DETERMINING THE MOST RESILIENT REAL ESTATE MARKET SEGMENT IN THE RESIDENTIAL SECTOR THROUGHOUT THE ECONOMIC CYCLE WAVES, FOR THE INNERCITY OF JOHANNESBURG

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Research Report submitted in partial fulfillment of the requirement for the degree of Master of Science in Building – Property Development and Management

DECLARATION

I, Desmond Neo Kgano, hereby declare that this research report is my own unaided work and it has never been previously produced or submitted before for any degree or examination at this University or any other institution This research report is being submitted in partial fulfiment of the Master of Science in Building (Property Development and Management) to the University of the Witwatersrand. All sources of information have been duly acknowledged.

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Desmond Neo Kgano Date

ABSTRACT

The research study seeks to determine the most resilient residential real estate market segment throughout the economic cycle waves, for the innercity of Johannesburg, South Africa. The study is prompted by various global reports that subtly suggests a uniform effect to real estate market segments throughout economic cycle waves. Such reports have adopted various indices as proxy to economic cycle waves (e.g. interest rates, current account deficit, gross domestic product, etc.) and house price as proxy to real estate market segments in an attempt to justify the relationship between the proxies. For purposes of this research report, business cycles are employed as proxy to economic cycle waves whilst house prices are also representative of real estate market segments. In a country that ranks third globally on high inequality, with a gini coefficient of 0.63, it is considered improbable – at the very least - that the performance of real estate market segments would react uniformly to the effects of economic cycle waves. The residential sector is opted as a test case, mainly due to growing number of population and the desperate need for housing to accommodate such high population growth levels. The housing challenge needs to be thoroughly understood so that informed and/or adequate planning can be formulated. The research study follows a Pragmatism Philosophy, which allows for mixed method approach in addressing research questions, in order to meet the research aim and objectives. An Explanatory Sequential research design is used as a form of mixed method approach. The process involves collecting both Qualitative and Quantitative data, integrating the two forms of data, and using distinct designs that involves philosophical assumptions and theoretical frameworks. In this case, Quantitative methods are used to explain Qualitative methods. Priority is given to Quantitative data and the two methods are integrated during the interpretation phase of the research study. Empirical analysis using tools such as Quantile Regressions (e.g.OLS regressions) for a period between 2005 (Q1) and 2015 (Q4) are analysed and discussed. Standard errors and covariances were computed using tools such as the Huber-Sandwich methods, to which an Augmented Dickey-Fuller test was conducted to test for the null hypothesis of a unit root in a time series sample. The Breusch-Godfrey Serial Correlation LM test is also used to confirm the absence of serial correlation at four lags. The ARCH LM test is used to show that residuals are homoskedastic, i.e. that there is no evidence of time-varying variance. A negative and significant coefficient appears only the high price sector, suggesting that the business cycle has a negative impact on house prices in the high residential real estate market segment, displaying negative average growth over the period. House prices in the low and medium residential real estate market segments do not respond to movements in the business cycle, on the average. Property size also displayed a negative impact on house prices in the high residential real estate market segment. The autoregressive parameters for house prices in the low and middle residential real estate market segments are statistically significant at 5% and 10%, respectively. Negative and significant coefficient is recorded for the middle residential real estate market segment as well, at the second quantile.

In conclusion, the low residential real estate market segment appeared to have been the most resilient residential real estate market segment amongst other residential real estate market segments. The middle residential real estate market segment appears to have been a partially resilient, whilst the high residential real estate market segment appears to have been the least resilient. Given these findings, it is submitted that residential real estate market segments need to be considered or assessed individually, in order to formulate adequate strategies for integrated and sustainable human settlements.

DEDICATION

To my late grandmother, Mrs. Elizabeth R. Kgano, where do I begin. You have been and continue to be a critical pillar of my life. You live in my heart, mind and soul everyday. I am truly blessed to have been raised by you. As I continue, I hope and pray that I am making you proud. Rest in Peace Mma, this is for you.

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To Alpha & Omega, You are worthy to be praised…(John 14).

To my Mother, I am truly blessed, words are minimal to express my sincere gratitude for your existence. I thank you for your love, which surpasses all. I am eternally grateful.

To my brothers, you guys are amazing. Would not change you for the world. Thank you for all your support and prayers.

To my Supervisor, Dr. Kola Ijasan, I offer my sincere gratitude to you. I am blessed to have been guided by you. Your support, patience and humility kept me going. Not once have you turn me away when I needed you help, always kept an open door policy. I thank you endlessly for your understanding. I hope someday I make you proud.

To Kecia Rust and Kgomotso Tolamo of Centre for Affordable Housing Finance in Africa ("CAHF"), you came through for me, you provided the structure, you saw my vision and supported it regardless. I am indebted to you. I hope someday I can do more good to others as you have done to me. I thank you endlessly.

To Dr. Jones Mensah, now I find inspiration in Classical music because of you. You are truly gifted and selfless. Your will to assist is immeasurable, I thank you for your patience and understanding. I hope someday I make you proud as well.

To my extended family and friends, your support and encouragement has been outstanding. I thank you deeply. The list is too long to mention. I don't know how to repay you all, my heart and prayers are with each and every one of you.

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LIST OF ACRONYMS

BoP – Bottom of Pyramid

CAHF – Centre for Affordable Housing Finance in Africa

CoJ – City of Johannesburg Metropolitan Municipality

CPI – Consumer Price Index

EY – Ernst & Young

FLISP – Finance Linked Individual Subsidy Programme

GDP – Gross Domestic Product

HREC – Wits Human Research Ethics Committee

HSRC – Human Science Research Council

IES – Income Expenditure Survey

JSE – Johannesburg Stock Exchange

KPMG – Klynveld Peat Marwick Goerdeler

LSM – Living Standard Measure

MDI – Mortgage Default Insurance

NAREIT – National Association of Real Estate Investment Trusts

NCA - National Credit Act (No. 34 of 2005)

NDoHS – National Department of Human Settlements

NDP – National Development Plan

PHP – People's Housing Programme

RDP – Reconstructive Development Programme

REIT – Real Estate Investment Trust

SAARF – South African Audience Research Foundation

SADC – South African Development Community

SARB – South African Reserve Bank

SAREIT – South African Real Estate Investment Trust

S.M.A.R.T. – Specific, Measurable, Achievable, Realistic, Timely

StatsSA – Statistic South Africa

UDZ – Urban Development Zone

VAR – Vector Auto Regressive model

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CHAPTER ONE - INTRODUCTION AND BACKGROUND

1. INTRODUCTION

1.1. BACKGROUND AND CONTEXT

The study is largely driven by issues of Inequality[1] in South Africa, described as one of the most unavoidable forms that distinguishes developing countries. According to Wolf (2014), the rising inequality is "incompatible with true equality as citizens", which true equality has in many ways punted as the cornerstone of democracy. South Africa however, is disputed to being the most unequal since a number of countries such as Namibia and Seychelles have a much higher Gini coefficients[2] (Keeton, 2014). According to the Human Science Research Council ("HSRC"), South Africa ranks third at 0.63 behind Seychelles and Namibia, which have higher Gini indices of 0.66 and 0.64 respectively, for the Southern African Development Community (SADC) region (as at April 2014). In terms of international rankings, Seychelles is ranked as the most unequal country in the world, with Namibia third and South Africa fourth.

By contrast, income inequality has hardly changed despite the introduction of social transfers that reaches over 16 million poor South Africans. Inequality remains high partly because the number of jobs created over the past 20 years barely kept pace with growth in the labour force. Other reasons include skewed initial endowments (or assets that people and households have) post-1994 in the form of, for example, human capital, access to financial capital, and ownership patterns. All of these, and other endowments, served to generate a highly unequal growth trajectory, ensuring that those households with these higher levels of endowments gained from the little economic growth that ever existed. This view somehow affirms Kuznet's (1955) perspective that in developing countries, economic growth initially leads to increasing levels of inequality. In addition, South Africa is described as an economy characterised by a growth path which is both skills-intensive and capital-intensive, thus not

[1] Inequality' can be defined in terms of being the opposite of 'equality', a state of social organization that enables or gives equal access to resources and opportunities to all members. However, there are a number of possible objectives for policy aimed at reducing inequality, such as increasing the relative income share of the least well-off, lowering the income 'ceiling' (the income earned by the most well-off), facilitating upward mobility, promoting economic inclusion, avoiding perpetuation of the advantages conferred by wealth, and achieving more favourable comparisons against international yardsticks. For the purposes of measurement, the PIR focuses on income inequality, because there is little reliable and readily accessible data on wealth in South Africa. http://www.polity.org.za/polity/govdocs/reports/poverty.html

[2] It should be noted that the Gini Coefficient measures the income distribution and not the distribution of wealth. It is worth noting that the Gini coefficient is a relative measure that does not capture absolute differences in income, e.g. excludes informal sector, agro-based subsistence-driven economies etc.

generating a sufficient quantum of low-wage jobs. Unemployment remains at a record high between 25% and 35% levels, depending on whether one counts discouraged workers who have given up looking for a employment.

According to Statistic South Africa ("StatsSA"), the population has been steadily growing at an average rate of 1.40% for a period between 2005 and 2015. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship -except for refugees not permanently settled in the country of asylum, which are generally considered part of the population of the country of origin (see Figure 1.).

Figure 1. Statistics on South African Population Growth (Source: StatsSA)

Given the natural intangibility in the measurement of Gini coefficients, particularly for developing countries, the Income Expenditure Survey ("IES") is adopted as one of the value add measure, partly as it is conducted every 5 years. In brief, the IES seeks to establish what South Africans spend their money on, so that the basket of goods which makes up the Consumer Price Index ("CPI"), used to calculate the inflation rate, can be updated continuously. In some instances, the IES measure can be likened with movements or shifts within the Maslow (1954) hierarchy of needs theory (see Figure 2 below).

