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**INVESTIGATING THE MACROECONOMIC DETERMINANTS
OF RDP HOUSE PRICES IN SOUTH AFRICA.**

A Thesis presented to:

The Graduate School of Business
University of Cape Town

In partial fulfilment
of the requirements for the
Master of Commerce in Development Finance Degree

by
Nicholas Avramis

December 2016

Supervised by: Hamutyinei Harvey Pamburai



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ABSTRACT

The main purpose of this study is to investigate the relationship between macroeconomic variables and South Africa's affordable housing market using basic multivariate regression analysis. This paper examines empirically whether increases in RDP house prices can be explained by movements in gross domestic product (GDP), prime lending rate (RATE), the stock market (JSE) and inflation (CPI). As an exploratory paper in nature, data of RDP resale prices from eight major metros is collected from the Centre of Affordable Housing Finance (CAHF) from 2007 to 2015. Results show that only JSE can be identified as a key determinant of RDP housing prices in South Africa. GDP, RATE, CPI show no statistically significant relationship to affordable housing price movements; it is recommended that other hedonic variables be used in future studies. The findings of this paper are useful for financial institutions, investors, housing authorities and the government who want to understand which factors account for the behaviour of RDP home prices in South Africa.

Keywords: housing price determinants, economic variable, GDP, prime rate, stock market inflation rate, RDP housing, affordable housing, regression analysis, South Africa

TABLE OF CONTENTS

ABSTRACT.....	i
LIST OF FIGURES AND TABLES.....	v
GLOSSARY OF TERMS.....	vi
LIST OF ACRONYMS AND ABBREVIATIONS	vii
CHAPTER 1: INTRODUCTION	1
1.1 Problem Statement	3
1.2 Purpose of the Study	3
1.3 Significance of the Study	4
1.4 Motivation of the Study.....	5
1.5 Objectives of the Study	5
1.6 Research Questions	5
1.6.1 Hypothesis.....	6
1.7 Limitations of the Study.....	6
1.8 Organization of the Study	7
CHAPTER 2: THE HISTORY OF AFFORDABLE HOUSING IN SOUTH AFRICA ...	8
2.1 Policy Framework: Reconstruction and Development Programme (1994)	8
2.2 Housing as a Constitutional Right (1996)	9
2.3 Legislative Framework: Housing Act (1997).....	9
2.4 National Housing Subsidy Programme (1996)	10
2.5 National Housing Finance Corporation (1996).....	11
2.6 Breaking New Ground (2004).....	11
2.7 Impact of Affordable Housing in South Africa.....	12
2.7.1 Property Registration: Share of RDP vs. Entire Household Market.....	12
2.7.2 Geographic Distribution of RDP Homes	13
2.7.3 Value of RDP Homes in South Africa	14
2.7.4 Equity Growth in the RDP Homes.....	16
CHAPTER 3: LITERATURE REVIEW – HOUSING PRICE DETERMINANTS	18
3.1 Macroeconomic Drivers and the Property Market.....	18
3.2 The Relationship between GDP and House Prices	19

3.3	The Relationship between Interest Rates and House Prices	19
3.4	The Relationship between the Stock Market and House Prices.....	20
3.5	The Relationship between the Inflation and House Prices.....	22
3.6	Housing Price Determinants in the South African Context	23
3.6.1	The Relationship between GDP and House Prices in South Africa	24
3.6.2	The Relationship between Interest Rates and House Prices in South Africa	25
3.6.3	The Relationship between the Stock Market and House Prices in South Africa....	25
3.6.4	The relationship between Inflation and House Prices in South Africa.....	26
3.7	Summary	27
CHAPTER 4: DATA COLLECTION AND RESEARCH METHODOLOGY.....		28
4.1	Data Collection.....	28
4.1.1	Dependent Variable	29
4.2	Independent Variables.....	32
4.2.1	GDP Performance in South African	33
4.2.2	Prime Interest Rate in South Africa	34
4.2.3	FTSE/JSE Africa All Shares Index.....	35
4.2.4	Inflation Rate in South Africa.....	36
4.3	Validity of Sources.....	37
4.4	Research Method Applied.....	38
4.4.1	Regression Analysis.....	38
4.4.2	Pre-Testing the Data	39
CHAPTER 5: EMPIRICAL RESEARCH FINDINGS, ANALYSIS & DISCUSSION..		41
5.1	Descriptive Statistics	41
5.2	Multicollinearity.....	41
5.3	Homoscedasticity, Linearity and Normality	42
5.3.1	Simple Regression Analysis	43
5.4	Reporting of Regression Analysis.....	45
5.5	Discussion & Analysis of Results	47
5.5.1	GDP Analysis.....	47
5.5.2	Prime Rate Analysis.....	48
5.5.3	Stock Market Analysis	49



5.5.4	Inflation Analysis.....	50
5.6	Discussion Summary.....	51
CHAPTER 6:	RECOMMENDATIONS & CONCLUSION.....	52
6.1	Recommendations for Future Research	52
6.2	Conclusion.....	52
REFERENCES.....		55

LIST OF FIGURES AND TABLES

Figure 1 - Breakdown of SA Residential Property Market (Source: Citymark, 2015).....	15
Figure 2 - Location of Metros with Highest RDP transactions (Source: CAHF, 2016).....	30
Figure 3 - Real GDP Growth in South Africa 1960 - 2015 (Source: OECD, 2016)	34
Figure 4 - Prime Interest Rate in South Africa 1960 to 2014 (Source IMF, 2016)	35
Figure 5 - FTSE/JSE All Share Price Index 1995 to 2016 (Source: JSE, 2016)	35
Figure 6 - Inflation in South Africa (CPI) 1960 - 2015 (Source: World Bank, 2016).....	36
Figure 7 - RDP Prices vs. JSE Performance, 2007 to 2015 (Source: JSE & CAHF, 2016).....	49
Table 1 - Properties on the deeds registry, 2010 - 2013 (Source: Citymark Dashboard, 2015)...	13
Table 2 - % Change in RDP Housing YOY, since 2007 (Source: Citymark Dashboard, 2015)..	13
Table 3 – YOY % Change in Residential Properties (Source: Citymark Dashboard, 2015).....	13
Table 4 - Distribution of RDP Properties, 2013 (Source: Citymark Dashboard, 2015)	14
Table 5 - Value of Government Sponsored Properties as at 2014 (Citymark Dashboard, 2015).	15
Table 6 – Value of Government Sponsored Properties, 2014 (Citymark Dashboard, 2015)	16
Table 7 - Equity Growth of RDP Homes <R300k (Source: Citymark Dashboard, 2015)	17
Table 8 - Data Sources	29
Table 9 – Definition of Independent Variables.....	32
Table 10 – Descriptive Statistics of Variables	41
Table 11 – Pearson Correlation Matrix.....	42
Table 12 - Variance Inflation Factor for RDP Sales.....	42
Table 13 – Regression Results of RDP Sales Price to Macroeconomic Variables.....	46

GLOSSARY OF TERMS

Adequate Housing	This includes: legal security of tenure, affordability, and availability of services, habitability, accessibility, location and cultural acceptability (South African Human Rights Commission, n.d.).
Affordable Housing	Housing that costs less than R500,000.
Gap Market	A South African reference to those in the home market earning too much income to receive government subsidies, yet earning too little to afford or be eligible for mortgage financing in the private property market.
RDP Housing	Commonly used to refer to government subsidized or delivered homes for low income earnings housing that is specific to the South African context.
Township	Underdeveloped urban areas (typically on the outskirts of major metros) that were reserved for non-white communities during the apartheid era South Africa.

LIST OF ACRONYMS AND ABBREVIATIONS

ANC	African National Congress
BNG	Breaking New Ground
CAHF	Centre for Affordable Housing Finance
CPI	Consumer Price Index
DSCR	Debt Service Coverage Ratio
FLISP	Finance Linked Individual Subsidy Programme
GDP	Gross Domestic Product
IMIESA	Institute of Municipal Engineering of Southern Africa
JSE	Johannesburg Stock Exchange
LTV	Loan-to-value
R	South African Rand
RDP	Reconstruction and Development Programme
OECD	Organization for Economic Cooperation and Development
ZAR	South African Currency Abbreviation
UK	United Kingdom
US	United States

CHAPTER 1: INTRODUCTION

Government and policy experts around the world continue to extol the merits of home ownership and its effect on the economy and society as a whole. It is widely accepted that the independence that comes with home ownership will lead to a better quality of life for households and contribute to economic growth (Rohe, Zandt, & McCarthy, 2002). However, access to affordable housing continues to be a massive socio-economic problem across the globe. By 2030, an estimated 3 billion people in the developing world will need housing. This means that 565 million new units, adding to the current shortfall of more than 400 million homes, will need to be brought online in order to meet this demand (Walley, 2014).

Since the birth of South Africa's Rainbow nation in 1994 the African National Congress (ANC) government has endeavored to deliver affordable housing units to the most vulnerable members of its society. The ANC has implemented a variety of policy measures, including both development initiatives and various financial programs, to help disadvantaged citizens to fulfil the South African dream of home ownership. To date, the ANC has directly delivered 3.4 million new homes to its citizens (CAHF, 2015b). The ANC's motivation was to provide the poor with assets as a definitive measure of financial success. A key component of the country's Reconstruction and Development Programme (RDP) was to transform informal settlements into more humane and environmentally sustainable living and working environments (Lemanski, 2011).

According to the ANC government's 20 Year Review, approximately 12.5 million individuals have been aided by the state's provision of an "RDP home" (CAHF, 2015b). It is estimated that the Department of Human Settlements has spent R125 billion on housing delivery; R16 billion has been spent by other government agencies on other infrastructure projects for redeveloping human settlements. However, not everyone in the new South Africa received a subsidized RDP home.

Despite the ANC government's effort to deliver affordable housing, there is a current backlog of approximately 2 to 3 million housing units in South Africa (Murray, 2014). Despite the continued demand for housing at the bottom of the housing pyramid, the South African government's delivery of free RDP homes has created a new housing submarket: RDP homes now make up one quarter of South Africa's entire residential housing market (National Housing Financing Corporation, 2014). The fair market value of these homes is estimated at R300 billion; representing a threefold increase in the value of the government's initial investment to construct the homes (The Presidency, 2014).

As per the Housing Act, 1997, the resale of RDP homes or government subsidized housing cannot occur in the open market within the first eight years of its introduction into the market. Furthermore, any residential home that is sold on the open market must be registered with the national deeds registry system (CAHF, 2016). With over 50% of all RDP homes now registered and with hundreds of thousands of RDP homes maturing past their release point, the RDP submarket offers the affordable housing market for a much needed source of supply for the demand of upward mobility in the R150,000 to R250,000 sales price range (CAHF, 2015c).

Real estate financing is the life blood for any property market. However, access to financing, both on the development supply side and the end-user demand side, continues to be a problem for scaled growth in South Africa's affordable housing market. Historically, there are several reasons for the credit constraints associated with financing the affordable housing market.

However, the increase in value or equity associated with the RDP homes presents an opportunity for their inclusion in the broader financial services market. In this view, the primary concern of this study is to examine and provide an understanding of the relationship between various macroeconomic variables and the pricing of matured RDP homes in South Africa.

1.1 Problem Statement

Prices of real estate properties are generally influenced by macro-economic fundamentals, as well as general supply and demand dynamics in local market as shown by (Quan & Quigley, 1991) research. For example, (Pillaiyan, 2015) argues that there is a tight interdependence between the economy and house prices. However, the argument is on whether real estate property prices in less formalized markets are driven and characterized by a different set of factors in comparison to formalised real estate property markets. For instance, the overall affordable housing market in South Africa has being stymied or constrained by affordability constraints, over-indebtedness, poor credit ratings, access to credit and inadequate housing supply. As such, less formalised real estate property market has historically been marginalized or precluded from the mainstream financial services market as it is seen as a market that presents an inferior asset. Despite this notion, this study seeks to investigate whether RDP resale units respond to the traditional macro-economic movements using South Africa as the location of the study. A clear understanding of the macro-economic drivers effecting RDP house prices is a critical first step in forecasting the behavior of these non-traditional assets. The results of this type of analysis will provide stakeholders, including the financial community with a greater comfort and understanding for developing products for these assets.

1.2 Purpose of the Study

The purpose of this study is to use multivariate regression methods to test the statistical significance of the relationship between RDP home prices and South Africa's macro economy. While (Standish, Lowther, Morgan-Grenville, & Quick, 2005) and (Clark & Daniel, 2006) completed the most recent work on the relationship between home prices in South Africa and domestic macro-economic variables, RDP homes (less than R300,000 in value) were not included

as part of these studies. As the literature will show, low cost housing assets are rarely if ever included in home price determinant studies. Drawing from the Centre for African Housing Finance's (CAHF) newly compiled RDP resale data, this paper will use statistical inference tests - that are commonly used in other markets around the world - to help understand the economic behavior of these none traditional assets. The finding of this study will contribute to the idea of whether RDP resale homes can be considered as a credible financial asset class (i.e. capital wealth) within the broader South African property market.

