	1395.4	0.000
		9	0.894	-0.016	1554.2	0.000
		10	0.881	-0.018	1709.3	0.000
		11	0.868	-0.019	1860.7	0.000
		12	0.855	-0.014	2008.2	0.000
		13	0.841	-0.017	2152.0	0.000
		14	0.827	-0.014	2291.8	0.000
		15	0.813	-0.016	2427.8	0.000
		16	0.799	-0.014	2559.9	0.000
		17	0.785	-0.019	2687.9	0.000
		18	0.770	-0.019	2812.0	0.000
		19	0.755	-0.011	2932.1	0.000
		20	0.740	-0.016	3048.1	0.000
		21	0.725	-0.012	3160.2	0.000
		22	0.710	-0.018	3268.2	0.000
		23	0.695	-0.019	3372.2	0.000
		24	0.679	-0.009	3472.1	0.000
		25	0.663	-0.015	3568.1	0.000
		26	0.647	-0.015	3660.1	0.000
		27	0.631	-0.017	3748.2	0.000
		28	0.615	-0.014	3832.3	0.000
		29	0.599	-0.014	3912.5	0.000
		30	0.582	-0.013	3988.9	0.000
		31	0.566	-0.015	4061.5	0.000
		32	0.549	-0.016	4130.3	0.000
		33	0.533	-0.013	4195.4	0.000
		34	0.516	-0.013	4256.8	0.000
		35	0.499	-0.017	4314.7	0.000
		36	0.482	-0.011	4369.0	0.000

Appendix 3: Augmented Dickey Fuller t-test for Standard Bank house prices

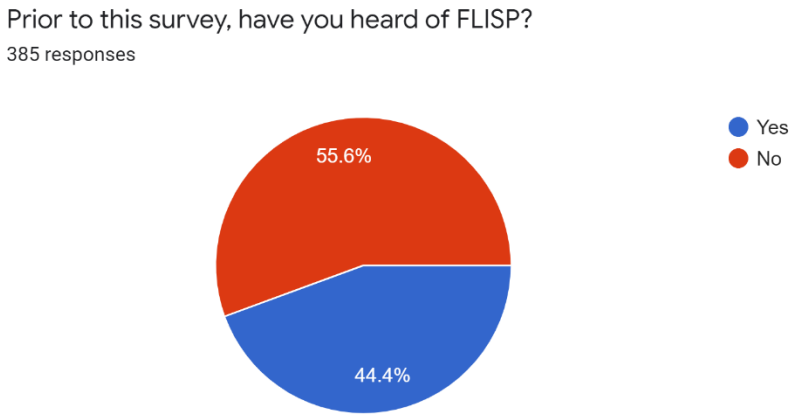
	ADF t test for STD bank house prices	
At level	**Augmented Dickey-Fuller Unit Root Test on STANDARD_BANK_HOUSE_PRIC** Null Hypothesis: STANDARD_BANK_HOUSE_PRIC has a unit root Exogenous: Constant Lag Length: 9 (Automatic - based on SIC, maxlag=14) t-Statistic Prob.* Augmented Dickey-Fuller test statistic -1.394707 0.5840 Test critical values: 1% level -3.467418 5% level -2.877729 10% level -2.575480	I fail to reject the Null Hypothesis. STDbank_Price has a unit root as Prob*>0.05. ADF t-stat is statistically insignificant. Therefore, the price is non-stationary.
At first difference	**Augmented Dickey-Fuller Unit Root Test on D(STANDARD_BANK_HOUSE_PRIC)** Null Hypothesis: D(STANDARD_BANK_HOUSE_PRIC) has a unit root Exogenous: Constant Lag Length: 8 (Automatic - based on SIC, maxlag=14) t-Statistic Prob.* Augmented Dickey-Fuller test statistic -1.578805 0.4913 Test critical values: 1% level -3.467418 5% level -2.877729 10% level -2.575480	I fail to reject the Null Hypothesis. STDbank_Price has a unit root as Prob*>0.05. ADF t-stat is statistically insignificant. Therefore, the price is non-stationary.