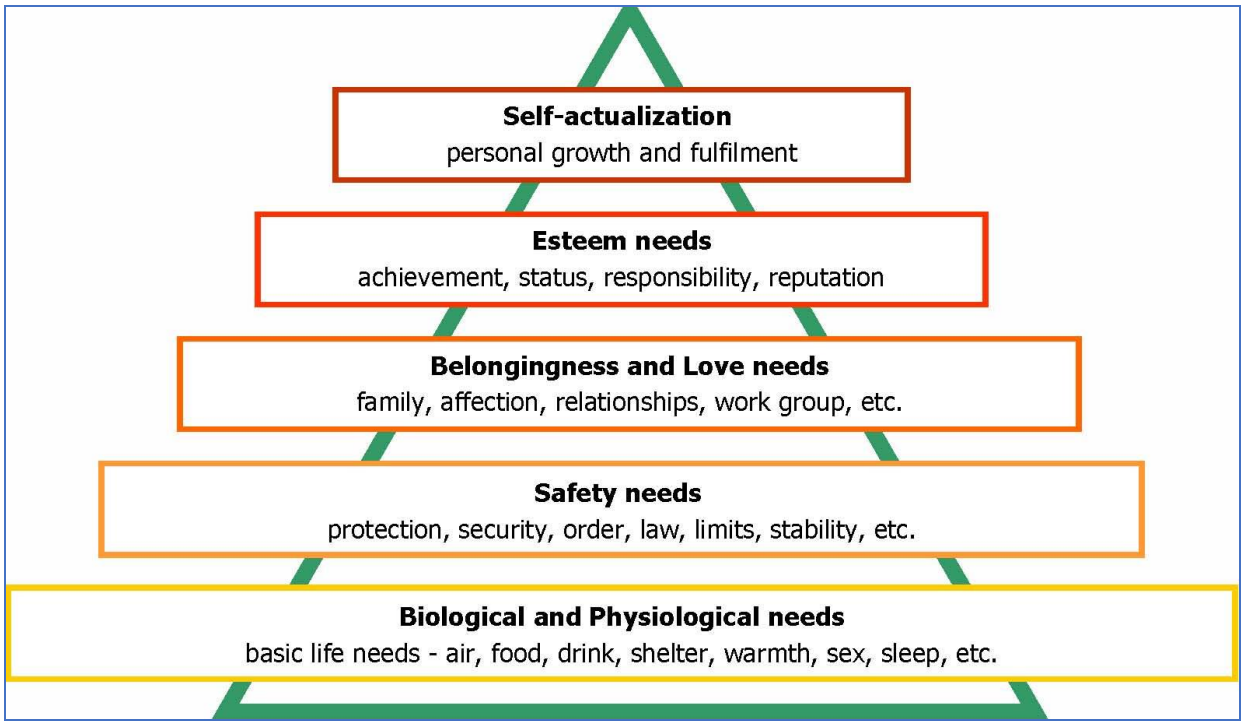

Figure 2. Maslow hierarchy of needs. (Adapted from "A Theory of Human Motivation") (Maslow 1954)

Maslow used the terms "physiological", "safety", "belongingness", "esteem" and "self actualization" to describe the pattern that human motivations generally move through. Briefly, the theory suggests that unless the lower order human needs are satisfied, the higher-level ones may remain dormant. The last IES was conducted between September 2010 and August 2011 (see Figure 3 below).

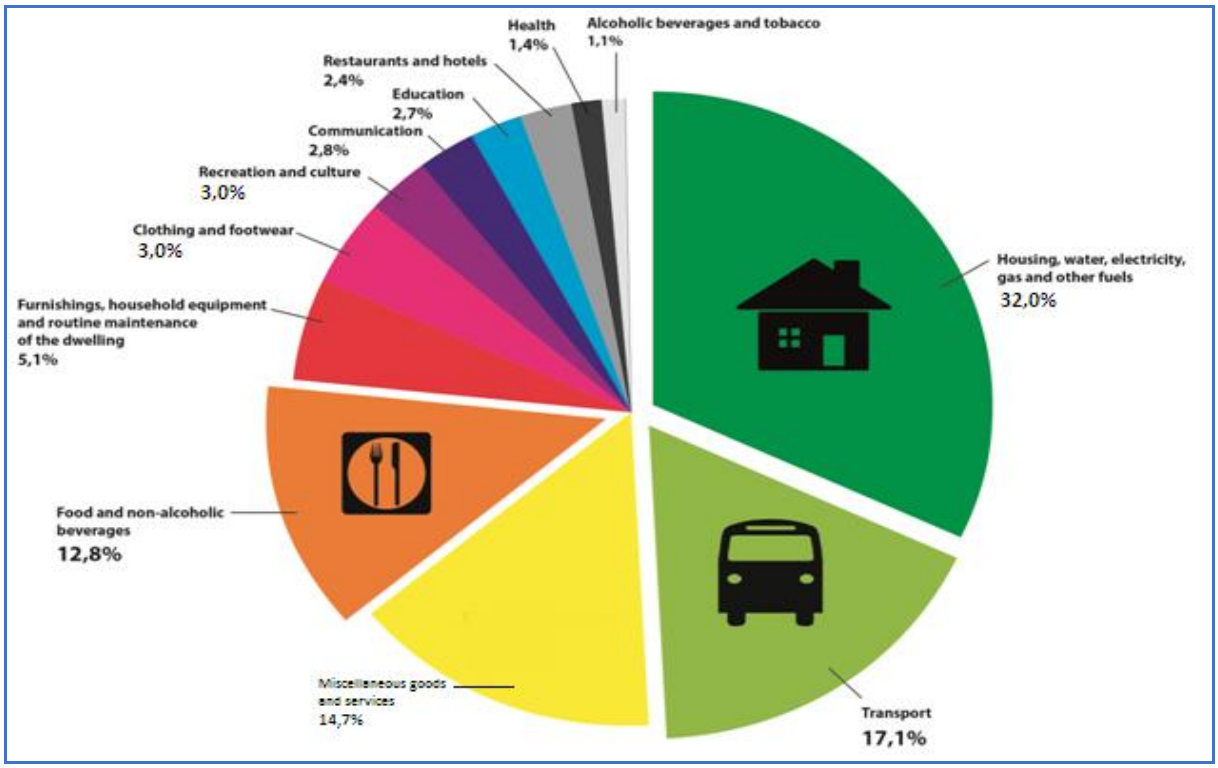

Figure 3 **Income Expenditure Survey (Source: StatsSA, 2015)**

In a generic overview, the chart (Figure 3 above) suggests that the population spends 44.80% of their income on Physiological needs; 35.90% on Safety & Security needs; 7.90% on their Social needs; and 9.50% on Self Esteem and Self Actualization needs. This signifies that holistically, the population is somewhat held within the lower-order tiers (or levels) of the Maslow theory, the biggest spend being on that which is deemed basic needs. In concurrence to the Maslow's theory, Subrahmanyan et al. (2008) have over time realized that despite having income and resource constraints, the Bottom of the Pyramid ("BoP") consumers seek to fulfill higher order needs either to build social capital for cultural reasons, or as a means to compensate for deficiencies in other areas of their lives.

Consequent to population growth, the residential real estate sector (i.e. housing) thus become a natural basic need that requires focused attention. As it is classified in tandem with finance and business services, the residential real estate sector is said to have increased its relative importance of 17% in 1993 to approximately 24% in 2012 to the Gross Domestic Product (StatsSA) [3]. Gumede (2014) views the residential real estate sector as a very important sector of any economy, identifying immovable property is one of the key asset classes for investment and shelter, a basic human need. He further submits that the well-being and

[3] http://www.statssa.gov.za/?page_id=735&id=1

functioning of the economy, its financial system and society depends on the residential real estate sector. These views concur with those of Zhu (2003), who identifies the residential property sector as a major source of strength for global economy, particularly since the economic downturn. Dufrenot & Malik (2012) describes house prices as the most scrutinized set of asset prices amongst other asset prices. In another contribution, Chen et al. (2009) had in a period between 1996 and 2003 found that rapid appreciation in housing values had boosted homeowners' confidence in the United States of America ("U.S."), thereby powering consumer spending and driving the overall economy. The empirical literature considering the relationship between features of the residential real estate markets and business cycles[4] has thus increased over time. In 2007, Learner (2007) went as far as describing housing as the business cycle and that developments in the housing real estate sector leads economic activity[5]. Learner's (2007) view was supported by Dufrénot et al. (2012) who indicated that similar evidence highlighting the leading nature of housing market cycles with respect to business cycles has been put forth by Álvarez et al. (2009) for the Euro area, Ferrara & Vigna (2009) for France and by Álvarez & Cabrero (2010) for Spain.

These views presupposes that the residential real estate (i.e. housing or house prices) is the key driver of the broader macro-economy. In this event, business cycles are thus utilized as proxy to broader macro-economy. Many views and/or submissions have been made regarding the relationship between residential real estate and business cycles, or *vice versa*. Of critical concern, however, is that these views and/or submissions inherently presume that all residential real estate market segments respond uniformly (or synchronically) equal to their respective business cycles, or that business cycles have uniform influence on all residential real estate market segments. In other words, the views and/or submissions presupposes that all residential real estate market segments deter business cycles simultaneously (and possibly equally), or rather, business cycles deters all residential real estate market segments uniformly (and at times equally).

[4] Business cycles is applied as a proxy to broader macro-economy (i.e. economic cycle waves).
[5] Learner (2007) has submitted that 8 of 10 U.S. post-war recessions have been preceded by substantial problems in housing and consumer durables. He also proposes a monetarypolicy based on features of the housing sectorsuch as housing starts as opposed to output gap.