1.3 Significance of the Study

While there has been a tremendous volume of work compiled on affordable housing policy around the world and in particular, South Africa, there has been limited research conducted into the pricing dynamics of South Africa's affordable housing market. In large part, this is due to the lack of verifiable, measurable and sufficient data. While South Africa enjoys market efficiencies in its formalized housing sector, the affordable housing market has operated outside the norms of the formalized market as the RDP market was created by the government's free delivery of homes. As these assets are now being traded in the open market this research will help financial institutions, micro creditors, developers, economists, academics and government authorities better understand the macroeconomic factors driving house prices in RDP resale submarket.

With an understanding of the relationship between the economy and RDP home prices it will be possible to create macroeconomic models to forecast house prices and stress test these assets. Government authorities, and more importantly, mortgage lenders, will be able to identify the significant macroeconomic factors (if any) that influence this housing submarket. By providing a quantitative appreciation of the value associated with RDP homes, more financial products can be created for these assets, as well as more investment in the supply of affordable housing from the

private sector. Through economic predictability RDP homes may gain credibility in the financial markets.

1.4 Motivation of the Study

There are few, if any, institutionalized lenders, such as South Africa's big four (4) banks, that offer financing - both on the supply and demand side – for non-traditional assets, such as affordable housing. By industry standard, a non-traditional real estate asset is one where the asset's cash flow from operations is deemed riskier due its questionable consistency, in so far as its ability to service debt or generating risk adjusted return for investors. This risk can be born out of the assets operating nature, location, ownership structure etc. Moreover, the perception in the market associated with affordable housing is that the value of the underlying assets is weak or difficult to determine. This perception is one reason for a remaining social and humanitarian crisis in the delivery of affordable housing in both South Africa and the rest of the world. This study's motivation is to help rationalize the value of RDP houses in order to attract more capital toward affordable housing projects; thereby helping to provide more housing to those vulnerable members of society.

1.5 Objectives of the Study

The objective of this study is to:

To determine the relationship between the RDP home prices movements and macroeconomic factors such as GDP, the stock market (JSE), the average bank lending rate, the inflation rate in South Africa.

1.6 Research Questions

The overarching research question that will be addressed in this paper is whether there is a significant relationship between the RDP sales prices and various macroeconomic factors (i.e. GDP, interest rates, the stock market and inflation) in the context of the South African economy.

A statistically significant relationship among the variables would suggest that a RDP resale market that moves in congruence with the market will allow for greater measurability and predictability. In light of the above, this could mean that, these assets could be eligible for more conventional or augmented financial products that other mainstream housing assets enjoy; including, but not limited to mortgages, lines of credit, and insurance products.

1.6.1 Hypothesis

This quantitative based study uses a deductive research approach. A null hypothesis (H_0) is developed to test the statistical significance of the independent variables' relationship to the dependent variable (RDP house prices):

H₁: Gross Domestic Product (GDP) has a significant impact on the RDP house prices in South Africa.

H₂: The prime lending rate has a significant impact on the RDP house prices in South Africa.

H₃: The stock market has a significant impact on the RDP house prices in South Africa.

H₄: Inflation has a significant impact on the RDP house prices in South Africa.

1.7 Limitations of the Study

The scope of this study focuses on RDP house price movements relative to macroeconomic factors in South Africa's major metros. Two limitations are defined below:

- a. Macroeconomics factor selected for analysis are real GDP, the prime bank lending rate, the stock market and inflation, as measured by the consumer price index. Other studies have incorporated other variables such as population growth, rentals, housing supply, consumer confidence and exchange rate (Tze, 2013), Pillaiyan, 2015, Aye, Mehmet and Gupta, 2011, Standish et al., 2005).
- b. Multivariate regression analysis is the technique used in this study. A per the literature review, most studies of this nature use a period of ten years or longer; using a quarterly

frequency. A study spanning over a longer time period – that provides for more data points - allows for the smoothing out of economic factors that will provide a more significant regression as economies tend to experience both external and internal shocks through boom and bust cycles. Unfortunately, aggregated RDP resale prices only began to be tracked in 2007. For this reason the study relies on nine years (i.e. 2007 -2015 inclusive of 2007) of data which is captured on a yearly basis. Despite covering only 9 years, there is no concern because the study covers 8 metropolitan cities. This means that in each year there are 8 data points, which results in 72 data points for the entire period under consideration. Therefore, with 72 data points, it is possible to conduct meaningful tests using regression analysis since the minimum requirement for a meaningful interpretation of regression results is 60 data points.

1.8 Organization of the Study

In Chapter 2 the study will begin by documenting the historical evolution of South Africa's affordable housing market. This will allow the reader to appreciate the government's role in creating this unique housing market. In Chapter 3, a compressive literature review will be presented on the academic studies that have used various scientific research methods to study the relationship between house prices and macroeconomic determinants. Studies from the Global North and South, as well as, South Africa will be examined and the gaps in the current state of the knowledge will be discussed. This is followed by a comprehensive description of the study's research method and variables in Chapter 4. The empirical findings will be reported in Chapter 5, along with an analysis and discussion of the results. Chapter 7 concludes this with recommendations for the future research in the area of affordable housing economics in South Africa.

CHAPTER 2: THE HISTORY OF AFFORDABLE HOUSING IN SOUTH AFRICA

Access to affordable housing remains a contentious issue within South Africa's national dialogue. Despite the government's achievement in the delivery of state sponsored housing, South Africa continues to deal with a backlog of low cost housing demand. In order to address this historical problem – that intersects between racial and socio economic lines - the government's hand has played an active and interventionist role in the mobilization of housing in the market (Lebone, 2010).

This chapter aims to provide an understanding of the state of South Africa's housing infrastructure in the early 1990's - or lack thereof - when the newly elected ANC government took power from the previous apartheid government. Highlighting the progress made to date, this chapter also identifies the major government policy, key legislative frameworks, and specific programmes that have helped shape today's RDP housing market.

2.1 Policy Framework: Reconstruction and Development Programme (1994)

When the ANC took power in 1994, millions of South Africans lacked access to basic housing and other essential services, such as water, sanitation and electricity (Lemanski, 2011). According to the Labour Development and Research Unit “approximately one quarter of all urban households in the country didn't have access to sanitized water. Some 48% of all households did not have access to flushing toilets. Further, 16% did not have access to any type of sanitation system; while 46% of all South African households were not connected to the electricity grid” (Housing White Paper, 1994, s 3.1.4(a)). In order to address these monumental challenges the ANC government introduced the Reconstruction and Development Programme (RDP). This mass infrastructure programme would serve as the blueprint to help improve the quality of life for the republic's citizens by acting as the overarching framework for infrastructure development. A key pillar of the

RDP was to provide adequate housing, socio-economic opportunities and spatial integration to displaced residents (Landman, 2005: 130). With a massive backlog in housing the ANC government committed to building one million new homes in its first term in office as prescribed by the framework of the RDP (South African Human Rights Commission, 2004).

2.2 Housing as a Constitutional Right (1996)

With South Africa's transition to a democratic republic in 1994 the government committed itself to the delivery of low cost housing to those citizens who had been marginalized by the previous apartheid government's spatial policies (Khan & Thurman, 2001). As a sign of this political commitment the ANC government – which had become the sole ruling party by 1996 – recognized the right to adequate housing as per Section 26(1) of the South Africa Constitution: “Everyone has the right to have access to adequate housing.” Further, sub-section 26 (2) states: “The state must take reasonable legislative and other measures within its available resources to achieve the progressive realization of this right.” Finally, sub-section 26 (3) requires, “no one shall be evicted from the home, or have their home demolished, without any order of court made after considering all the relevant circumstances. No legislation shall permit arbitrary evictions.”

In its purest interpretation the 1996 constitution acknowledges and protects the right of South Africans to have access to adequate housing and places a burden on government to take “reasonable legislative and other measures within its available resources to achieve the progressive realization of this right” (Lemanski, 2011).

2.3 Legislative Framework: Housing Act (1997)

With the idea of housing as a basic right now enshrined in the republic's constitution the White Paper on housing was the first major policy document submitted to the South African parliament in 1994; it laid the legislative foundation for the provision of housing: “to increase the budget

allocation of housing in order to reach the targets set in the RDP within record time and to accelerate delivery of housing” (Housing White Paper, 1994, 3.1.2). This was followed by the Housing Act of 1997, which was the key piece of government legislation that identified the overall relationship and responsibility among the three levels of governments. According to the Housing Act, the national, provincial and local municipal governments “shall prioritize the needs of the poor regarding housing development and should consult with both individuals and communities who are affected by such developments” (Housing Act 107, 1997).

In order for the government to deliver on its new housing legislation, as well as to fulfill its political promises and constitutional obligations, the South African government would embark on various development initiatives and financial programs over the next decade and a half. The most notable programmes are identified below.

2.4 National Housing Subsidy Programme (1996)

As part of the RDP framework - targeting the delivery of one million houses in the first five years of democracy - there would be a minimum housing standard for government housing whereby the cost of construction would be financed through a combination of a government subsidy and loan provision from private lenders (Tomilson, 1995). As such, the government introduced the National Housing Subsidy Programme (NHSP) in March of 1994 with a target of delivering of 200,000 units per year at a cost of R30,000. The government agreed to provide a once-off capital subsidy for a starter home (or “RDP home”) to all households that had a combined income of less than R3,500 per month - almost 86% of South Africa's households fit into this category at the time (Tomilson, 1995). The subsidy amounts ranged from R5,000 to R15,000 depending on the government’s prescribed income scale. (Tomilson, 1995) states that a consequence of this state led

delivery approach was the creation of a “culture of entitlement” among lower income households; unrealistic and unsustainable in the long run.

2.5 National Housing Finance Corporation (1996)

The RDP housing policy also called for initiatives to enhance housing affordability for the greater population. This included establishing the National Housing Finance Corporation (NHFC) which acts as a wholesale financier that provides capital to non-bank housing lenders who service low-income earning households. Today, South Africa has a small, yet growing housing microfinance industry. Several programmes were also launched that encouraged formal financial institutions to lend credit for housing needs, such as upgrades. An agreement was reached between the government and the banks to provide 50,000 micro loans to lower income households at the time (CAHF, 2012).

2.6 Breaking New Ground (2004)

Ten years into South Africa’s fragile new democracy the government made a major policy shift on its housing policy with its Break New Ground (BNG) framework. The BNG strategy aimed to promote a more integrated society by developing sustainable “human settlements” and “quality housing” rather than the government simply providing once off subsidized units in informally planned areas (Department of Human Settlements, 2004).

The purpose of spatial restructuring was an attempt to create well located housing on land that is near economic hubs and where infrastructure was already in place. The strategy also sought to address the issue of poverty by building houses in an environment where the home would become an economic asset to the homeowner. BNG sought to address the disadvantage of building homes in poorly located areas that were on urban peripheries and did little to address the “apartheid space

economy.” Converting the delivered houses into valuable economic assets is heavily contingent on the location of these houses and the ability to register the title deeds with the registrar.

2.7 Impact of Affordable Housing in South Africa

While government would go on to create other subsidy programmes since BNG, such as the Financial Linked Individual Subsidy (FLIPS) – where beneficiaries received a once off capital contribution for a home down payment of between R10,000 to R87,000 (Lebone, 2010) - the ANC government has made tremendous gains in addressing the massive deficiency in affordable housing supply. The government announced in its Twenty Year Review publication that approximately 2.8 million residential dwellings, and 876,774 serviced sites were delivered to 12.5 million South African since the implementation of the RDP in 1994 (The Presidency, 2014).

2.7.1 Property Registration: Share of RDP vs. Entire Household Market

According to (Rust, 2010) the registration of a residential property is critical: “as residential properties are registered through a process with the South African deeds registry homeowners are ensured security of tenure, and with legal title, they can raise credit against the security of those assets, and can climb the housing ladder by selling their home and buying a new home.”

The deeds registry in South African holds 6.7 million properties on its registry system; with an estimated value of R5.2 trillion. About 5.8 million of these registered properties or 86% are classified as residential dwellings. Of these, about 1.42 million have been are thought to be RDP homes, which comprises a quarter (24%) of South Africa’s total residential housing market (National Housing Financing Corporation, 2014).

As per the table below, from 2010 to 2014 residential properties listed on the South African deeds registry grew by approximately 52,000 units, of which 16,000 are considered to be RDP homes. Over this period the registration rate of RDP homes, or new “government sponsored” properties,

is higher than its percentage of total market share (24%); hence the proportion of these units that are eligible for a legal open sale in the residential market is growing at a higher pace year-over-year. This is seen through a 40% change in value between 2012 to 2013 (CAHF, 2015b).