At second difference	**Augmented Dickey-Fuller Unit Root Test on D(STANDARD_BANK_HOUSE_PRIC,2)** Null Hypothesis: D(STANDARD_BANK_HOUSE_PRIC,2) has a unit root Exogenous: Constant Lag Length: 7 (Automatic - based on SIC, maxlag=14) t-Statistic Prob.* Augmented Dickey-Fuller test statistic -9.094266 0.0000 Test critical values: 1% level -3.467418 5% level -2.877729 10% level -2.575480	I reject the null hypothesis as Prob*<0.05. ADF t-stat is statistically significant. Therefore, the price is stationary at 2nd difference.
	ADF t test for STD bank mortgage advances	
At level	**Augmented Dickey-Fuller Unit Root Test on STD_BANK_MORTGAGE** Null Hypothesis: STD_BANK_MORTGAGE has a unit root Exogenous: Constant Lag Length: 3 (Automatic - based on SIC, maxlag=14) t-Statistic Prob.* Augmented Dickey-Fuller test statistic -1.144932 0.6976 Test critical values: 1% level -3.466176 5% level -2.877186 10% level -2.575189	I fail to reject the null hypothesis. STDbank_mortgage has a unit root as Prob*>0.05. ADF t-stat is statistically insignificant. Therefore, the price is non-stationary.
At First Difference	**Augmented Dickey-Fuller Unit Root Test on D(STD_BANK_MORTGAGE)** Null Hypothesis: D(STD_BANK_MORTGAGE) has a unit root Exogenous: Constant Lag Length: 2 (Automatic - based on SIC, maxlag=14) t-Statistic Prob.* Augmented Dickey-Fuller test statistic -3.017266 0.0351 Test critical values: 1% level -3.466176 5% level -2.877186 10% level -2.575189	I reject the null hypothesis as Prob*<0.05. ADF t-stat is statistically significant. Therefore, the price is stationary at 1st difference.

Appendix 4: Testing for cointegration using the Johansen cointegration method

Standard Bank	
Johansen Cointegration Test Date: 08/18/21 Time: 22:55 Sample (adjusted): 2000M11 2015M12 Included observations: 182 after adjustments Trend assumption: Linear deterministic trend Series: LOGSTDBANK LOGSTDBANKMORT Lags interval (in first differences): 1 to 4 Unrestricted Cointegration Rank Test (Trace) Hypothesized No. of CE(s) / Eigenvalue / Trace Statistic / 0.05 Critical Value / Prob.** None * 0.061262 17.44271 15.49471 0.0251 At most 1 * 0.032094 5.936971 3.841466 0.0148 Trace test indicates 2 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values Unrestricted Cointegration Rank Test (Maximum Eigenvalue) Hypothesized No. of CE(s) / Eigenvalue / Max-Eigen Statistic / 0.05 Critical Value / Prob.** None 0.061262 11.50574 14.26460 0.1306 At most 1 * 0.032094 5.936971 3.841466 0.0148 Max-eigenvalue test indicates no cointegration at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values	Trace statistic (17.44271) > critical value at 5% level of significance therefore we reject the null hypothesis. There is cointegration between house prices and mortgage advances in the long run.

Appendix 5: FLISP survey results regarding awareness of the subsidy



Appendix 6: FLISP survey conducted (Google forms)

Section A

Employment status: Employed ☐ Unemployed ☐

Salary Range (Gross per month):

0-R3500 ☐

3501- R15000 ☐

R15001- R22 000 ☐

>R22 000 ☐

Age

20-25 ☐

26-30 ☐

31-35 ☐

35-40 ☐

41+ ☐

Gender: Female ☐ Male ☐ Prefer not to say ☐

Section B

Do you own residential property: Yes ☐ No ☐

Are you a first-time home buyer? Yes ☐ No ☐

Section C

Do you know what FLISP is? Yes ☐ No ☐

On a scale of 1-5 (1 (do not know & 5 being fully understand), how well do you know how FLSIP works?

Do you know how to apply for FLISP? Yes ☐ No ☐

Prior to this survey, have you heard of FLISP? Yes ☐ No ☐

Would the FLSIP encourage you to apply for mortgage financing? ☐

Would receiving FLSIP enable you to manage monthly mortgage payments better?

Yes ☐ No ☐

Do you think the government raised enough awareness about the subsidy? Yes ☐ No ☐