1.2. PROBLEM STATEMENT

Researchers have over decades discussed the impact and/or relationships between economic cycles (i.e. both at macro and micro economic levels) and residential real estate cycles (e.g. house price movements). The concomitant interaction between the residential property sector and the economy gained support from other researcher alike (i.e. (Ahearne 2005; Iacoviello 2005; Vargas-Silva 2008; Bjornland 2010; Iacoviello 2010). Amongst other economic variables of influence to the residential property markets, Vogel (2012) identifies GDP as a 69% contributor towards changes in house prices, for all residential market segments (small, medium and large). Vogel's (2012) view is one of the many that presupposes uniformity and/or congruency and/or simultaneous and/or synchronised correlations that occurs with different residential real estate market segments. There appears to be a systematic thinking that residential real estate market segments respond congruently to economic cycle waves, suggesting a unified deterrence (or rather, non-deterrence) of macro-economic influences. To the contrary, Goddard (2012) insisted that 'markets do not move in unison'. In certain emerging markets, some occurences have been associated with the contagion effect[6] (Hatemi-J, 2011), which suggest a lagged reaction to the effects of global crisis, particularly on Banks and Investors internationally, i.e. investor liquidity, portfolio rebalancing and information channel (Hatemi-J, 2011). For instance, in exploring the stability of the conditioning variables accounting for the real estate valuation, Aizenman & Jinjarak (2014) recognized the lagged real estate valuation appreciation (i.e. real estate inflation minus CPI inflation), followed by lagged declines of the current account/GDP, lagged domestic credit/GDP growth, and lagged equity market appreciation (equity market appreciation minus CPI inflation), both before and after the global economic crisis over 36 countries. In other views, De Klerk (2013) suggests bond and equity markets to be developed and liquid and have a well-capitalized banking sector which is essential for a well-functioning residential real estate market in South Africa. He argues that such characteristics have enabled the residential real estate sector to ease through the effects of the sub-prime mortgage crisis (De Klerk, 2013). It can be deduced that sub-prime markets had an effect on corporates investing in low residential real estate market segment schemes (i.e. mortgage-backed securitization schemes), a vastly contrasting residential real estate market segment from its investing community.

[6] Contagion is defined as a spill-over effects or co-movements between markets that are caused by non-fundamental factors.

The problem is that the performance of individual market segments in relation to economic cycle waves has predominantly been downplayed, particularly for high inequality environments. In many forms, it remains a subject for further scrutiny as to how individual residential real estate market segments perform throughout economic cycle waves, i.e. the role and performance of individual residential real estate market segments on economic cycles or vice versa. It further remains unclear as to whether or not the individual residential market segments are most likely (or not) to be deterred by the shifts (or factors) in economic cycle waves. Current views on the relationship between residential real estate market segments and economic cycle waves presupposes a uniform response, that which Goddard (2012) made attempt to dispute. An opportunity therefore exists to explore the relationship between residential real estate market segments with economic cycle waves, on a individual market segment basis. This opportunity has potential to be expanded upon, in the event that submarket segment intricacies needs to be understood further.

The above problem statement seeks to encapsulate aspects to which existing literature may not have been stretched. For instance, existing literature is predominantly concerned with an inferred collective view on the performance of residential real estate market segments. In many of these cases, house prices are used as a proxy to residential real estate market segments, whilst various indicators have been applied as proxy to economic cycle waves (e.g. Gross Domestict Products, Inflation Rate, Busines Cycles, Interest rate etc.) over time.

Overall Aim:

The study is aimed at adding value to the existing body of literature, by dissecting the performances of individual residential real estate market segments, to affirm whether or not their respective outcomes would concur with existing literature. The research study seeks to validate the performances of individual real estate market segments in a high inequality environment, particularly when considering the suggested ‘buffer’ effects to the global economic crisis (Baxter, 2008). It is envisaged that the revised perspective may provide some approach towards residential real estate development projects and/or investments, *amongst other things*. For example, the study may result in tailor-made development products for each individual residential real estate market segment, to cater for direct needs of a particular community. This can somehow be viewed as an attempt to address *issues of supply and/or demand* in the residential real estate environment, adaptation to the high inequality environment. Structured investment decisions or residential portfolio balancing may emanate

from the findings of this research study. It is considered critical to identify and explore individual market segments, in order to take issue with the much generalized congruency (or uniform) effect, beyond the urban to rural ratio (Relations, 2012).

1.3. RESEARCH QUESTIONS

This research report thus intends to expand on existing literature, to provide a detailed analysis on the performances of individual residential real estate market segments. As a result, this research report seeks to address the following research questions:

i. What has been the performance of individual residential real estate market segments in relation to economic cycle waves?

ii. Which individual residential real estate market segment is likely to be considered most resilient?

iii. What could potentially be the benefit, if any, in understanding individual residential real estate market segments at such levels of analysis?

It is conceived that the attempts to address the abovementioned research questions, may provide clarity and add value to the existing body of literature. Ideally, the study is conducted on the premise that the learning outcomes may be applicable to various real estate practices in the residential sector (e.g. portfolio management; asset management, housing delivery; basic services delivery etc.). It is further conceived that the learning outcomes may have a domino effect on other real estate sectors such as Town and Regional Planning, to address spatial and land use planning - *amongst other things*. Furthermore, the study may derive a form of strategic analytical framework that may serve pivotal in decision-making processes towards other national planning structures such as the National Development Plan ("NDP").

1.4. RESEARCH OBJECTIVES

Research studies have been conducted globally, to discuss the relationship between residential real estate and economic cycle waves, by applying various proxies to justify the relationship thereof. For example, Bouchouicha and Ftiti (2012) studied the "real estate markets and the macroeconomy: a dynamic coherent framework"; Minetti and Peng (2013) studied the "lending constraints, real estate prices and business cycles in emerging markets"; Chinloy (1996) studied "real estate cycles: theory and empirical evidence"; *amongst many other studies.* At the very most, outcomes on these research studies seem to suggest or infer

uniformity between the residential real estate market segments and economic cycle waves, almost discounting and/or downplaying individual residential real estate market segment performances. In a high inequality environment, it is considered improbable that a uniform performance of residential real estate market segments exist. Market segments are considered to be contextual, hence the need to explore each individual residential real estate market segment. Therefore, the key objectives of this research report are to:

i. To assess and discuss the performance of individual residential real estate market segments in relation to economic cycle waves;
ii. To determine the most resilient individual residential real estate market segment;
iii. To identify and outline the potential benefits and/or importance of undertaking a detailed analysis of individual residential real estate market segments in relation to economic cycle waves; and

1.6 DESCRIPTION OF RESEARCH AREA (CITY OF JOHANNESBURG)

I. SCOPE

According to Glaeser et al. (2013) , seventy five percent (75%) metropolitan statistical areas ("MSA") experienced 111% trough-to-peak growth in real house prices in the 1990s and 2000s, whereas the remaining twenty five percent (25%) non-metropolitan statistical areas had only 32% trough-to-peak real house price growth[7]. This was preceded by Goodman and Thibodeau (1998), who indicated that housing submarket models have typically focused on differential hedonic[8] prices across metropolitan areas. Of interest however is the fact that house prices showed record declines for the second quarter of 2007 in almost all of the metropolitan statistical areas in the US (Companies, 2007).

II. STUDY AREA

Adopting Baxter's (2008) view that South Africa has weathered the global economic crisis, the City of Johannesburg ("CoJ") is identified as a metropolitan statistical area, to undertake the research study.

The CoJ is a metropolitan municipality that manages the local governance of Johannesburg, South Africa. According to StatsSA, the CoJ has a population of 4 434 827[9], with a growth

[7] Federal Housing Finance Agency ["FHFA"] data.
[8] Hedonic – relating to, characterized by, or considered in terms of pleasant (or unpleasant) sensation.
[9] As at last date of statistic of 2011.

rate[10] of 3.18%. Applying the growth rate to a period of up to and including year 2015, it can be deduced that the estimated population is 5 026 420 (as at 2015), *ceteris paribus*. Consequently, the population within the CoJ can thus be estimated to constitute 9.31% of the country's total population.

According to the CoJ, Johannesburg is a divided city; the poor mostly live in the southern suburbs or on the peripheries of the far north, and the middle class live largely in the suburbs of the central and north. Unemployment is near 46% and most young people are out of work. Around 20% of the city lives in abject poverty in informal settlements that lack proper roads, electricity, or any other kind of direct municipal service. Another 40% live in inadequate housing with insufficient municipal housing. The CoJ is embarking on new spatial plans in line with Joburg 2040, the Growth Development Strategy, based on transport-orientated development, the so-called "Corridors of Freedom". The shape of the future city will consist of well-planned transport arteries linked to interchanges where the focus will be on mixed-use developments. The residents will then not have to use private motorized transport but can opt for alternative means, which include cycling, bus lanes and pedestrian walkways. The Corridors of Freedom is meant to transform entrenched settlement patterns, which have shunted the majority of residents to the city's outskirts, away from economic opportunities and access to jobs and growth.

In line with the Corridors of Freedom strategy is the Urban Development Zone ("UDZ") tax incentive. This is an incentive scheme aimed at encouraging inner city renewal across South Africa. For example, the tax incentive is legible when a Developer and/or Investor refurbishes an existing office building into residential real estate units. Any taxpaying, property owning, individual or entity may claim the tax benefits of the UDZ incentive. The incentive takes the form of a tax allowance covering an accelerated depreciation of investment made in either refurbishment of existing property or the creation of new developments within the inner city, over a period of 5 (five), or 17 (seventeen) years, respectively. The CoJ defines the UDZ innercity and its boundaries as follows (see map on Figure 4 below):

[10] Population Growth Rate (PGR) is the increase in a country's population during a period of time, usually one year, expressed as a percentage of the population at the start of tha period. It refelects the number of births and deaths during aperiod and the number of people migrating to and from a country.