Table 1 - Properties on the deeds registry, 2010 - 2013 (Source: Citymark Dashboard, 2015)

	2010	2011	2012	2013
Total residential properties on the deeds registry	5 637 324	5 702 826	5 756 958	5 808 964
Annual increase in the number of residential properties	55 404	65 502	54 132	52 006
Total (est.) government sponsored properties on the deeds registry	1 359 826	1 383 489	1 404 990	1 421 041
<i>Percent of all residential properties that are government-sponsored</i>	<i>24%</i>	<i>24%</i>	<i>24%</i>	<i>24%</i>
Annual (est.) delivery of govt-sponsored properties recorded on the deeds registry	27 691	23 663	21 501	16 051
<i>Percent of total increase that is government-sponsored (est.)</i>	<i>47%</i>	<i>36%</i>	<i>40%</i>	<i>31%</i>

In two of Gauteng’s metros (Tshwane and Ekurhuleni), the increase in registered government-sponsored properties over the past eight years has slightly exceeded the increase in all properties overall, as seen in Table 2 and Table 3.

Table 2 - % Change in RDP Housing YOY, since 2007 (Source: Citymark Dashboard, 2015)

Percent Change in Government Sponsored properties Per year, since 2007								
Municipality Name	2007	2008	2009	2010	2011	2012	2013	2014
City of Tshwane	0.0%	3.2%	4.6%	7.5%	9.1%	14.4%	19.5%	21.4%
City of Johannesburg	0.0%	1.2%	1.7%	2.1%	3.1%	4.8%	6.1%	6.3%
Ekurhuleni	0.0%	1.0%	2.2%	3.5%	4.1%	4.2%	4.2%	4.3%

Table 3 – YOY % Change in Residential Properties (Source: Citymark Dashboard, 2015)

Percent Change in All Residential Properties Per year, since 2007								
Municipality Name	2007	2008	2009	2010	2011	2012	2013	2014
City of Tshwane	0.0%	2.7%	4.2%	5.4%	6.4%	8.0%	9.8%	11.3%
City of Johannesburg	0.0%	2.1%	3.0%	3.7%	4.9%	6.2%	7.4%	8.6%
Ekurhuleni	0.0%	1.7%	2.8%	3.8%	4.8%	5.2%	5.6%	6.0%

2.7.2 Geographic Distribution of RDP Homes

Although Table 4 (below) shows that the Province of Gauteng has the lowest proportional share of RDP homes based on the total number residential properties, it does have the largest number of RDP homes at 364,000. With Gauteng having the largest residential property market in the county,

its three biggest metros have the largest number of RDP homes in the country out of all of the major metros: Johannesburg, 129,000; Ekurhuleni, 100,000; and City of Tshwane, 84,000 (CAHF, 2016).

Table 4 - Distribution of RDP Properties, 2013 (Source: Citymark Dashboard, 2015)

Province	Number of Govt Sponsored properties (est)	Number of Residential properties	Percent Government Sponsored
Eastern Cape	224K	585K	38%
Free State	165K	458K	36%
Northern Cape	52K	167K	31%
Mpumalanga	83K	296K	28%
North West	70K	267K	26%
Limpopo	45K	183K	25%
KwaZulu-Natal	180K	789K	23%
Western Cape	237K	1 069K	22%
Gauteng	364K	1 996K	18%
Total	1 421K	5 809K	24%

Metro	Number of Govt Sponsored properties (est)	Number of Residential properties	Percent Government Sponsored
Nelson Mandela Bay	85K	224K	38%
Buffalo City	32K	103K	31%
Mangaung	41K	169K	24%
eThekwinini	90K	437K	21%
City of Cape Town	143K	712K	20%
Ekurhuleni	100K	536K	19%
City of Johannesburg	129K	690K	19%
City of Tshwane	84K	508K	17%
Total	705K	3 379K	21%

According to (Rust, 2010) the clustering of RDP homes near or around major metros is a result of the BNG policy of delivering well located RDP homes that are spatially connected to major urban centres; helping to allow for economic gain via home value appreciation.

2.7.3 Value of RDP Homes in South Africa

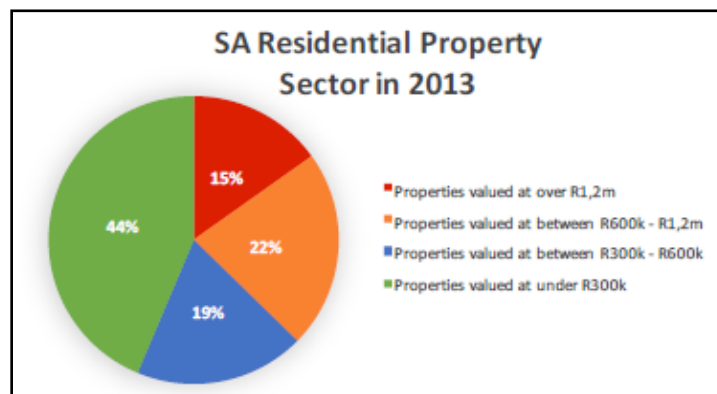
Based on (CAHF, 2016) estimates the total value of RDP housing in South Africa is approximately R218.9B. This represents 5.0% of the total value of the total value of all the residential real estate in the country (R4,024 billion).

Table 5 - Value of Government Sponsored Properties as at 2014 (Citymark Dashboard, 2015)

Value of Government Sponsored Properties, nationally, 2014			
Province Name	Value of Govt Subsidized properties	Value of Residential properties	% Government Sponsored Value
Free State	R 21.1B	R163.3B	13%
Northern Cape	R 7.5B	R55.4B	14%
Eastern Cape	R 31.9B	R282.2B	11%
Mpumalanga	R 12.1B	R141.3B	9%
North West	R 11.1B	R120.5B	9%
Limpopo	R 7.0B	R90.1B	8%
KwaZulu-Natal	R 25.9B	R511.4B	5%
Gauteng	R 64.5B	R1 611.0B	4%
Western Cape	R 37.8B	R1 049.2B	4%
Grand Total	R 218.9B	R4 024.4B	5%

Again, while the province of Gauteng has among the smallest proportional share of RDP homes as compared to its total market, it has the highest total value of RDP homes at an estimated R65.4B. The majority of homes in the residential property market (63%) include homes valued at less than R600,000; which are thought to include RDP homes. Residential homes that are valued at R300 000 or less make up 44% of all residential homes in South Africa’s housing market – which is the largest value bracket in the housing market as per Figure 1. While the deeds office does not make a distinction between RDP vs non RDP homes in its tracking, it is estimated that the overwhelming majority of homes valued at less than R300,00 are in fact RDP homes (CAHF, 2015b).

Figure 1 - Breakdown of SA Residential Property Market (Source: Citymark, 2015)



According to (CAHF, 2016), the average value of these units among the major metros is about R168,000. This is about 21% of the national average for a residential property in South Africa - which is estimated to be R813,000. In the case of RDP properties, the value listed at the time of registration is listed as the original subsidy amount, rather than a true market value or sales price. Hence, these initial listed property values are more than likely an underestimate of the R218.9B noted in Table 6.

Table 6 – Value of Government Sponsored Properties, 2014 (Citymark Dashboard, 2015)

Value of Government Sponsored Properties, nationally, 2014			
Province Name	Value of Govt Subsidized properties	Value of Residential properties	% Government Sponsored Value
Free State	R 21.1B	R163.3B	13%
Northern Cape	R 7.5B	R55.4B	14%
Eastern Cape	R 31.9B	R282.2B	11%
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North West	R 11.1B	R120.5B	9%
Limpopo	R 7.0B	R90.1B	8%
KwaZulu-Natal	R 25.9B	R511.4B	5%
Gauteng	R 64.5B	R1 611.0B	4%
Western Cape	R 37.8B	R1 049.2B	4%
Grand Total	R 218.9B	R4 024.4B	5%

2.7.4 Equity Growth in the RDP Homes

According to (de Soto, 2000), the growth in value of and economic assets, such as a home, provides a significant source of capital to lift families out of poverty. Equity, the value of homes less any outstanding mortgage debt, can help families move up the housing continuum by making subsequent homeownership more affordable by reducing the amount of the bond or increasing the amount of houses which can be bought.

Table 7 from below shows the percentage growth of equity for homes below R600,000 versus the overall market . In Gauteng’s three major metros, equity in homes under R600,000 has grown by 20.0% more over the period than the overall residential housing market in South Africa. Those

homes valued at or less than R300,000 have increased in value more quickly than the overall market and are less likely to have a bond. Both factors contribute to the faster growth in equity.

Growth in Equity, from 2007		
All properties and properties under R300 000		
Gauteng metro municipalities, to 2014		
Municipality Name	All Residential Properties	Properties under R300k
City of Johannesburg	40%	61%
City of Tshwane	44%	73%
Ekurhuleni	46%	62%
Grand Total	43%	64%

Table 7 - Equity Growth of RDP Homes <R300k (Source: Citymark Dashboard, 2015)

CHAPTER 3: LITERATURE REVIEW – HOUSING PRICE DETERMINANTS

The literature review in this paper will focus on various academic studies that have scientifically tested the effects of GDP, prime lending rate, the stock market, and inflation on housing markets around the world. Studies conducted in the South African context will be examined in Section 3.6.

3.1 Macroeconomic Drivers and the Property Market

Based on the current literature it is widely understood that house prices are influenced by macroeconomic fundamentals in the economy, as well as supply and demand dynamics associated with the respective the local market (Huu, Ismail, & Nasir, 1999). One of the primary reasons researchers and governments continually seek to understand, measure and evaluate the relationship between the macro economy and movements in property prices is because when house prices move beyond prevailing economic fundamentals there is the potential for property bubble to form. When a real estate bubble eventually bursts home prices will drop dramatically leading to significant wealth destruction in the market (Pillay, 2008). This phenomenon was clearly demonstrated in the recent US housing market meltdown that triggered the 2008 global financial crisis. The subsequent market meltdown clearly showed the interdependent link between the housing market and the overall economy (Pillaiyan, 2015). While this paper is not focused on the potential for a property bubble formation in South Africa's RDP housing market, it is important to appreciate the interdependence between the various macroeconomic drivers have had on affordable home prices in South Africa. The international literature suggests that there are a number of key economic variables that are likely to influence the value of residential homes. While researchers have created a variety of econometric models to test different economic variables against home prices, the most frequently used ones are GDP, prime lending rate, stock market performance and inflation (Brooks & Tsolacos, 1999).

3.2 The Relationship between GDP and House Prices

According to (Case, Goetzmann, & Rouwenhorst, 2000) it is widely accepted that real GDP is the main long run macroeconomic determinate of home prices; (Wit & Dijk, 2003) explain real GDP as the main driver of real estate in economic boom and bust cycles. As per (Tsatsaronis & Zhu, 2004), real GDP growth captures information contained in other more direct measures of household income, such as unemployment and wages. (Tze, 2013) finds real GDP to be the main driver of house prices in Malaysia. With reference to the Malaysian state of Sarawak, (Huu et al., 1999) find that real GDP is significantly related to the “number of terraced, semi-detached and long houses.” According to the researchers, terraces increase when the GDP rate is growing. Detached housing is found not to have any significant lead relation. Thus, (Huu et al., 1999) work shows that the housing market is fragmented along housing market segments; buyers are not necessarily influenced by GDP when making their buying decision. Alternatively, the demand for houses generates housing industry investment and drives the GDP growth rate (Qing P.M., 2010).

3.3 The Relationship between Interest Rates and House Prices

Generally speaking, when interest rates increase the cost of capital goes up as loan repayments become more expensive. Hence, a high prime rate results in higher mortgage repayments; reducing the affordability and therefore the overall demand for housing. It is widely accepted that interest rates and real estate prices have an inverse relationship. However, this is not always the case as seen in (Tsatsaronis & Zhu, 2004) work studying the Malaysian housing market.

(Meen, 1994) takes the view that interest rates are the most important factor that affects residential house prices in the United Kingdom (UK). (Meen, 1994) argues that with the government’s loosening of mortgage markets – through its monetary policy in the early 1980’s - the economy

had become more sensitive to changes in bank lending rates. As such, government monetary policy was central determinant to housing prices. (Jud & Winkler, 2002) further support this finding with their research that shows a drop in after tax interest rates from 1984 to 1998 had a significant relationship to house price in the US.

(McCue & Kling, 1994) found that nominal interest rates – through a negative relationship - is the most important determinant of real estate returns; (Lizieri & Satchell, 1997) also found that the movement of the nominal interest rate to the inflation rate has a significant degree of influence on property share prices; (Brooks & Tsolacos, 1999) investigated the impact of economic and financial drivers in the UK real estate market. They conclude that the interest rate term spread, along with lagged values of the real estate series, were the most important drivers of property returns in the UK market.