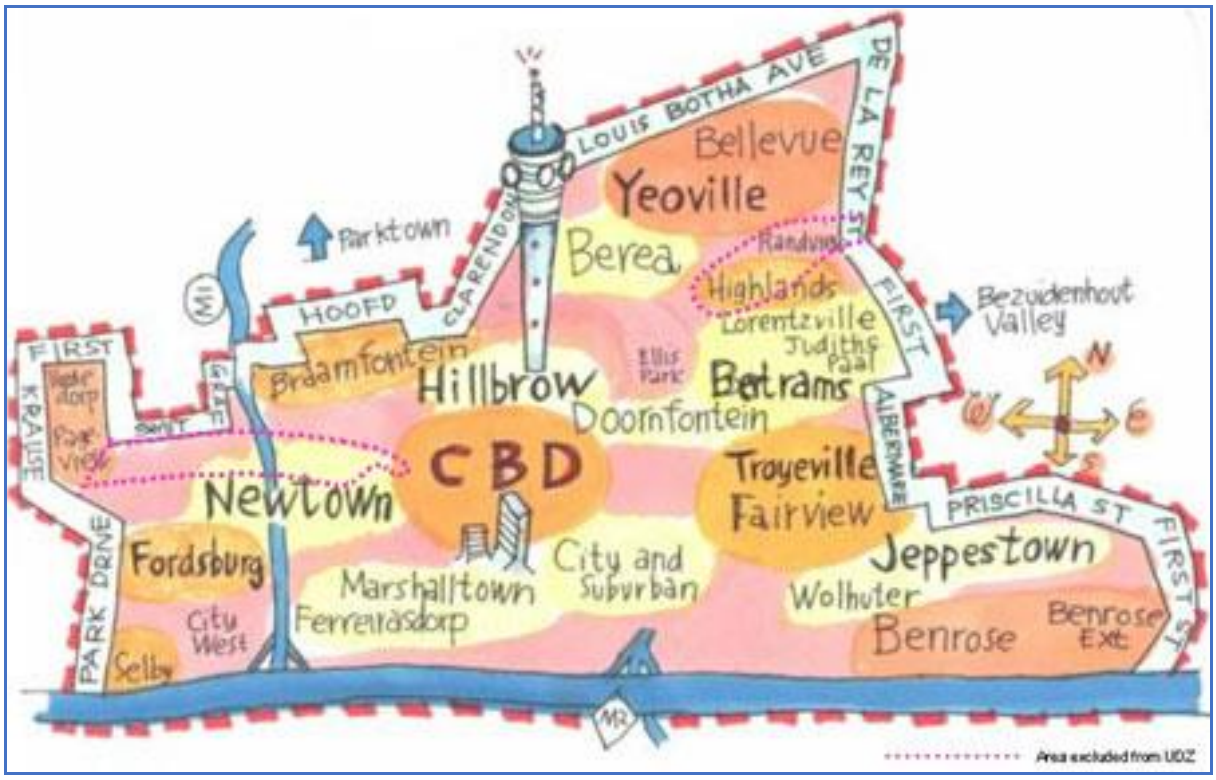

Figure 4. The City of Johannesburg's Innercity jurisdiction area. **(source: City of Johannesburg Metropolitan Municipality).**

For purposes of the research study within the CoJ area, the following suburbs constituting the innercity are considered:

- Bellevue; Benrose; Benrose Extension; Berea; Bertrams; Braamfontein; Central Business District; City & Suburban; City West; Doornfontein; Fairview; Ferreirasdorp; Fordsburg; Highlands; Hillbrow; Jeppestown; Judith's Paarl; Lorentzville; Marshallstown; Pageview; Randview; Selby; Troyeville; Vrededorp; Wolhuter; and Yeoville.

The CoJ innercity is chosen on the basis of an empirical study which sought to determine the relationship between wages, housing prices and commutes. Mayock (2015) established that the value workers place on shorter commutes and lower housing prices is substantial. This view concurs with the Corridors of Freedom notion, an attempt to create 'work, live and play' environment within the CoJ innercity.

Amongst many other factors, the residential real estate sector is chosen due to the fact that housing (or access thereto) has been identified as one of the critical challenges in South Africa. As has also been echoed by Zhu (2003), housing (or residential real estate sector) is also seen to provide a form of human dignity, integrity and sometimes as a best performing

form of long term savings, *amongst other formal long term saving products (e.g. provident fund, retirement annuity, pension fund etc.).*

In an attempt to attain the research aim and objectives, the CoJ innercity is identified as a critical research area for determining the most resilient residential real estate market segment throughout the economic cycle waves.

1.7 CONTEXTUALIZATION OF INCOME LEVELS

In an attempt to clarify the high inequality issues, clearly defined market segmentation becomes a critical milestone towards meeting the aim and objectives of this research study. The most commonly utilized and generally accepted tool such as the Living Standard Measure ("LSM") as developed by the South African Audience Research Foundation("SAARF") is adopted, to ensure systematic thinking and application. Briefly, the LSM tool is largely based on household income, which is also a generic variable applied in the residential real estate sector. The most recent LSM measure was conducted in 2013, where the LSM were grouped based on averaged monthly household income levels, as follows (see Table 1.):

Table 1. LSM Levels in South Africa.

Level	Averaged Household Income (Rands per month)	Population
LSM 1 - 2	R 1 353	658 000
LSM 3- 4	R 2 098	5 900 000
LSM 5 - 6	R 4 497	18 400 000
LSM 7- 8	R 12 026	5 900 000
LSM 9 - 10	R 25 453	5 300 000

(Source: FinScope SA 2013 Consumer Survey).

As a point of reference, the National Department of Human Settlements ("NDoHS") describes the low residential real estate market segment being households with income of up to and including R15, 000.00 (Fifteen Thousand Rand). This threshold is seldom linked to inflation rate as the NDoHS's focus is to alleviate housing shortages to the previously disadvantaged households. By implication, the NDoHS's definition signifies that four (4) of

five (5) grouped levels in Table 1 above can be classified as the low residential real estate market segment (i.e. LSM 1 to 8). From the definition, it can be deduced that a further fraction of LSM 9-10 also constitutes the low residential real estate market segment, actual percentage could be clarified when making further analysis to the submarket segments. In principle, it is most likely that the low residential real estate market segment may be in excess of 85.32% (i.e. 30 850 410 population), given on a LSM total population of 36 158 000, depicted in Table 1 above. It can be deduced that the remaining population of 5 307 590 constitutes middle and high real estate market segments, although not clearly defined. A subject for further research study.

Given the country's total population 54 million inhabitants, it can be inferred that the low residential real estate market segment constitutes a minimum of 57.13% (i.e. 30 850 410 population). This means that 57.13% of the population are most likely to qualify for a residential real estate not exceeding R466, 000.00 (Four Hundred and Sixty Six Thousand Rands)[11], assuming 30% of household income constitutes net disposable income, as required by the prescripts of the National Credit Act, 2005[12]. Also, it can further be deduced that the remaining 14.68% (i.e. a population of 5 307 590), constituting middle to high real estate market segments are most likely to qualify for residential real estate between the amounts of R467, 000.00 (Four Hundred and Sixty-Seven Thousand Rand) and R790, 000.00 (Seven Hundred and Ninety Thousand Rand). This could also mean that both middle and high residential real estate market segments constitutes 42.87% of the country's total population.

The NDoHS's focus on the low residential real estate market segment was premised on eradicating housing backlog for the previously disadvantages individuals, which housing backlog was last reported to be 1.5 million in 1994[13] to 2.3 million in 2014. Initiatives such as the UDZ tax incentives were introduced as part of the initiatives to eradicating housing backlog, particularly in innercities. The need and demand for residential real estate (i.e. housing), particulalrly in the low real estate market segment requires further intervention and

[11] The amount of R466,300.00 (Four Hundred and Eighty Thousand Rand) assumes a mortgage period of 20 years, at an interest rate of 10%, based on monthly repayment of R4,500.00 (Four Thousand Five Hundred Rand). The monthly repayment of R4, 500.00 (Four Thousand Five Hundred Rand) assumes a maximum of 30% to the suggested household income of R15, 000.00 (Fifteen Thousand Rand).

[12] The National Credit Act (No. 34 of 2005) aims to protect borrowers from over-indebtedness, by limiting the amount of funds that can be borrowed, and requiring every lender to assess borrowers' credit-worthiness. It requires lenders to disclose every term in the contract and gives the borrowers the right to request their credit report, and to challenge the report if there are inaccuracies.

[13] Commencement year of democracy in South Africa.

initiatives. According to FinMark Trust, only the high real estate market segment has the most access to any form of credit[14] (SA, 2013), when compared to both low and middle real estate market segments.

1.8 LIMITATIONS OF STUDY

The research study mainly comprise of secondary data, in an attempt to analyse past performances, to call into question the existing thinking on residential real estate market segment performances. The research study endeavours to circumvent some of the shortcomings related to secondary data, which includes but not limited to:

1. **Relevance** - the purpose for which the data were collected is not likely to be exactly the same as the research objectives in the research study

2. **Accuracy and quality** - it may be difficult to be certain, although the reputation of the authors of the report or the institution publishing it will be a guide.

3. **Availability** - it may be that no secondary data have yet been collected in connection with the topic area.

For the most part of the research study, the following were some of the limitations encountered, that eventually or somehow gave shape to this research report:

- Information and data not easily available. Where information or data is available, it is every expensive and sometimes exceed the actual student fees. Datahouses (e.g. Lightstone Properties) need to be engaged for reasonably structured fees with students conducting research for study purposes.

- This type of study requires extensive analysis from Professionals (e.g. Economists). As a result, the analysis processes may prove to be very costly and requires substantial time and efforts as well.

- Inconsistency of information and data requires extensive attention and sometimes strict guidance from Supervisor. A healthy and consistent open discussion with a Supervisor plays a pivotal role.

[14] Credit in this instance refer to a) borrowing from formal institutions or people; b) borrow from friends and family; c) borrowing from informal institutions or people.

- Periods at which some information or data is released may not provide the full picture, depending on the period in which one requires such information or data. Attempts to co-ordinate such disparities in information and data may be time consuming and costly as well.

- Studies of this nature are likely to remain inconclusive (and subject to various interpretations) as further information may be required for a more detailed analysis and outcomes.

- Various indices may be utilised to conduct a study of this nature. As a result, these studies are most likely to remain inconclusive, for a period of time.

1.9 ETHICAL CONSIDERATIONS AND CLEARANCE

In the quest for undertaking this research study, an ethical clearance was submitted and subsequently approved by the Wits Human Research Ethics Committee (HREC). This clearance was obtained on 09 November 2015 and is valid until 09 November 2017 (see Appendix A).

1.10 OUTLINE OF THE REPORT

The structure below (see Figure. 5) provides an overall outline of the research report and the process flow to be followed in undertaking the study.

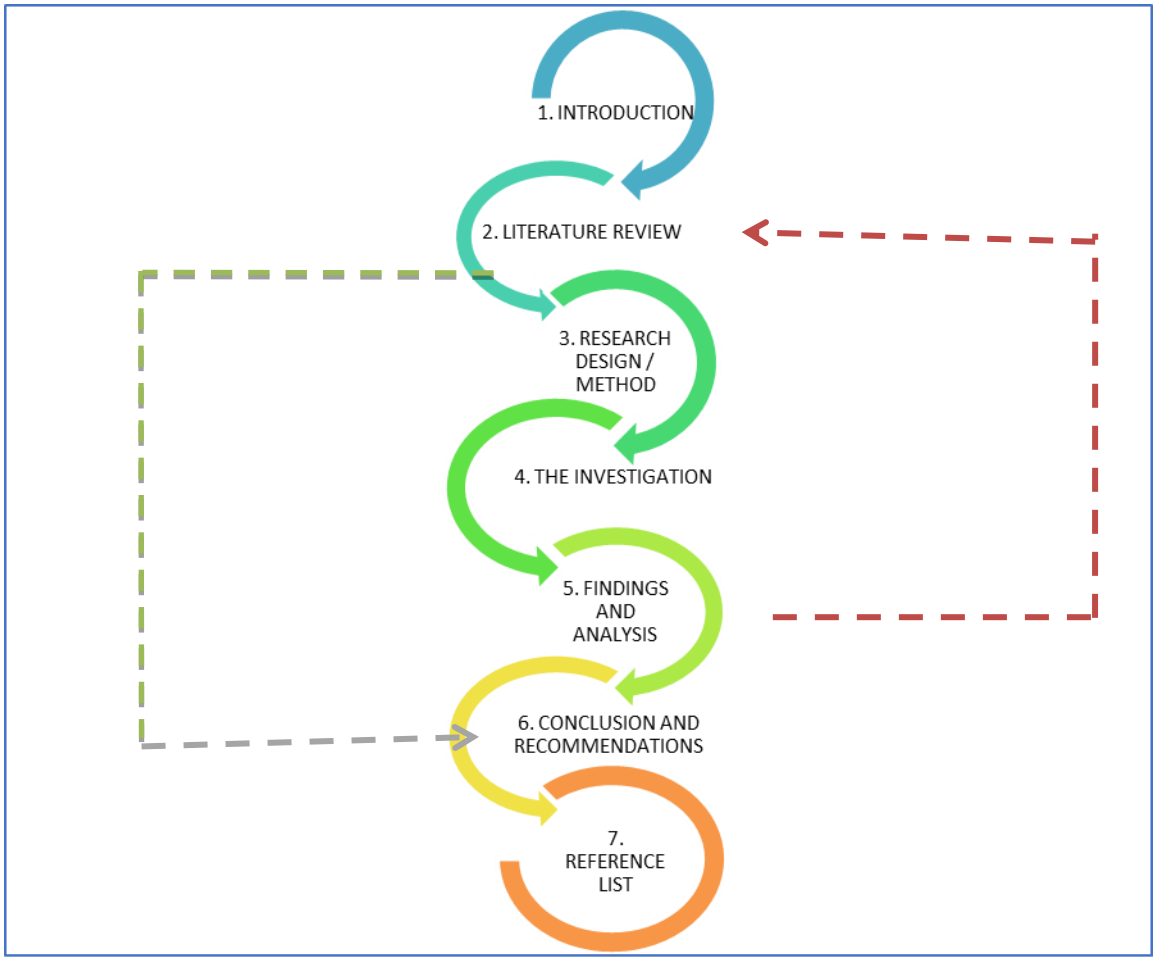

Figure 5. Research process flow.

Of critical importance to the above process flow is the fulfilment of the overall aim i.e. to add value to the body of existing literature or knowledge. Without any form of repetition and/or contradiction, it is the intention to make further analysis to the existing literature, through analysis of individual residential real estate market segments in relation to economic cycle waves. More specifically, the intention is to further determine the responsiveness of individual residential real estate market segments to economic cycle waves. In so doing, it is hoped that the 'findings and analysis' of this research report may reveal an alternative outcome from the existing literature, to encourage for more structured solutions in the residential real estate sector. It is the intention further that the 'conclusion and recommendations' should thus adopt the SMART principles, i.e.:

- Specific
- Measurable
- Achievable
- Realistic

- Timely

Chapter One: Introduction: This chapter introduces the research by giving the background to the study. It provides a detailed analysis of the problem statement for which research questions, aim and objectives are formulated, with the research method to be undertaken. The description of the research area, assumptions of the research, and, the scope and limitations are then discussed to provide more understanding on how the research is to be undertaken and shaped.

Chapter Two: Literature Review: This chapter reviews the current thinking as has been expressed by researchers and academics alike. The following issues are discussed, which are pertinent to determining the most resilient residential real estate market segment. This chapter also highlights the subtle suggestions of a uniform effect on house prices as a proxy for real estate market segments and business cycles as proxy for economic cycle waves. The topics are structured as follows:

- Understanding resilience from a real estate environment perspective;
- Real Estate Cycles;
- Residential Real Estate Market Segments;
    - Real Estate Investments;
    - Real Estate Investment Trusts ("REITs");
    - South African Real Estate Investment Trusts Taxation Regulation;
- Wages, Housing Price and Commutes;
    - Real Estate Valuations and Current Account;
    - Real Estate Valuations;
    - The effects of Interest rates and Vacancy Rates;
- Summary to Literature Review.

A rigorous summary of the literature review shall be outlined, to highlight the developing themes and potential heads of argument.

Chapter Three: The research design provides a detailed explanation about the process, the methods and the various stages when implemented during the study. Thus, the chapter details the research design, methodology and methods of data collection, sampling techniques, tools chosen for obtaining data and presentation of the data. In addition, the chapter indicates specific stages for the research process as well as detailed steps for the administration of interviews conducted during the field work.

Chapter Four: The sections outlines the process followed for data collection and analysis. Various tools are employed and dicussed to ensure thorough empirical analysis. Various other supporting data collection and analysis is also annexed at the end of the research study.

Chapter Five: The main findings of the study are presented, along with their implications and conclusions. In addition, recommendations for verifying the cause and effect relationship between economic cycle waves and residential real estate market segments. Thus, the section synthesizes the major findings fromsection four and offers recommendations to future perspectives of residential real estate market segments.

CHAPTER TWO – LITERATURE REVIEW

2. LITERATURE REVIEW

2.1. INTRODUCTION

The residential property sector serves as a major source of strength for global economy since the economic downturn (Goodman et al., 2003). He made a further submission that falling property prices tend to impose downward pressure on the banking sector, predominantly due to the increase in bad debts and the deterioration in the balance sheets of corporate borrowers that rely on real estate as collateral. A subtly contradictory view was made by Vogel (2012), who submitted that the residential property sector showed an increase in all segments of the residential market (small, medium and large), throughout the economic cycle waves. It is considered improbable that all residential real estate markets may partake in the mainstream economy as corporate borrowers (Vogel, 2012). This is despite the suggestion of a unified impact on falling property prices that imposes a downward pressure (Goodman et al., 2003), or a suggested 'uniform' increase in all market segments (Vogel, 2012).This research report draws from such examples of researchers' contradictions to the relationship between real estate market segments and the economic cycle waves. However, these subtly contradictory views provide a distinct premise in which the following topics are discussed, in pursuit of determining the most resilient real estate market segment, in relation to the economic cycle waves:

- Understanding resilience from a real estate environment perspective;
- Real Estate Cycles;
- Residential Real Estate Market Segments;
- Real Estate Investments;
    - Real Estate Investment Trusts ("REITs");
    - South African Real Estate Invetsment Trusts Taxation Regulation;
- Wages, Housing Price and Commutes;
- Real Estate Valuations and Current Account;
- The effects of Interest Rates and Vacancy Rates;

- Summary to Literature Review.

2.2. CONCEPT OF RESILIENCE

Theories of resilience, which have commonly been associated with sustainability, are said to go back to the 1960s and 1970s (Folke, 2006). In some instances, it has been argued that resilience has often been incorrectly applied to replace the idea of sustainability, or at times that the two concepts are essentially the same. Some theorists have further argued that both concepts are linked conceptually. Sustainability (or sustainable developments), however, was defined by the Brundtland Commission (Development, 1987) as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

In an attempt to establish the linkage between the two concepts, the term resilience is defined widely to mean the ability to recover from some shock or disturbance. It is further explained that the term has various meaning which are context dependant. Much closer to the real estate environment, Harrison et al. (2014) defines resilience as "*the capability of individuals, social groups, or social-ecological systems including towns and cities not only to live with changes, disturbances, adversities or disasters but also to adapt, innovate and transform into new more desirable configurations*." The definition was carefully constructed with substantive consideration on the origins of the term. The term itself has been widely researched by Psychologists, Sociologists, Social Workers, Educators and Ecologists (Holling, 1973) *amongst many others*, in an attempt to provide an indication of what makes individuals and groups of individuals resilient (i.e. the resilience theory). As such, resilience was defined as follows, *amongst other definitions*:

- The capacity to maintain competent functioning in the face of major life stressors (Kaplan, 1996);
- The capacity for successful adaptation, positive functioning or competence, despite high risk status, chronic stress, or following prolonged or severe trauma (Sonn, 1998);
- The presence of protective factors (personal, social, famillal, and institutional safety nets) which enable individuals to resist life stress (Kaplan, 1996).