In terms of developing countries, (Ramazan, Bradley, & Bahadir, 2007) found that in Turkey interest rates had a bigger impact on the housing market when compared to those of developed economies. It was suggested that this is due to the fact that most developing economies have a less mature financial institutions and are therefore constrained in their sourcing of capital in the international markets. The central bank lending rate in (Pillaiyan, 2015) extensive examination of the Malaysian property market – using nine economic variables in total - was found to be most statistically significant independent variable in its relationship to home prices.

3.4 The Relationship between the Stock Market and House Prices

As a leading financial indicator in the daily market, the stock market's relationship to house prices has been one of the most widely studied explanatory variables in the literature. Understanding the causality relationship between these two variables (or assets) provides important insight as to household welfare, asset allocation, and portfolio investment. Also, various financial studies

suggest that both stock prices and house price act as leading indicators for both output and inflation in the economy (Stock & Watson, 2003). Regarded as a consumption good, real estate assets are also considered as alternative investment to stock market securities.

In explaining the relationship between stock market and real estate prices two theoretical mechanisms are consistently referenced in the literature: the Wealth Effect and the Credit-Price Effect (Pillaiyan, 2015). The Wealth Effect theorizes that households who profit from capital gains in share prices will have an increased demand for housing. Hence, a stock market boom will lead to housing price growth. Alternatively, Credit-Price Effect postures that house price increases will improve the balance sheet position of firms as real estate is used as a form of collateral. Firms holding real estate on their balance sheets will see an increase in company's tangible value. Investors are now willing to pay a premium for these companies, thus putting upward pressure on the company's stock price (Kapopoulos & Siokis, 2005).

These opposing theories might explain why the literature shows inconsistent results on the relationship between these two variables and continues to be the subject of debate in the academic literature. For instance, (Krainer & Furlong, 2000) witnessed a positive relationship between stock prices of high-tech firms located in the San Francisco Bay area. However, they were unable to see a similar relationship with high-tech firms situated in the city of Los Angeles and San Diego. (Catella, 2002) argues the opposite: there is a negative relationship between property prices and the performance of the stock market. Theoretically, a negative relationship is a possible outcome as the property market and the equity market can be seen as two competing markets for investors. (Okunev, Wilson, & Zurbruegg, 2002) account for the inconsistencies in the literature by arguing previous studies are using different data sources and shorter time series intervals. In their examination of Australian real estate and stock market from 1980 to 1999 the authors contributed

to the existing literature by concluding that structural movements in both the stock and property market can lead to the emergence of an “unstable linear relationship between these markets.” Specifically, full-sample results support bi-directional Granger causality between the two variables, while the of sub-samples used to explain for structural shifts in the equity markets generally shows that changes in stock market influence real estate market returns, but not vice versa.

While previous studies have focused on the time series of stock and real estate returns using data from a single country, (DC Quan & Titman, 1999) used data from 17 different countries over 14 years observed the real estate and the equity market do have a positive relationship. Similar to other country-specific studies the authors found the contemporaneous relation between yearly real estate price changes and stock returns is not statistically significant. However, when the data was pooled across countries using longer time intervals there was a significant relation between stock returns and home values. Interestingly, (DC Quan & Titman, 1999) found GDP growth rates significantly influence home prices. Hence, it would appear there is always a need to incorporate more than one variable in any data analysis.

3.5 The Relationship between the Inflation and House Prices

The prevailing literature suggests that inflation is a key macroeconomic determinate for house prices. (Tsatsaronis & Zhu, 2004) focused on the characteristics of the mortgage markets in 17 industrialized countries (North America and Europe); concluding there is a strong and long-term link between inflation and housing price. The researchers found that inflation accounts for more than 50% in the total variation in house prices when analysed at a five-year timeline. Similarly, in the short run, the size of the impact is even larger. Inflation’s contribution is close to 90% of the total price variation in the one-quarter horizon and drops to about two thirds over the one-year

horizon. (Tsatsaronis & Zhu, 2004) maintain that the reason for this influence is related to houses being viewed as an investment and a good hedge against inflation in the market. As such, during periods of high inflationary pressure in the market investors will seek the refuge of real estate as a vehicle for long-term savings as the expected returns on bonds and equities are uncertain.

Interestingly, (Tze, 2013) ten year study of the Malaysian housing market found a relatively insignificant relationship between inflation and real housing prices. The study used CPI as a measure of inflation over a ten year period. However, (Zainuddin, 2010) 15 year study of the Malaysian housing market – using a multivariate regression model - showed a statically significant relationship at the 10% significance level. The different results may be due to (Zainuddin, 2010) longer time intervals. Notwithstanding, the (Zainuddin, 2010) result implies that Malaysian house prices are sensitive in nature to inflation and any expected increase in asset pricing - as seen through the inflationary signals - may actually influence the buying decision of Malaysian's in the market. This interpretation also implies that the decrease in inflation may be seen as a permanent decrease in the real rates of inflation. Thus, the demand for housing increases; leading to higher prices. The (Zainuddin, 2010) experiment in Malaysia shows that the demand for housing is based on expectations about future prices of houses.

3.6 Housing Price Determinants in the South African Context

Understanding current state of the South African economy is important as it serves as part of the backdrop to this study. It has been said that South Africa is the engine of growth in Africa (Arora & Vamvakidis, 2005). Until recently South Africa had the largest GDP on the continent; today it is ranked second only behind Nigeria in terms of GDP. Classified as a “middle income” country by the (World Bank, 2016), South Africa enjoys a well-diversified economy as seen through its well-built transportation, IT, and service infrastructure that is supported by both

enabling legislation and the rule of law; allowing for the free flow capital helps drives private investment in the market.

With a market capitalization of USD \$1 trillion (2014) the Johannesburg Stock Exchange (JSE) is currently ranked as the 19th largest stock exchange in the world. As South Africa's central bank, the South African Reserve Bank (SARB) is focused on managing the growth of the economy by maintaining price stability and protecting the value of the Rand. SARB's monetary policy focuses on an inflation target which currently works a rolling band of 3.0% to 6.0% based on CPI.

Despite the country's economic achievements since through the first 20 years of democracy, South Africa continues to suffer from extreme socio-economic inequality as seen through a Gini coefficient of 0.65. The high Gini coefficient is driven by a staggering national unemployment rate of 25.0% (OECD, 2015). Notwithstanding, it is important to review and analyze what the literature reveals about behavior of the overall South African residential market, as well as the scientific research methodologies that were used in the South African context. This understanding will help guide the methodology approach in this study.

3.6.1 The Relationship between GDP and House Prices in South Africa

(Clark & Daniel, 2006) reveal there is a positive relationship between GDP and home prices for residential properties valued at less than R2.2 million with a size of 80m² - 400m² in South Africa. Over a 25 year time period the authors observed 11 different economic and financial variables that drive South Africa's (non-state sponsored) residential property market¹. Using a lagged approach within a period of two quarters their model produced a coefficient of determination (R^2) of 0.784,

¹ JSE/Actuaries All Share Index, (ALSI), Number of Building Plans Passed, Rand Merchant Bank/Bureau for Economic Research (RMB/BER) Business Confidence Index, Ratio of Household Debt to Disposable Income, Real Gross Domestic Product (GDP), Real Gold Price, Number of Motor Vehicle Sales, Real Oil Price, Real Prime Rate

indicating that the model explains a significant portion or 78.4% of the variability in the response variable. In addition, all the explanatory variables included in the model are significant at the 5.0% level. Having positive relationship with GDP, the coefficient for GDP in the (Clark & Daniel, 2006) study reveal that a one percent increase in GDP will increase property prices by 0.367%.

3.6.2 The Relationship between Interest Rates and House Prices in South Africa

(Clark & Daniel, 2006) found a negative relationship exists among interest rates, exchange rate movements and house price growth rates in South Africa. The study's analysis reveals that a 1.00% increase in central bank's exchange rate led to a -0.026% decrease in the quarterly property growth rate. In the (Standish et al., 2005) study - *The of determinants of residential house prices in South Africa* – ten explanatory variables were incorporated into two separate models for the periods between 1974 to 2003 and the second 1994 to 2003². In this study, a strong negative correlation was found between real interest rates and home prices. Surprisingly, inflation was not incorporated in either model, including the (Clark & Daniel, 2006) study.

3.6.3 The Relationship between the Stock Market and House Prices in South Africa

(Aye, Mehmet, & Gupta, 2011) conducted a comprehensive South African examination of the long and short-run relationships between house and stock prices using both linear and nonparametric approaches for the period 1966 to 2011. House prices in this study were obtained from the Allied Bank of South Africa (ABSA), while the All Share Index (ALSI) from the JSE was used as a proxy for share prices. Based on a series of statistical tests the authors conclude that the nonparametric approaches in their modeling “implied that the two asset markets not only move together in the

² Interest Rates, Real Rand/Dollar (R/\$).Gross Domestic Product (GDP), Household to Debt Income, Net migration, Affordability, Rental Incomes, Sentiment, Wealth Effects, Crime and Cost Of Construction.

long-run, but also short-run interdependencies in the form of a wealth effect and a credit-price effect are prevalent in the South African economy (Aye et al., 2011).”

3.6.4 The relationship between Inflation and House Prices in South Africa

(Gupta, Jurgilas, & Kabundi, 2010) studied the impact of monetary policy shocks on real house price growth. Specifically the authors used the growth rate of the ratio of nominal house price to the Consumer Price Index (CPI) over five cross segments of the housing market in South Africa: the luxury, large-medium-and small-middle-segments and the affordable housing market from between 1980 to 2006³. Using the factor-augmented vector autoregression methodology (FAVAR) - which can manage a large set of data in order to improve the accuracy of an econometrics model’s interpretation of the effects of monetary policy – the study concluded that house price growth in South Africa generally responds negatively to a positive monetary policy shocks. Notwithstanding, the response of real house price growth rate was found to differ across the five housing categories. This suggests that these segmented markets exhibit varying behavior in relation to inflationary pressures. For instance, the study found that the luxury, large-middle and medium-middle-segments experience the largest negative impacts following a contraction in monetary policy. In contrast, at the bottom pyramid of the market – small, middle segment and the affordable housing market segment “see small and short-lived negative” effects on home prices as there is a rise in inflation. As one of the only studies of this nature conducted in the South African context, (Gupta et al., 2010) suggest that variations among the aforementioned housing sub-segments can

³ The ABSA Housing Price Survey: luxury houses (R2.6 million to R9.5 million), middle-segment houses (R226,000 to R2.6 million) and affordable houses (R226,000 and below with an area in the range of 40 m²–79 m²); and further subdivides the middle-segment category based on the square meters of house area into small (80 m²–140 m²), medium (141 m²–220 m²) and large (221 m²–400 m²).

potentially be due to regional variances (i.e. provinces). Future analysis on the regional housing price difference is suggested.

3.7 Summary

The literature review has highlighted the major findings and current state of understanding in the field of housing price drivers in the macro economy. Notwithstanding, the current gaps in the literature are twofold: first, the existing body of knowledge exploring the relationship between macroeconomic indicators and residential house prices have mostly focused on economies in the Global North – with varied studies in developing economies, such as Turkey and Malaysia (Pillaiyan, 2015) (Sari, Ewing, & Aydin, 2007) – there have been a few studies in both the South Africa and other developing housing market. Second, there is no literature on the price determinants for both RDP housing and affordable housing markets around the world. The next chapter will outline the methodological framework that utilized to address these two gaps in the field.

CHAPTER 4: DATA COLLECTION AND RESEARCH METHODOLOGY

To investigate the problem statement from Chapter 1 this study will pursue a quantitative research methodology; no primary data is considered in the paper. This is deemed appropriate given that the analysis and data for the study's hypothesis is based on quantitative data sources. (Saunders & Lewis, 2009) explain that through explorative research, a quantitative research design will consider specific values, trends, or distributions of all the variables.

Chapter 4 is split into two sections. The first part of the chapter describes how the data was assembled and analyses its validity. The second section focuses on the specific methods used to ascertain the relationship and interdependencies between the dependent variable and independent variables. This will be conducted through a multiple regression technique – using Excel software – that will measure and quantify how the dependent variable (Y) is related to the selected independent variables (X).

4.1 Data Collection

All secondary data has been gathered from a combination of government, private sector, non-profit and academic sources. The study uses annual data from 2007 to 2015 for all macroeconomic data. This choice in data frequency is driven by the independent variable values (RDP resale values) that are only available on an annual basis. The Centre for Affordable Housing in Finance in Africa began tracking price movements in RDP homes sales in 2007. They are the only organization in South Africa that has the capacity to track this data. The corresponding independent variables were all gathered from a combination of credible institutions in South Africa. The table below identifies the sources of all data collected for this paper.

Table 8 - Data Sources

No.	Variable	Abbreviation	Source
1.	RDP Housing Price	Y	Data sourced from CAHF's Citymark Dashboard data.
2.	Real Gross Domestic Product	GDP	Data sourced from Statistics South Africa's Economic update section.
3.	Interest Rates	RATE	Data sourced from SARB.
4.	Stock Market	JSE	Data sourced from DataStream terminal located in GSB library.
5.	Inflation (Consumer price index)	CPI	Data sourced from SARB.