Harrison et al. (2014) argues that one way of understanding the relationship between sustainability and resilience is to consider sustainability as an essential goal for development,

and resilience as a way of thinking and acting that would lead towards achieving sustainability. According to Walker and Salt (2006), resilience is the key to sustainability. After much deliberation on the co-existence between urban resilience and urban vulnerability, Weakley (2013) submits that there are two types of resilience, i.e.:

- Equilibrist resilience – this type of resilience assumes that systems are in a stable balance or equilibrium, and that when they are disturbed they must find a new equilibrium (Simmie, 2010). In some cases, the system may return to the pre-existing equilibrium, but in other cases it may evolve into a new state of equilibrium. The resilience of the system is dependant on the speed with which it restores equilibrium, or the ability to resist being knocked off its state of equilibrium in the first place.

- Evolutionary or transformative resilience – This type of resilience assumes that in complex systems, change is constant and so a state of equilibrium is hardly attainable. As such, some theorist respond to this reality by referring to multiple points of possible equilibrium (Holling, 1973). With the recognition of consistency in change, it has been argued that systems never achieve a point of stability but are always adapting. With this understanding, resilience means the capacity for continual adaptation to never-ending disturbance. There is no complete or end-state to the adaptive process, not even for a short period of time (Holling 2001; Gotham 2010).

According to Weakley (2013), both equilibrist and evolutionary resilence have both positive and negative aspects, and that desired resilience may be a subtle combination of the two (see Figure 6 below):

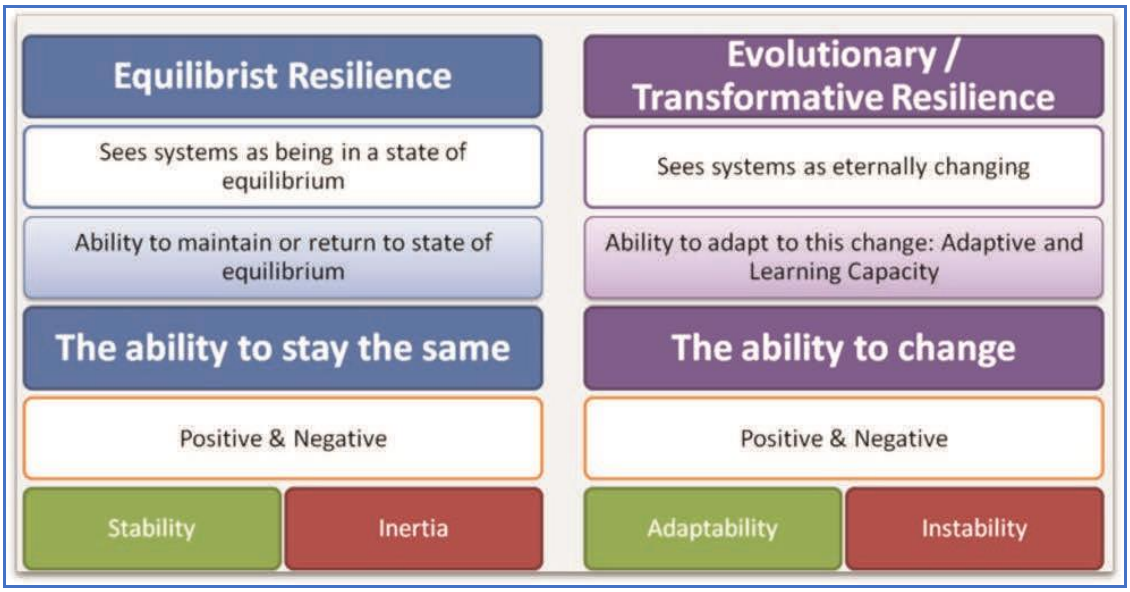

Figure 6. Types of resilience.

The concept of resilience emerged from within the ecological sciences, through the work of pioneers such as Holling (1973) and Walker (2006). It is a way of looking at why some systems collapse when they encounter shock, and some don't. The insights gleaned now offer a very useful overview for determining how systems can adapt and thrive in changing circumstances. Resilience at the community level depends upon:

- *Diversity:* a broader base of livelihoods, land use, enterprise and energy systems than at present;
- *Modularity:* an increased self-reliance (but not necessarily self-sufficiency), with "surge protectors" for the local economy, such as local food production and decentralized energy systems; and
- *Tighter feedback loops:* bringing the results of our actions closer to home, so that we cannot ignore them.

In the South African literature, Turok (2014) writes that "resilience is not a neutral attribute of a social system, affecting all groups the same way. It is necessary to discuss 'for whom' it applies and not assume homogeneous interests", he adds. Preceding Turok's (2014) view was a submission that resilience theory provides a useful framework for understanding "the complex interplays between persistence, adaptability and transformability" and "has the potential to become a bridging concept between the natural and social sciences"(Davoudi, 2012).

A. REFLECTION ON RESILIENCE ON REAL ESTATE (In conclusion):

Whilst resilience theory, proves to be more complex and requires consideration of various aspects to be near conclusive for this research report, Turok's (2014) view become more critical. For instance, the studies conducted on resilience, vulnerability and sustainability do not provide sufficient indication on the impact relationship between residential real estate market segment (e.g. house prices) and economic cycle waves (e.g. business cycle), or *vice versa*. Given the research aim and/or objectives, it becomes critical to identify a particular market segment (i.e. "for whom") which can be tested for 'persistence, adaptability and transformability', notwithstanding all other factors that are generally considered in urban resilience. Amongst other reasons, this research report is seen as a quest to deviate from "assuming a homogeneous interest" and/or the perceived generalization of residential real estate market segments, particularly when challenged by economic cycle waves.

Above all, the term resilience implies a reaction to an occurrence, rendering the term a reactive process instead of being proactive. This could imply *inter alia* that any strategy formulation emanating from a resilience perspective would generally be assessing historic occurrences, assuming some learning can be derived therefrom, to improve the future. A further implication is that historical information and/or data forms a greater basis for analysis on resilience. Given this context, secondary data/information inherently forms part of the research design method.

2.3 REAL ESTATE CYCLES

According to Krugman (1995), asset boom-and-bust cycles have played a key role in macroeconomic fluctuations, particularly in developing countries. Many studies have found that collapses in house prices are at the heart of many financial crises (Learner, 2007; Reinhart, 2008; Iacoviello, 2010). Grenadier (1995), however, argues that it is the combination of new units arriving at inopportune times, along with the failure of the market to adjust to changing economic circumstances that is at the foundation of the model's explanation for the persistence of real estate cycles. In another view, it has been submitted that concurrent market dynamics occurs with boom and bust cycles in emerging markets i.e. financial liberalization, increase in foreign capital inflow, and high levels of lending liquidity (Koptis and Offerdal, 1994).

In his submission, Chinloy (1996) argues that prices (and rents) in real estate markets depend on the behavior of the business cycle, which in turn affects production and prices. To the contrary, Learner (2007) submitted that an increase or decrease in house price fundamentally affects economic activity and economic fluctuations, and can as a consequence, alter the business cycle. In another dimension, McKenzie et al. (2011) have argued that the real estate construction activity fluctuates severely, experiencing great booms and deep depressions. They submit that, on average, these real estate cycles took approximately 18 years to move through expansion and recession. This 18-year cycle is known as the *long real estate cycle*. Such *long-run trends* in real estate activity are said to be influenced by gradual changes in population, age distribution, marriage rates, income levels, construction costs, taxes, and transportation patterns. However, economists have never been certain on clear signs of this *long-run real estate cycle*. A *short-term real estate cycle* was also identified, which was said to be taking three (3) to six (6) years to move through all four phases of real estate cycle (see Figure 7):

- Expansion – a speedup in the pace of economic activity;
- Peak – the upper turning of business/economic cycle;
- Contraction – a slowdown in the pace of economic activity; and
- Trough – the lower turning point of business/economic cycle, where a contraction turns into an expansion.

In his Phoenix and Tucson[15] study, Chinloy (1996) found that the effect of real estate cycles on prices and/or rentals for multi-family housing are characterized by upside and downside lengths of three (3) years i.e. a depiction of *short-term real estate cycle*. However, *short-run* trends in real estate activity are said to be influenced heavily by the availability and cost of mortgage money and the current state of the national and local economy (e.g. interest rates).

[15] Phoenix and Tucson are town cities in the United States of America.

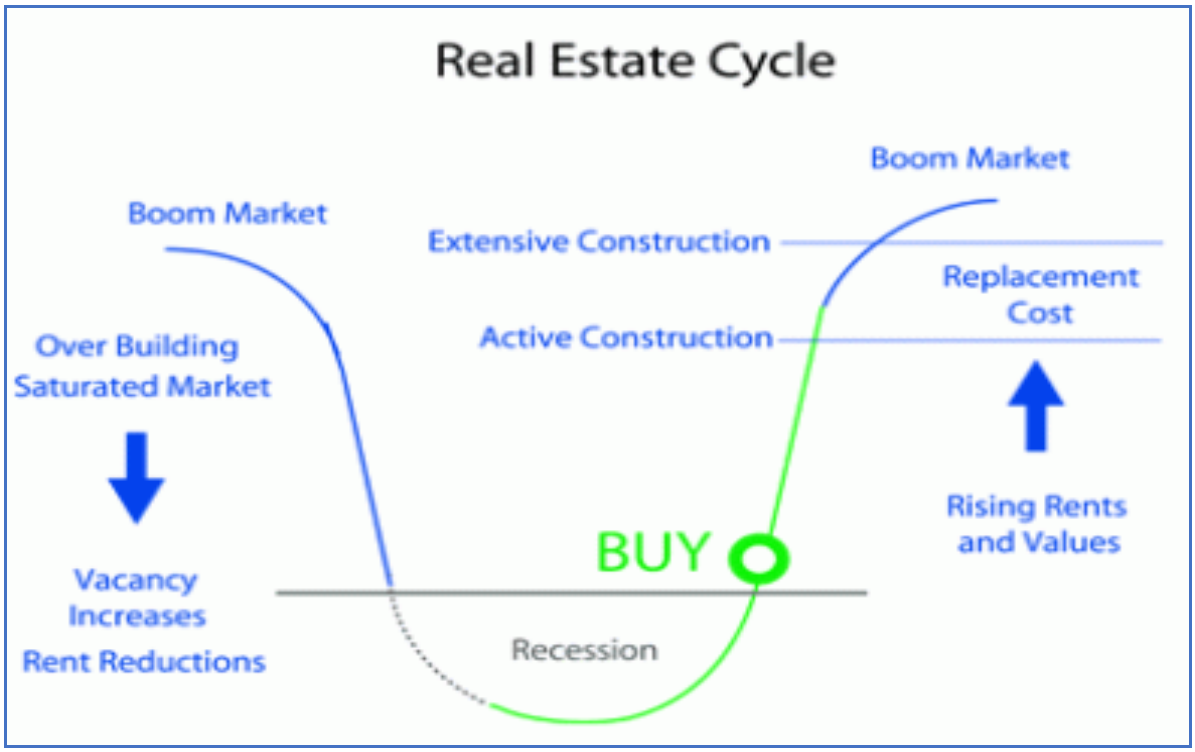

Figure 7. Real Estate Cycle phases.

However, Grenadier (1995) argues that the vast majority of both academic and practitioner explanations of the real estate cycles focus on the supply side of the market, that which McKenzie et al. (2011) considers being an aspect of the *short run* trend. For instance, it is from the supply perspective that Chinloy (1996) argues that the real estate market responds to vacancy clearance, which itself exhibits sluggishness. Meaning, due to the lag in construction, planning and entitlement, developers are unable to adjust capacity as they do not have ability to meet current excess demand. Cycles are said to occur when expectations are imprecise because of a systematic error in expectations. Apart from the supply side of the market, Cocconcelli et al. (2013) have demonstrated the presence of speculative behavior and the need for robust fiscal and monetary policy structures (i.e. land tax) in emerging countries (e.g. Estonia, Northern Europe). The term 'speculative bubble' refers to a situation in which excessive public expectation of future increase in prices causes prices to be temporarily elevated above their fundamental value (Flood 1986; Stiglitz 1990; Diba 1998; Case 2003; Engsted 2006). Rigobon & Sack (2004) and Bernanke & Kuttner (2005) have submitted that asset prices react quickly to monetary policy announcements. In their study of business cycles, Ahearne et al. (2005) found that the housing prices show co-movements with the macroeconomic environment and that house price booms are preceded by loose monetary policy.

B. REFLECTION ON REAL ESTATE CYCLES (In conclusion):

The causal relationship and timing disparities between residential real estate (i.e. house prices) and economic cycle waves (i.e. business cycles) remain a constant contentious subject, that which Gallie (1956) refers to as the 'Essentially Contested Concepts'. It is conceived that the factors or variables of supply and demand play a critical role to comprehensively underpin the relationship between house prices and business cycles. It is systematic however to consider the relationship from a supply perspective (Gallie, 1996) as the demand for housing in emerging markets/ developing countries is inherently in the high. Above and beyond the relationship between house prices and business cycles as articulated by various researchers, there persists a subtle inference that the movements between house prices and business cycle are somewhat cohesive for all real estate market segments, distinction in individual residential real estate market segments is generally downplayed. There appears to be a generic outlook on house price performances in emerging markets throughout the boom-and-bust economic cycles, with very little or no asset class categorization that may assist in comprehending the relationship. However, it remains a desperate need to unpack such causal relationships with individual market segments, in order to fully comprehend the impact of such individual market segments upon factors such as financial liberalization, increase in foreign capital inflow, and high levels on lending liquidity, *amongst many other things*.

In principle, South Africa as an emerging country has been largely affected by the influences in both *long-run* and *short-term* real estate cycle movements over time, sometime rapidly. The prevalence of both real estate cycle influences occurs regardless of the robust fiscal and monetary policies (including flexible exchange rates), that helped South Africa to weather the global economic crisis (Baxter, 2008). For instance, the demand for housing is continuously affected by the ever increasing population. Amongst other things, access to housing is largely influenced by factors of short term real estate cycle (i.e. availability and cost of mortgage money etc.). Despite issues of affordability which are reciprocal to such income level inequalities, politics dominated such access to funding. For example, financial institution were reluctant to provide mortgage funding to townships[16] (i.e. the so-called 'red-lining'), which predominantly consist of the low market segment predominantly. Amongst other

[16] In South Africa, the terms township and location usually refer to the often underdeveloped urban living areas that, from the late 19th century until the end of apartheid, were reserved for non-white residents, namely black Africans, Coloureds and Indians). Townships were usually built on the periphery of towns and cities. The term township also has a distinct legal meaning in South Africa's system of land title, which carries no racial connotations.

things, the FSC was established to obliterate such red-lining activities, to improve access to mortgage funding by the majority of the population i.e. the low market segment. Both the supply and demand for residential real estate (particularly housing) can be studied from two points of view:

- The total demand , or the number of housing needed in a given market;
- The composition and quality of housing (i.e. unit size, age, location, and condition, and whether the units are intended for owner occupancy or for rent).

2.4 RESIDENTIAL REAL ESTATE MARKET SEGMENTS

Claycamp and Massy (1968) submitted that very little progress has been made in developing a normative theory of the market segmentation process. Most articles on segmentation tend to be either general discussion of the basic concept or research reports showing differences in consumption patterns among specific consumer groups. The strategy of segmentations often seems to be roughly equated with the *act* of defining subparts of some total market. In their book titled "Market Segmentation: Conceptual and Methodological Foundation", Wedel and Kamakura (2000) submits that goods can no longer be produced and sold without considering customer needs and recognizing the heterogeneity of those needs. They argue that for firms to obtain a competitive advantage, production processes need to be flexible to accommodate diversification of demand, in order to reach customer satisfaction. Their rational is largely premised on Smith's (1956) definition that "market segmentation involves viewing a heterogeneous market as a number of smaller homogeneous markets, in response to differing preferences, attributable to the desires of consumers for more precise satisfaction of their varying wants." They submit that Smith's (1956) definition has retained its value over time. Such recognition to the heterogeneity of needs and/or market demands gave rise to operational marketing strategies such as a the Four Vs (Slack et al., 2009), i.e.:

- The **Volume** of the products and services produced;
- The **Variety** of different products and services;
- The **Variation** in demand for the product or service; and
- The degree of **Visibility** that the customer has in the production of goods and services.

According to Claycamp et al. (1968), the concept of market segmentation was developed in economic theory to show how firm selling a homogenous product in a market characterized by heterogeneous demand could maximize profits. The theory shows that optimal profits can be achieved if the firm uses consumers' marginal responses to price, i.e. price elasticity's, to define mutually exclusive segments and sets price (or output) so that marginal profits can be achieved in each segment are equal. They further argue that marketers are interested in the segmentation concept because of its profit implications and because the economic theory is related to profit maximization i.e. the so-called "optimal" approach. However, the optimal segmentation is said to be having four kinds of shortcoming, namely:

- Problems of defining mutually exclusive market segments;
- Problems of measuring response elasticities on a segment by segment basis;
- Information constraints that affect the possibility of reaching segments selectively (i.e. the marketer ordinarily has only socioeconomic or demographic information about audiences reached by promotional media or areas covered by distribution outlets, and it is usually difficult to find relationships between these variables and marginal response differentials);
- Institutional constraints that limit the ability to use existing means of reaching segments with the desired degree of price or promotional selectivity.

Chen et al. (2009) submits that previous research on house prices has largely focused on the parametric specification of the model – for example, using ordinary least squares of Box-Cox transformation regressions to examine the interaction between house prices and regressors, with a couple of notable exceptions (e.g., Goodman et al. 1998, 2003; Bourassa et al. 1999, 2003) that have addressed the issue of market segmentation[17].

Following his finding that the stochastic properties of vacancy rates differ significantly across property types (Grenadier, 1992), in the 'persistence of real estate cycles' Grenadier (1995) also made an empirical finding that an economic shock which cause the average office market's vacancy rate to deviate from equilibrium will still have 75% of its effect persist a full year later. For the industrial and apartment (residential) markets, the effects are 55% and

[17] In this case, market segmentation is described as the process of defining the suitability of a sub-market for a specific housing property.

35%, respectively. As a result, even the rental market for the residential real estate sector affirms the *short term real estate cycle* (Chinloy, 1996), with a 35% effect full year later.

Prahalad (2012) provide a distinct market segmentation through an income level of $1500 per annum, being what he defines as the bottom of the pyramid ("BoP"). When translated to the South African context, the BoP market segment are household with income levels not exceeding R18 000.00 (Eighteen Thousand Rand) per annum[18]. In essence, Prahalad (2012) definition aligns with the earlier 66.96% low residential real estate market population, following market segmentation by house prices (Chen, 2009). In his book, Prahalad (2010) submitted that two-third of the world's population survive with the same annual per capita income of less than $1500. He further submits that the BoP market segment, as defined, has in the past few years received increased attention of marketers and policy makers. For example, internet, mobile communications, computer software and health-care are marketed to the BoP markets in Latin America, Africa and South Asia (Cai 2007; Guesalaga 2008; Subrahmanyan 2008; Schuster 2012; Dubey 2013). These products and services have enabled BoP customers' participation in consumption practices, which reduces their poverty levels and improves standard of living (Prahalad, 2012).

In the quest to serve the so-called BoP residential real estate market segment,, the Clinton[19] administration placed political pressure on Fannie Mae and Freddie Mac[20] to start lending to low-and-moderate-income households (Baxter, 2008). The objective was to expand access to housing for poorer households i.e. the BoP residential real estate market segment. In essence, the pressure to lend to poorer households implied that the financial institutions would assume greater levels of risk. This means that during 'flush' economic periods when asset prices are rising, there are more limited risk to the lending banks. During periods of 'bear' market conditions, declining asset values would elevate the risk to banks significantly. As was indicated earlier by De Klerk (2013), sub-prime markets had an effect on corporates investing in the BoP market segment housing mortgage-backed securitization schemes, not necessarily the BoP residential real estate market segment itself. It can therefore be inferred that it was on the basis of these additional borrowings from marginal collaterals in other residential real estate market segments that the global economic crisis was partially caused (Haughwout, 2011).