4.1.1 Dependent Variable

To determine the price movements of RDP homes in South Africa CAHF provided the average resale values in the metros with the largest recorded sales transactions from 2007 to 2015 (Buffalo City, Cape Town, Johannesburg, Tshwane, Ekurhuleni, eThekweni, Mangaung and Nelson Mandela Bay). These metros were chosen as CAHF has identified them as having the highest volume of RDP home resales (CAHF, 2015c). According to data from the deeds office these nine metros combine for a total of 908,000 RDP units. This represents approximately one quarter of all the RDP homes in South Africa.

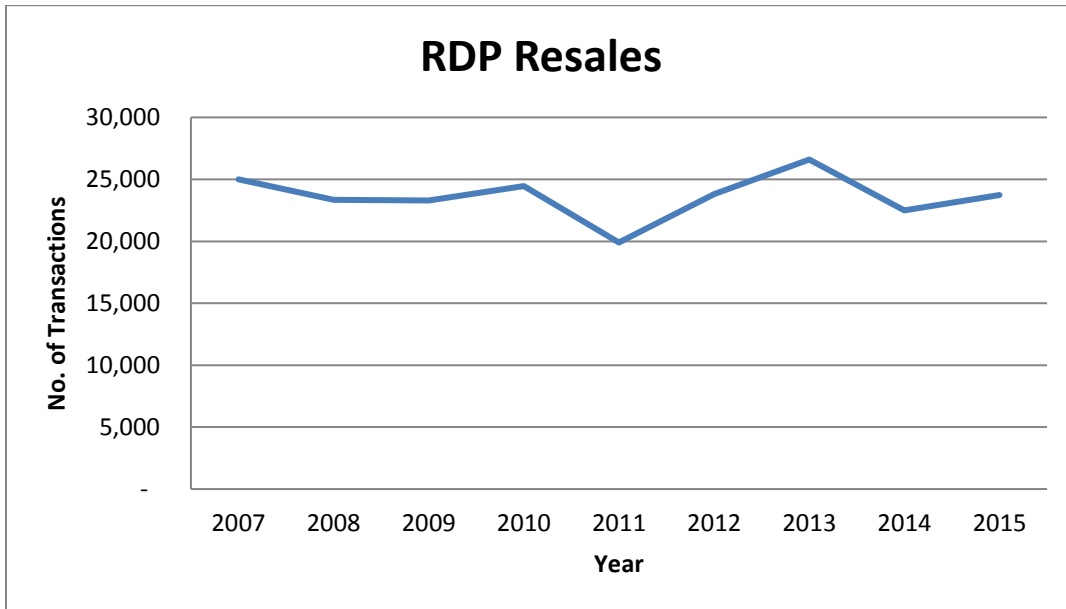
Figure 2 - Location of Metros with Highest RDP transactions (Source: CAHF, 2016)



CAHF compiles this data by obtaining and cross referencing title deeds records from the government registry, merging them at a suburb level interface and ranking them through their CAHF’s Citymark dashboard platform. CAHF explains: “priority is placed on actual transaction datasets from valid sources that have been geocoded to the subplace level, trended over time, and updated regularly (CAHF, 2015b).” With an estimated 3.4 million RDP homes in existence the transacted data represents 6.2% of total RDP homes. This data is deemed an appropriate sample size for the general population of RDP resales in South Africa.

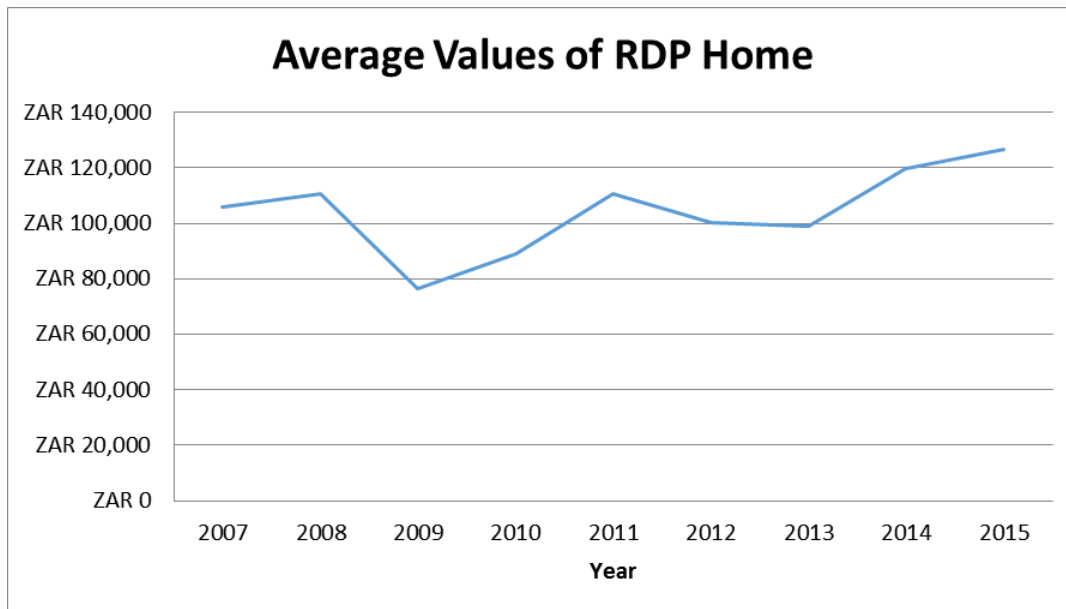
The graph below illustrates the aggregate transactions year over year among the eight cities selected. During the time period, on average, 23,500 RDP homes were traded per year with a slight dip below 20,000 units in 2011.

Graph 1 - Total Transaction of RDP Homes, 2007 to 2015 (Source: CAHF, 2016)



CAHF’s sales data indicates that from 2007 to 2015 the mean price of a government sponsored home was R104,000. In 2015, prices hit an all-time high of R126,500 and a low of R76,300 in 2008.

Graph 2 - RDP Home Prices, 2007 to 2015 (Source: CAHF, 2016)



4.2 Independent Variables

Table 9 defines each independent variable and explains its significance to the overall macro economy. The sections that follow describe South Africa's experience with the independent variables. This is intended to give the reader an understanding of each variable's performance in the economy.

Table 9 – Definition of Independent Variables

Variable	Definition
GDP	GDP is one of the most widely accepted indicators of macroeconomics performance; it is used by researchers to report on the general condition of the economy by measuring growth (MacLennan & Pryce, 1996). It is used in this study as it is the most widely accepted economic indicators between the macroeconomic environment and home price movements (Wheeler & Chowdhury, 1993). GDP is commonly defined as the overall total market value for all final goods and services produced in a country for a particular year. The formula for the GDP is equal to the total consumer, investment and government spending, plus the value of exports minus the value of imports.
RATE*	<p>According to the <i>International Journal of Central Banking</i> a central bank, reserve bank, or monetary authority is an institution that manages and executes a nation's monetary policy by controlling its currency, money supply, and interest rates (IJCB, 2016). A central bank will also regulate and oversee a state's commercial banking system by increasing the monetary base through the printing of the national currency or adjusting inter-banking lending rates. In managing the overall monetary policy the central bank's primary lever is managing of the prime lending (interest) rates. In most countries the prime lending rate is the rate that the central bank lends to private domestic banks or by issuing sovereign debentures (IJCB, 2016).</p> <p>Known as "Reserve Bank," SARB is the central bank of the Republic of South Africa. It was established in 1921 through the Currency and Banking Act (Act No. 31) of 1920. Today SARB's monetary policy is "conducted within an inflation targeting framework and the refinancing system is the mechanism used by the Bank for the implementation of monetary policy (SARB, 2016)."</p> <p>Since 2000, South Africa has used this inflation targeting framework in order to "adapt to economic and development challenges both domestically and abroad (SARB, 2016)." Inflation targeting is a monetary policy framework where a central "bank announces an explicit inflation target and implements policy to achieve this target directly (SARB, 2016)." Through its Monetary Policy Committee, SARB's inflation targeting framework provides it with full operational autonomy to use of any available monetary policy levers in its pursuit of inflationary targets (Ncube & Ndou, 2013).</p> <p>The SARB's "repo" rate is the lending rate that the central bank lends to private commercial banks in the country. It is the key mechanism used to control inflation through a CPI band of 3.00% to 6.00% (SARB, 2016). With the repo rate being the cost of capital for the banks,</p>

the prime rate is what banks charge to end user clients in the open market. The difference between these two bench mark rates is the known as the spread or “profit” for the banks (Fourie & Burger, 2008).

JSE While the JSE is currently ranked as the 19th largest stock exchange in the world by market capitalization, it is the largest exchange in Africa with a market capitalization of \$1 billion USD as at 2013 (JSE, 2016). With approximately 400 companies listed on the exchange today - that include major multinational corporations such as, British American Tobacco (BAT), SABMiller, GlencoreXstrata and BHP Billiton - the JSE was formed in 1887 during South Africa’s first gold rush. Today the JSE offers investors the ability to participate in five financial markets namely: equities, bonds, financial derivatives, commodity trades and interest rate derivatives (JSE, 2016).

As a market capitalization-weighted index, the FTSE/JSE Africa All Shares Index is the leading index on the JSE. The index traces the performance of the overall stock market on the JSE. It consists of five different indices - the All Share Index (J203), the Top 40 Index (J200), the Mid Cap Index (J201), the Small Cap Index (J202) and the Fledgling Index (J204) - whose movements are considered to be representative of the movements in the market (Bloomberg, 2016). Hence, positive changes in these stocks are indicative of confidence in the underlying companies and the overall economy; it is therefore expected that the residential property market is influenced by the stock market (Clark & Daniel, 2006).

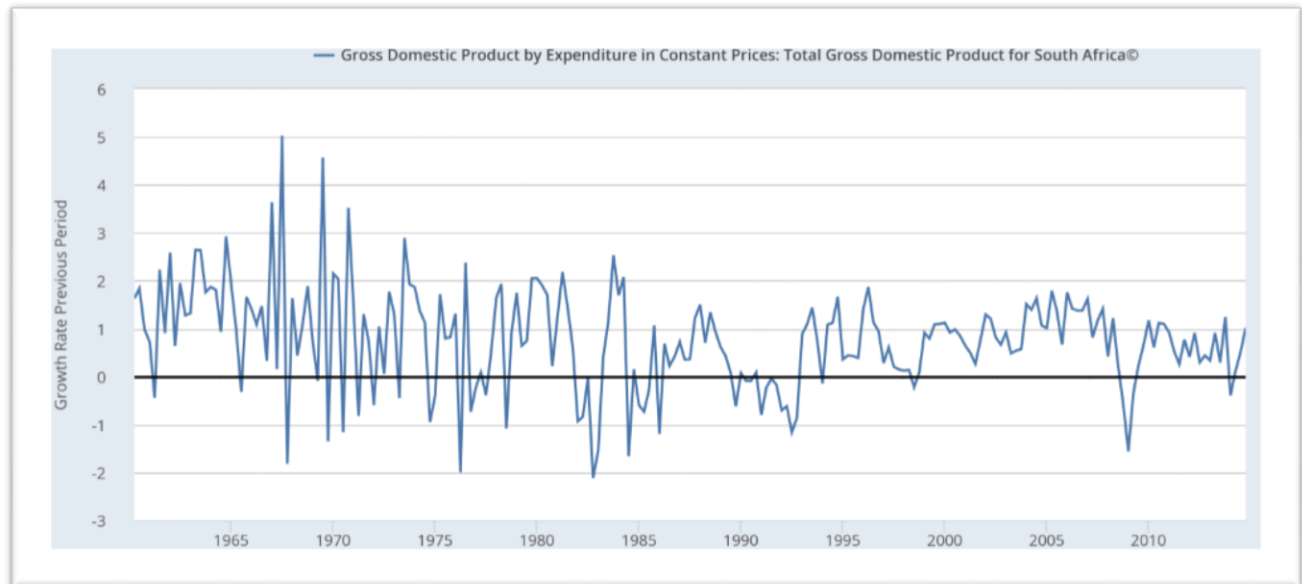
CPI Inflation can be explained as the sustained increase in average price in the economy. The inflation rate is the rate of increase of the average price level during a specific period in time, typically on a quarterly basis. Statistically it is measured using price indices, such as the consumer price index (CPI). The CPI measures a predetermined basket of consumer goods. The items in this basket match to the average consumption patterns of consumers. This cost is measured monthly and the amount then expressed as an index with a base value of 100 (Fourie & Burger, 2008).

* Includes a discussion about the South African Reserve Bank (SARB)

4.2.1 GDP Performance in South African

In 2015 Gross Domestic Product in South Africa was estimated to be worth \$312.80 billion USD or 0.05% of the global economy. From between 1960 to 2015 South Africa’s GDP averaged \$127.29 billion USD; reaching an all-time high of \$416.60 billion USD Billion. Figure 3 tracks the growth performance of South Africa’s economy from the early 1960s to the mid-1970s and dramatic decline during the early 1980s and again in the mid-1990s. Overall, the South African economy has followed the boom and bust cycles associated with the global economy.

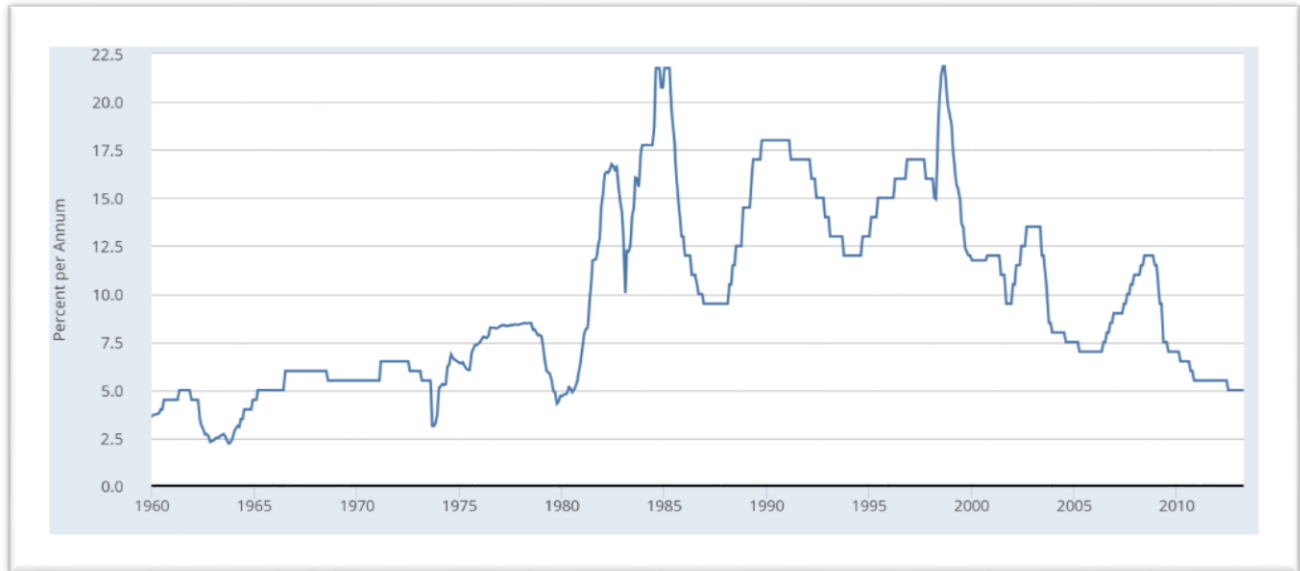
Figure 3 - Real GDP Growth in South Africa 1960 - 2015 (Source: OECD, 2016)



4.2.2 Prime Interest Rate in South Africa

Today SARB's benchmark repo rate stands at 7.00% and is widely believed to remain unchanged as CPI is stated at 5.9% (SARB, 2016). As reported by (SARB, 2016), the inflation outlook has improved over the last decade as inflation has been moving toward the target range, however, growth remains sluggish due to weak domestic fixed investment and low levels of business and consumer confidence in South Africa since 2008. Historically, the lending rate in South Africa averaged 12.90% from 2000 to 2016; reaching an peak of 23.9% in June of 1998 and a record low of 5.0% percent in July of 2012 (SARB, 2016).

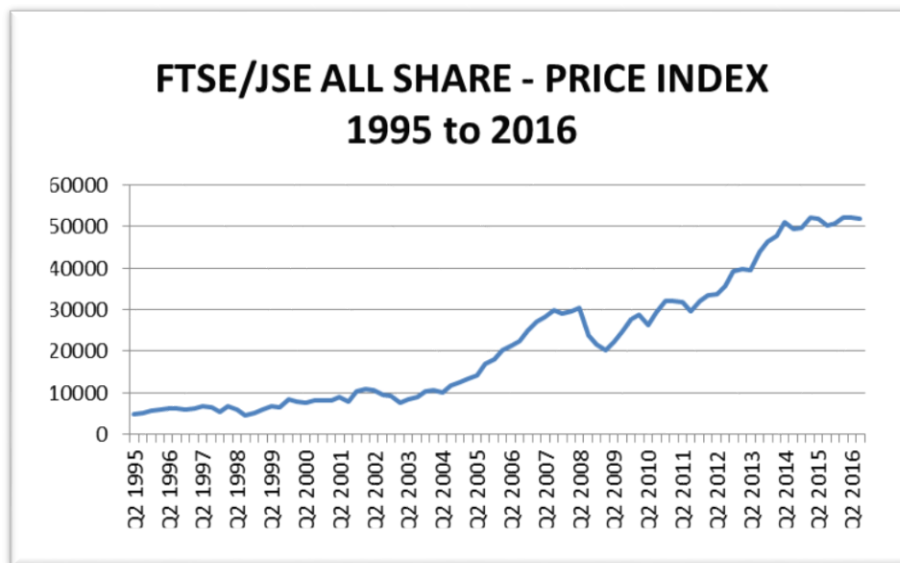
Figure 4 - Prime Interest Rate in South Africa 1960 to 2014 (Source IMF, 2016)



4.2.3 FTSE/JSE Africa All Shares Index

In the last quarter the index decreased 572 points or 1.11% to 51,178 from 51,750. Of note, the index reached an all-time high of 55,188 in April 2015 and a record low of 26,738 in August 2010.

Figure 5 - FTSE/JSE All Share Price Index 1995 to 2016 (Source: JSE, 2016)

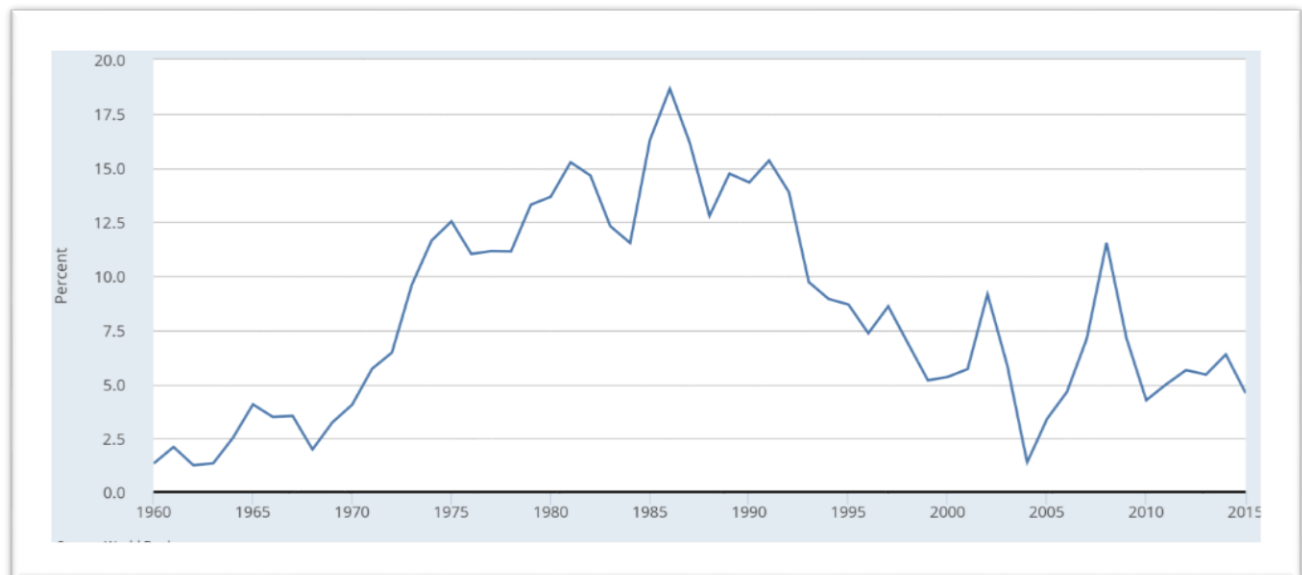


4.2.4 Inflation Rate in South Africa

CPI in South Africa inched up from 5.9% in August 2016 to 6.1% as at September 2016. However, since February 2016 inflation has fallen a full percentage point from 7.0% (Stats SA, 2016). From a historical perspective, from between 1968 to 2016 South Africa's inflation rate has averaged 9.27%; reaching an all-time high of 20.90% in January of 1986 and a record low of 0.20% in January of 2004 (Stats SA, 2016).

The inflation rate in South Africa started to creep up in the early 1970s with the worst period of sustained inflation experienced in the 1980s. It has generally shown declines since 1992, but with significant rises in 2002 and 2008. However, these were shorter in time duration as compared to the 1970s; a period that represented a structural shift in the inflation pattern. Between 1974 and 1992 there was a struggle to keep inflation under 10%. However, since 2008 the inflation rate in South Africa has generally remained underneath 10%.

Figure 6 - Inflation in South Africa (CPI) 1960 - 2015 (Source: World Bank, 2016)



4.3 Validity of Sources

The data for this paper have come from reputable sources that all have a duty to present data in a credible and authentic way. In the case of SARB's, its role as an independent and impartial institution is enshrined in South Africa's constitution as per sections 223 to 225 of the Constitution of the Republic of South Africa, 1996, the South African Reserve Bank Act, 1989. Specifically, section 224 of the 1996 Constitution states "the South African Reserve Bank, in pursuit of its primary object, must perform its functions independently and without fear, favour or prejudice, but there must be regular consultation between the Bank and the Cabinet member responsible for national financial matters" (SARB, 2016).

In the case of Statistics South Africa (Stats SA), it is a constitutionally mandated organization through the Statics Act. As part of Stats SA's mission and core principles "the purpose of official statistics is to assist organs of state, business, other organizations or the public in (a) planning; (b) decision-making or other actions; (c) monitoring or assessment of policies, decision-making or other actions" (Stats SA, 2016).

The Centre for Affordable Housing Finance in Africa, based in Johannesburg, South Africa, is a well-respected non-governmental organization that is funded by several international development finance institutions. Its mission is to facilitate and expand housing development and finance options by revealing the development potential of previously overlooked areas through information which is accurate, timely and easy to understand. The centre has created indicators of particular interest to the Department of Human Settlements, investors, developers and urban planners; for the purpose of enticing a range of development options. The high level indicators CAHF provides are intended to highlight a range of opportunities across Africa in order to stimulate the affordable housing market on the continent (CAHF, 2015a).

4.4 Research Method Applied

In order to analyse pricing determinant to the RDP market a number of assumptions are included in the standard statistical models. Given the limitation of data associated with RDP home sales and the difficulty in combining the conceptual and theoretical characteristics associated with formalised housing markets in developed countries, this study employs several assumptions:

- The secondary data used for this study are assumed to represent the true condition of the South African housing market.
- Other data, such as employment, construction sector, population growth and other housing supply factors are excluded from this study. This is because the housing supply variables are assumed to have a less significant effect on the movement of the house prices in the RDP housing market.
- There is no credit constraint in the RDP housing market.
- The scope of this study focuses on RDP market as a whole without dividing or taking regional issues into consideration.
- The house price term used in this study refers to asset prices of houses and the land they are associated with.

4.4.1 Regression Analysis

Although there are several advantages in using the multiple regression technique, it is necessary to point out that ordinary least squares (OLS) method only reveals a relationship among variables, rather than a cause effect relationship (Hill & Lewicki, 2006).

This relationship - in the multiple regression technique - fits for a new regression line to the dependent variable Y based on the ordinary least squares (OLS) method. The equation produced includes one intercept (α) and one slope (β) coefficient for each independent variable (Lind, Marchal, & Wathen, 2010). The multiple regression equation below represents the four selected independent variables that will be used in the study's multiple regression analysis:

$$Y = \alpha + \beta_{1t-1} GDP + \beta_{2t-1} RATE + \beta_{3t-1} JSE + \beta_{4t-1} CPI$$

The significance of the results will be tested using P-values, and F-statistics, and the slope coefficient and the overall explanatory power of the model will be tested with the adjusted coefficient of determination (R^2_{adj}) (Lind et al., 2010).

As the literature review demonstrates, previous housing price determinate studies have used a variety of multivariate regression techniques. The OLS regression has been tested in the housing market by several researchers such as (Kim, 2004) and (Labonte, 2003). For example, in the Korean housing market, (Kim, 2004) used an ordinary least square regression to explain the relationship between house prices and various macroeconomic fundamentals - among housing price, consumer spending, GDP, and inflation - for the period 1998:Q1 to 2002:Q4. Similarly, (Labonte, 2003) constructed an OLS equations for five econometric models to detect housing bubbles in the United States. For each model the author used the ordinary least square to explain the relationship between the house price index and the associated independent variables over a five year period 1997:Q1 to 2002 Q4.

4.4.2 Pre-Testing the Data

Before performing any regression analysis it is important to test the raw data in order to account for multicollinearity, autocorrelation and the assumptions of homoscedasticity, normality, and linearity (Keller, 2014). It is common when conducting a multivariate regression analysis that some or at least few of the independent variables are correlated to each other. (Keller, 2014) explains that “when two variables are correlated, it means that they both convey essentially the same information.” The consequence of this is that two variables on their own might not individually contribute to a regression model, but combined together their contribution might be statistically significant. Thus, an individually high p -value through multicollinearity can be

misleading. (Keller, 2014) goes on to further state that variables that display multicollinearity can be removed from the model to create a better fit.

Multicollinearity is measured by the variance inflation factor (VIF) test. When examining the macroeconomic variables - GDP, population, inflation rate, costs of construction, interest rate and real property gains tax - affecting the price of housing in Malaysia, (Tze, 2013) used a VIF before performing regression analysis. (Tze, 2013) did not detect any multi-collinearity among the study's six variables when testing for a factor of less than 10 ($VIF < 10$). Thus, it shows no major problem for regression analysis. Finally, Excel software will be used to generate descriptive statistics output in order to evaluate skewness, kurtosis and homoscedasticity of the explanatory variables.

CHAPTER 5: EMPIRICAL RESEARCH FINDINGS, ANALYSIS & DISCUSSION

This chapter reports the results of the relationship between RDP house prices and various macroeconomic variables as presented in 0. The beginning of the chapter presents pretesting results through descriptive statistics & tests for Multicollinearity, homoscedasticity, normality & linearity, while Section 5.4 analyses the empirical findings of the studies multivariate regression analysis to that of the findings from the literature. This chapter concludes with a discussion of the findings.

5.1 Descriptive Statistics

Table 10 provides descriptive statistics of the independent and dependent variables. The skewness test of the data indicates that all independent variables were not symmetrically distributed around the mean (0). The skewness ranged from -0.54 to 1.29. Both JSE and GDP were negatively skewed to the left. Notwithstanding, all the variables fell between the ± 1.96 critical value ($\alpha = 0.05$) range for acceptable skewness (George & Mallery, 2010). The kurtosis for variables ranges from -1.1 to 1.4, which is within the acceptable range ± 2 as prescribed by (George & Mallery, 2010).

Table 10 – Descriptive Statistics of Variables

	Mean	Std Dev	Kurtosis	Skewness	Observation
Independent (Y)					
Sales Price	5.0854	0.1490	-0.4850	-0.3510	72
Dependent (X)					
JSE	4.5454	0.1216	-1.1088	-0.1348	8
Prime	10.4444	2.3936	-0.3639	1.1703	8
GDP	2.2811	1.7724	0.6674	-0.5390	8
Inflation	6.2444	1.5801	1.4884	1.2889	8

5.2 Multicollinearity

A Pearson correlation matrix for the independent variables was conducted to check for multicollinearity as presented in Table 11 **Error! Reference source not found.:**

Table 11 – Pearson Correlation Matrix

	JSE Index	RATE	GDP	CPI
JSE	1			
RATE	-0.7042	1		
GDP	-0.2115 *	0.4197 **	1	
CPI	-0.5336	0.7213	-0.1153 **	1

Note: **Correlation is significant at .05 level; *correlation is significant at .10 level.

With the exception of RATE to JSE, the correlation coefficients are very low and therefore it appears that multicollinearity is not a problem in the data. (Gujarati, 1995) maintains that multicollinearity may be a problem if correlation exceeds 0.80.

In addition to the correlation matrix, a variance inflation factor (VIF) table was generated for the dependent variable in the study to further test for multicollinearity. The results presented in Table 12 reinforce the conclusion that multicollinearity is not a problem in the study. Specifically, since the VIFs for the independent variables are all less than 10, and the mean variance is not too different from 1, there is no reason to suspect multicollinearity.

Table 12 - Variance Inflation Factor for RDP Sales

Variable	VIF	1/VIF
JSE	2.02220	0.49451
RATE	5.78676	0.17281
GDP	2.21116	0.45225
CPI	3.74251	0.26720

5.3 Homoscedasticity, Linearity and Normality

With regards to homoscedasticity, linearity and normality an examination of the residuals against predicted values suggests that there is little evidence of errors with homoscedasticity and linearity.

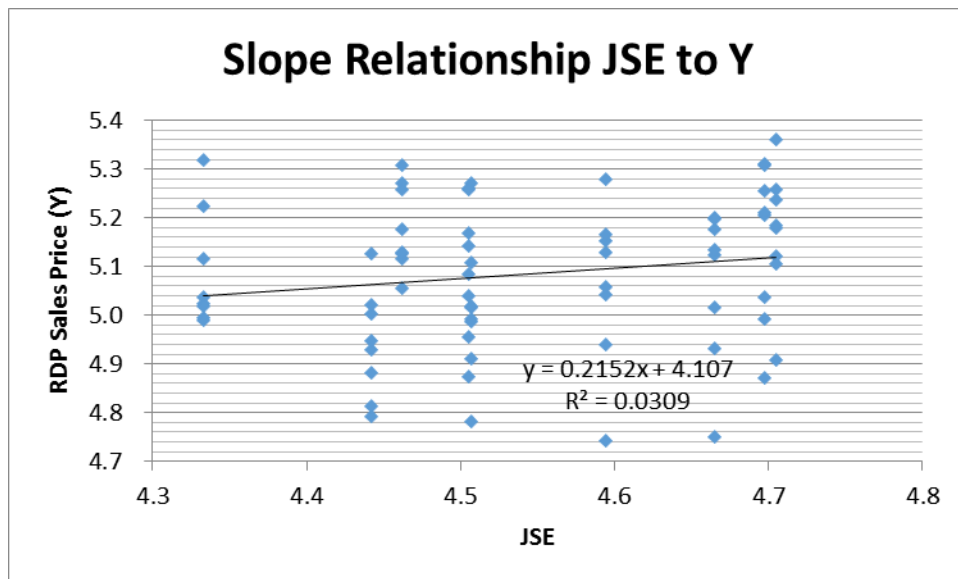
Moreover, further tests were conducted to test for homoscedasticity using White's test and the

Breusch-Pagan test, and both tests confirmed that the residuals are not heteroskedastic. Furthermore, the scatter plots of the residuals reveal that linearity is not a problem between RDP sales and the independent variables.

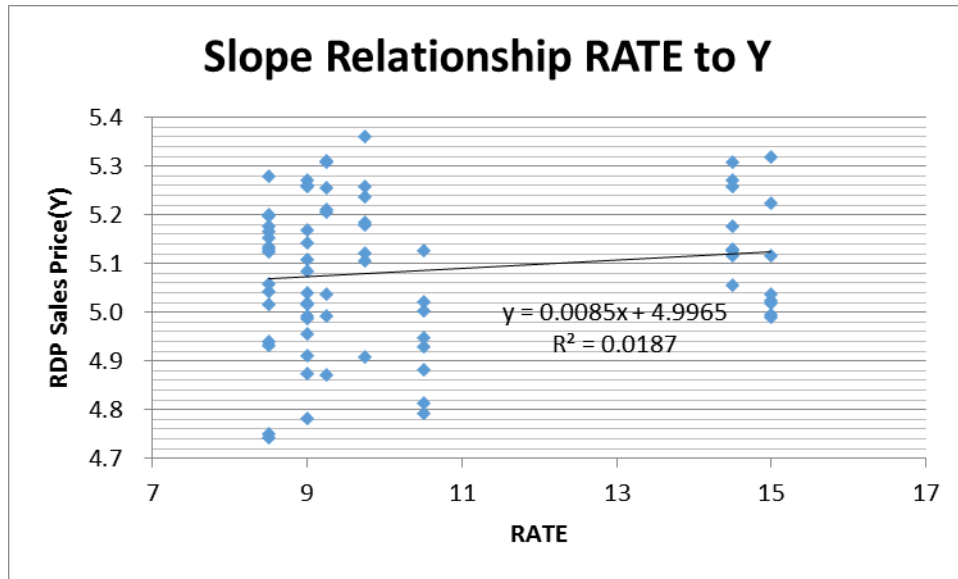
5.3.1 Simple Regression Analysis

The following regression graphs were made for the dependent variable (RDP home prices) and each respective independent variable. Each graph illustrates the correlation strength between the dependent variable to each independent variable.

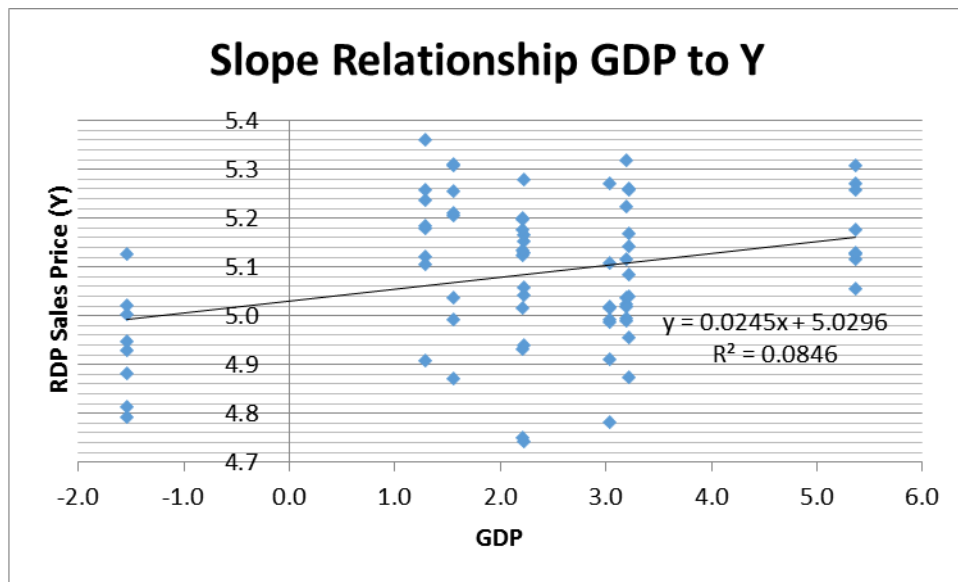
Graph 3 – Slope Relationship JSE to Y



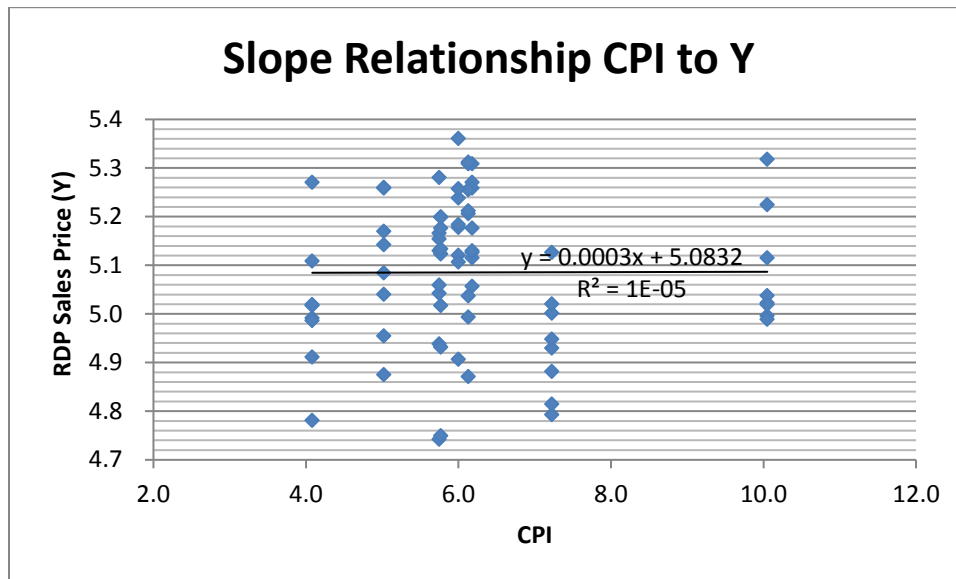
Graph 4 - Slope Relationship Rate to Y



Graph 5 - Slope Relationship GDP to Y



Graph 6 - Slope Relationship CPI to Y



5.4 Reporting of Regression Analysis

The multifactor regression results for this test are presented in below in Table 13. The overall model had an adjusted R^2 of 0.1591, with a corresponding F-test of 4.36 at the .01 significance level. In other words, the four independent macroeconomic variables can explain .15 or 15% of sales price movements in this model.

Table 13 – Regression Results of RDP Sales Price to Macroeconomic Variables

<i>Regression Statistics</i>						
Multiple R	0.45442					
R Square	0.20650					
Adjusted R Square	0.15913					
Standard Error	3.85E+04					
Observations	72					
<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	4	2.58E+10	6.45E+09	4.35906	0.00342	
Residual	67	9.91E+10	1.48E+09			
Total	71	1.24872E+11				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-19562.5019	44105.68604	-0.44354	0.658806	-107597.81966	68472.81593
GDP	5207.799153	3831.49088	1.35921	0.178638	-2439.88866	12855.48696
RATE	6317.572172	4559.76003	1.38551	0.170493	-2783.74694	15418.89129
JSE***	2.05047	0.60660	3.38028	0.001211	0.83969	3.26124
CPI	-706.195166	5627.62992	-0.12549	0.900514	-11938.99150	10526.60117
R Square	0.2065					
Adjusted R Square	0.1591					
Standard Error	38456.39706					

Note: ***Significant at .01 level; **significant at .05 level; *significant at .10 level.

The estimated regression equation from the results from Table 13 can be written in a standard format as illustrated below:

$$Y = -19562.50 + 2.05 \text{ JSE} + 6317.57 \text{ RATE} + 5207.80 \text{ GDP} - 706.20 \text{ CPI}$$

$$(-0.44) \quad (3.38)^{***} \quad (1.38) \quad (1.35) \quad (-0.12)$$

- Figures in parenthesis denote t-statistics

- *denotes significance at the 1% level of significance level

The key results are highlighted below:

- Based on the regression analysis results from Table 13 there is a positive relationship between GDP and RDP price movements. The coefficient indicates that for every unit increase in GDP there will be a 5,207.80 unit increase in price movement. However, the P-value is not significant for this variable; the null hypothesis (H₀) for GDP cannot be rejected.

- The coefficient for RATE is positive at 6317.57, suggesting a positive relationship between RDP house prices and the prime interest rate. However, with a P-value of 0.17 there is not a statistically significant relationship between the interest rate and the housing price; the null hypothesis (H_0) for RATE cannot be rejected.
- JSE has a positive relationship with the dependant variable with a coefficient of 2.05 With a P-value of 0.0012 there is enough statistical evidence to reject the null hypothesis (H_0) for JSE and accept the alternative hypothesis (H_3) that there is a significant relationship with RDP house prices in South Africa ($\alpha = .001$).
- CPI has an inverse relationship with inflation with a coefficient of -706.20. However, the P-value of .90 suggests there is not enough statistical evidence to reject the null hypothesis (H_0) for CPI.

5.5 Discussion & Analysis of Results

As (MacLennan, 1994) describes, "...the housing market is a large sector of the economy and it is highly possible that the housing market and the economy interact. Although the feedback mechanism is possible, it is not very clear." While the literature review in this paper shows several prevailing trends within the various international studies - explaining the relationship between house prices and macroeconomic determinants - the literature also demonstrates many instances of varied results between studies. The findings for each dependent in this study is analysed below.

5.5.1 GDP Analysis

As one of the most surprising results, there was not a statistically significant correlation for GDP; despite the literature overwhelmingly supporting the idea of a positive relationship between GDP and residential real estate price movements. According to (Tze, 2013), as part of GDP there will be an increase in personal consumption by definition. His findings in Malaysia are consistent with research conducted by (Qing 2010) in China that show housing investment is correlated to

movements in GDP. Hence, an increase in the development of housing will lead to an increase in the GDP. However, (Huu et al., 1999), who studied Malaysian housing price movements a decade before (Tze, 2013), found that the strength of GDP's relationship to house prices is largely based on the location and type of housing. Thus, (Huu et al., 1999) work shows that the housing market is fragmented along housing market segments; buyers are not necessarily influenced by GDP when making their buying decision. With regard to the South African experience, (Clark & Daniel, 2006) study found a statistically positive relationship ($\alpha = 0.05\%$ level) of GDP to house prices in their model that used lagged analysis; contrary to the findings of this study.

5.5.2 Prime Rate Analysis

The study's finding of a positive relationship with the prime interest rate contradicts the widely accepted view that interest rates and real estate prices have an inverse relationship. The literature overwhelmingly supports this generalization the aforementioned relationship in both developed markets and developing counties. As was seen in the early work (Meen, 1994) work in the UK, the author took the view that interest rates were the most significant variable in determining housing prices. (McCue & Kling, 1994) furthered this work by concluding that nominal interest rates – based on a negative relationship - is the most important determinant of real estate returns in the UK. In Turkey (Ramazan et al., 2007) found that Turkish interest rates had a bigger impact on the housing market when compared to those of developed economies. In South Africa, both (Clark & Daniel, 2006) and (Standish et al., 2005) found a significant negative correlation was found between real interest rates and home prices.

One explanation for the contrary finding with regards to RATE could be a result of the low limited use of mortgage financing to purchase RDP homes. As mentioned in section 2.8, the government's FLISP programme was designed to provide a once of capital contribution for RDP home buyers

to be used toward a down payment for home financing. According to (CAHF, 2015a), the programme has been unsuccessful with fewer than 3,000 subsidies issued. Further, the composition of South Africa’s credit market has changed over the last decade. In 2008 mortgages accounted for 47 percent of the value of all loans granted, by 2012, only a quarter of the value of all loans granted were residential mortgage bonds (CAHF, 2015a). This occurred with the backdrop of South Africa’s prime interest dropping from 14.5% in 2007 to 9.75% in 2015.

5.5.3 Stock Market Analysis

JSE was the only variable in this study that was found to have a significant relationship with RDP house prices in South Africa ($\alpha = .001$). Using logged values, the figure below illustrates RDP home prices and the JSE moving in unison over the past decade.

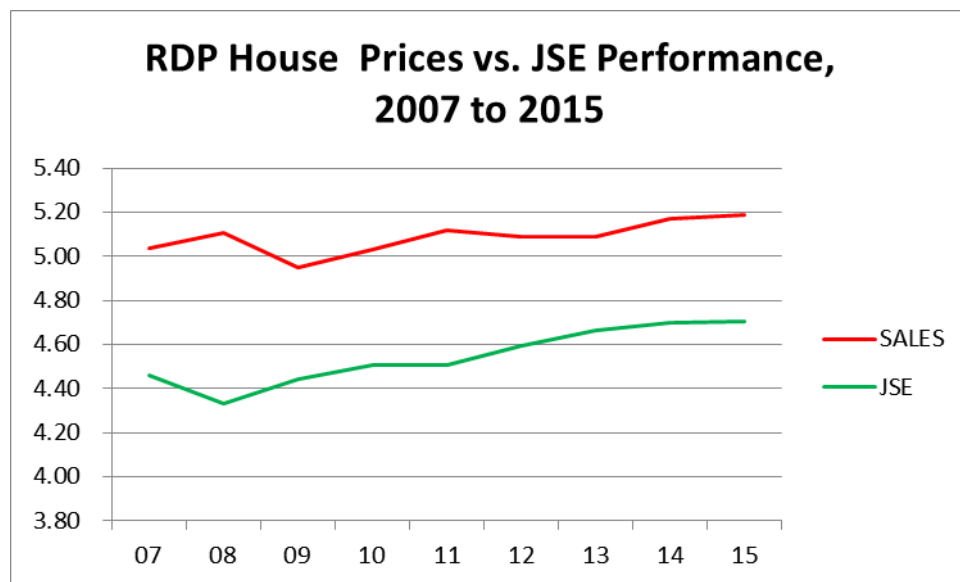


Figure 7 - RDP Prices vs. JSE Performance, 2007 to 2015 (Source: JSE & CAHF, 2016)

While there have been conflicting results in the literature between the relationship of stock market returns and house prices, the three South Africa studies investigating this phenomenon were consistent with the results of this study. The comprehensive study of (Aye et al., 2011) found both a long and short-run relationships between house and stock prices using both linear and

nonparametric approaches from between 1966 to 2011. Both (Clark & Daniel, 2006) and (Standish et al., 2005) found a statistically significant relationship between stocks and house prices in South Africa. However, in the three aforementioned South African focused studies never considered homes in the affordable housing market in their research. Only middle to upper income properties were included.

5.5.4 Inflation Analysis

The results in this study indicate CPI has a statistically insignificant relationship with RDP house prices. Moreover, the coefficient shows a negative relationship. While the prevailing literature suggests inflation is a key macroeconomic determinate for house prices in developed markets, other studies that focus on developing countries tell a different story. We learned from the (Tsatsaronis & Zhu, 2004) study of 17 industrialized countries, over 33 years, that there is a positive long-term link between inflation and housing price. They concluded that inflation accounts for more than 50% in the total variation in house prices at the five-year timeline. Inflation's contribution is close to 90% of the total price variation in the one-quarter horizon and drops to about two thirds over the one-year horizon for the major economies that they studied (Tsatsaronis & Zhu, 2004). However, in the Malaysia housing market – a developing country whose income distribution is similar to that of South Africa – the (Tze, 2013) study also had a similar result to this study. Inflation was found to have a negative relationship to house prices that was not significant.

In South Africa, the comprehensive (Gupta et al., 2010) study determined that house price growth in South Africa generally responds negatively to upward inflationary pressures. Notwithstanding, the response of real house price growth rate was found to differ across the five housing categories studied. This suggests that these segmented markets exhibit varying behavior in relation to

inflationary pressures. (Gupta et al., 2010) findings suggest that variations in the house price to inflation relationship within the various housing sub-segments can attributed to regional factors.

5.6 Discussion Summary

The inconsistency within the literature tends to cross along the divide of formalized economies in the Global North and developing economies in the Global South. Thus, varied results in the study's model and its general weakness might be expected. Notwithstanding, the special character and socioeconomic significance RDP homes in South Africa's housing market needs to be understood in context. Overall, the results of this study suggest that changes in RDP house prices do not have a significant relationship with the South African macro economy. GDP, RATE, JSE and CPI can only explain 15% of the price movements in RDP sales prices.

CHAPTER 6: RECOMMENDATIONS & CONCLUSION

Section 6.1 offers suggestions for future research on the house price determinants of RDP housing.

The concluding remarks for the study are presented in section 6.2.

6.1 Recommendations for Future Research

Through the course of this study several themes emerged that fell outside the specific mandate of the research hypothesis, notwithstanding, exploring these ideas will help in the future understanding of the economic behaviour of RDP housing in South Africa:

1. While this study used traditional secondary economic indicators as its independent variables, future research can benefit from gathering primary hedonic measures: location to public amenities, pollution level, housing features (number of bedrooms etc.) and access to public transportation. Hedonic regression or hedonic demand theory is described as a revealed preference method of estimating demand or value. It can subgroup the asset being researched into its constituent characteristics, and obtains estimates of the contributory value of each characteristic. As Chapter 2 described, RDP housing development has had a unique evolution through various policy initiatives in South Africa. A hedonic regression model will be able to capture these effects on home values.
2. As more socioeconomic knowledge is gained about townships - through enhanced census data - localized economic data can be used in future RDP housing regression models. Factors such as exact migration movements, real income growth, local consumer confidence and crime are not uniformly captured in all South African townships. As the literature demonstrates, these types of microeconomic indicators are typically used as explanatory variables in housing price determinant studies.

6.2 Conclusion

With RDP homes throughout South Africa appreciating in value, as older stock begins to trade in the open market, this study's research question focused as to the significance between RDP house prices and the macro economy. In this thesis, data was used from eight of South Africa's metros

(as provided by CAHF), SARB, and Datastream. All the macroeconomic variables are on a year basis from 2007 to 2015. A multivariate regression analysis was conducted to verify the relationship between GDP, RATE, JSE and CPI and RDP housing prices in South Africa. Only one macroeconomic variable (JSE) was found to be positively and significantly correlated with the RDP housing price. The result is not surprising as the study of (Aye et al., 2011) finds both a long and short-run relationships between house and stock prices using both linear and nonparametric approaches from between 1966 to 2011. Both (Clark & Daniel, 2006) and (Standish et al., 2005) found a statistically significant relationship between stocks and house prices in South Africa. Alternatively, the positive relationship found between RATE and RDP home prices is inconsistent with the prevailing body of literature that stipulates an inverse relationship. While the CPI results are not statistically significant, one reason for this finding could be the lack of demand in mortgage financing for RDP home purchase, as seen through the limited success of FLISP. Overall, the results of this study suggest that changes in RDP house prices do not have a significant relationship with the South African macro economy. GDP, RATE, JSE and CPI can only explain 15% of the price movements in RDP sales prices.

In future studies, other measurements contributing to the increase or decrease to the RDP housing price movements, such as investment, economy, hedonic and personal income, can be used. In the future, it is hoped that other researchers will continue in the study of understanding RDP housing price determinants. This will allow for the market to appreciate the behavior of these non-traditional assets. Researchers, financial funders, micro lenders, banks and the government will benefit this knowledge and allow for more market participants to engage in the affordable housing market.

With financial actors having a new level of comfort and understanding of the dynamics associated with the affordable housing market place the market could be an increase in the level of private capital investment. Increased liquidity into the RDP market could help address the current backlog of approximately 2 to 3 million affordable housing units in South Africa (Murray, 2014). As the literature suggests, home ownership may lead to a better quality of life for households and contributes to economic growth. Thus, both the South African economy and society stand to benefit as a whole from addressing the affordable housing dilemma.

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