[18] Assuming an exchange rate of R12.00 (twelve rands) in a U.S. dollar.
[19] William Jefferson "Bill" Clinton is an American politician who served as the 42nd President of the United States from 1993 to 2001 (https://en.m.wikipedia.org/wiki/Bill_Clinton).
[20] Fannie Mae and Freddie Mac is a United States government sponsored enterprise (GSE) mortgage lending institutions.

C. ***REFLECTION ON RESIDENTIAL REAL ESTATE MARKET SEGMENTS (In conclusion):***

This section is the basis in which this research report is conceptualized. It highlights the critical importance of dissecting the residential real estate market segments in understanding customer needs, the heterogeneity of those needs, to meet customer satisfaction. Particularly when dealing with countries with high levels of inquality. It is acknowledged that customer satisfaction and/or issues of competitive advantages are vast and well researched topic. Market segmentation for purposes of this research report is seen as the instigator towards meeting the ultimate goal of customer satisfaction. Flexibility to accommodate diversification of demand becomes a critical aspect, to possibly align with supply. As such, it is through efforts such as market segmentation processes that housing shortages can be eradicated, through the understanding of individual market segment performances throughout the economic cycle waves. Especially when considering the fact that the majority of the population - in this case the 57/43 split in terms of income levels - consist of the low residential real estate market segment i.e the BoP market segment. Given the high levels of inequality as depicted, it is considered probable that the suggested Four Vs is likely to yield different outcomes, when compared to the literature that previously suggested a congruent effect to residential real estate market segments. The actual comparison and/or demonstration of such impact on the Four Vs may form part of future research studies.

2.5 REAL ESTATE INVESTMENTS

In their general introduction to Real Estate Investing, Goddard & Marcum (2012) describes the period whereon real estate investments were encouraged, calling it the "Yes Era". Amongst many other things, this period is described by actions such as:

- Financial institutions offering ever more risky loan options;
- Central banks encouraging bank lending via low interest rates;
- Investors seeking as much of a loan as they could possibly obtain while interest rates were low and while lending appetite was strong.

Goddard et al. (2012) further submits that real estate investments is concerned with **income-producing** properties, be it residential; retail; office; warehouse and industrial sectors. For

these sectors, the following are identified as typical market participants in what is dubbed the commercial real estate (see Figure 8 below) (Phyrr, 1982):

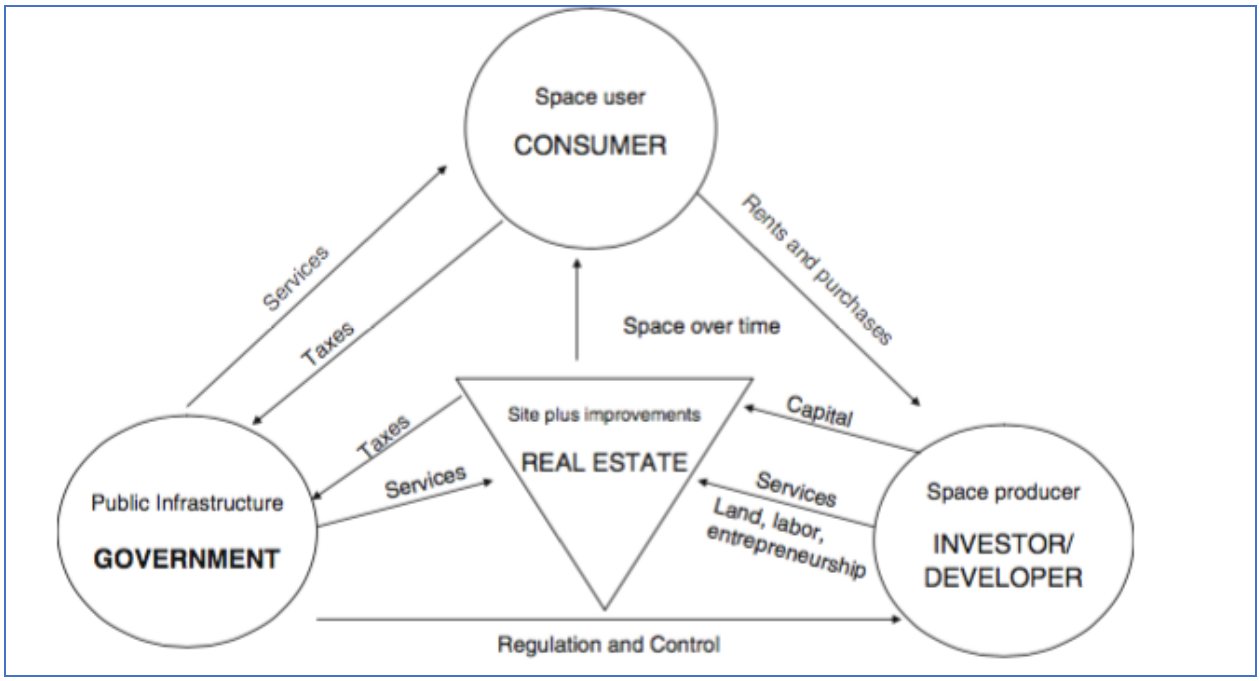

Figure 8. Typical participants in the commercial real estate (Phyrr, 1982)

The common theme for each is that all are seeking to utilize the available market knowledge and financial tools in order to acquire profitable real estate investments.

2.5.1 REAL ESTATE INVESTMENT TRUSTS (REITS)

Frost et al. (2005) defines Real Estate Investment Trusts (REITs) as a corporation or trust that uses the pooled capital of numerous investors to purchase and manage income property and/or mortgage loans or any other types of products related to real estate. REITs are special purpose investment vehicles that can serve as a portfolio diversification strategy for investors seeking an investment which provide return possibilities in a variety of property types and locations (Goddard, 2012). Simply put, REITs are viewed as a pool of properties or mortgages traded in the stock market, developed with the same structure of a unit trust. Given their passive nature, REITs are granted special tax considerations, which make them more attractive to some investors. The REIT regime is said to offer exempt tax status to investment companies or other investment vehicles, which meet certain criteria as to ownership and investment portfolio, on the basis that investment vehicle then distributes all or most of its profits to shareholders (KPMG, 2010). According to Ernst & Young (2012), REITs also qualify for a special tax status so that there is a single taxation at the investor level.

Shareholders own shares in REITs and pay taxes based on dividends received. These dividends are taxed at the individual tax rate of the investor. As cited in Naidoo (2014), REITs security allows investment in real estate without the considerable long-term commitment, which is often typical of other real estate investment alternatives (Connors, 2010). Investing in REITs gives one the opportunity to benefit from the income generated from real estate investment, without having to purchase or finance the actual property. However, REIT losses are not passed through to shareholders, but are carried forward to offset income in future periods. In order to qualify as a REIT under the U.S. tax law, the following requirements are mandated (Brueggemann, 2010):

- There must be 100 shareholders at a minimum;
- No more than 5% of shares can be held by five or fewer individuals;
- At least 75% of REIT assets must consist of real estate, cash, and government securities;
- Not more than 5% of asset value may consist of securities from one issuer if those securities are not included under the 75% test;
- At least 95% of REIT gross income must be received from dividends, interest, rents, or gains from ral estate sales;
- At least 90% of income must be distributed to the shareholders each year.

Based on the requirement above, it follows suit that REITs are significantly restricted from an asset and profit distribution standpoint. Thus Bodie et al. (2008) describes REITs similar to close-end funds. Generally, REITs can be either privately owned or publicly traded entities. Private REITs are not actively traded and are typically targeted toward institutional investors (Brueggemann, 2010). Whether public or private, REITs can generally be comprised of:

- Equity REITs;
- Mortgage REITs;
- Hybrid REITs (amix of both equity and mortgage)
- Mutual Fund REITs

SAREIT defines REITs as a listed property investment vehicle that is comparable to internationally recognized REIT structures from around the world (SAREIT, 2013b). As with international REITs structures, SAREIT can also be managed internally or externally and cater for different equity structures that may exist, amongst many other things. As a result, SAREITs comprise of two types of REITs, i.e.:

a. Company REITs:

- The shareholders in a Company REIT are active participants and they gain full protection of the Companies Act[21] and Takeovers Regulation Panel[22]. Shareholders can vote on specific issues in a general meeting and they can vote for the company to be a REIT;
- The company must have its REIT structure recorded in its Memorandum of Incorporation;
- The investment vehicle mus have an ongoing compliance with the JSE's listing requirements and the Companies Act is the responsibility of the company's directors;
- The company management and/or property administration may be either internal or external.

b. Trust REITs:

- Upon application to the JSE and after providing evidence of its compliance with the JSE Listing Requirements and that the investment vehicle is registered with the Registrar of Collective Investment Schemes, an existing PUT can become a SAREIT;
- The interest of investors' are protected by a trust deed and the trustee, who has the responsibility to ensure compliance with the Collective Investment Schemes Control Act and to safeguard investors' assets;
- The Trust REIT is not subject to the Takeovers Regulations, however they need to meet all JSE listing requirements;
- Trustees have to report to the Registrar and are obliged to meet all the requirements of the Collective Investment Schemes Control Act;

[21] Companies Act No. 71 of 2008
[22] Takeover Regulation Panel is established in terms of section 196 of the Companies Act (No. 71 of 2008).

- The Trust REIT has to have an external asset and property manager in terms of the Collective Investment Schemes Control Act.

Furthermore, according to SAREITs, the following list is the main criteria to accomplish REIT status and to qualify for listing on the JSE (SAREIT, 2013a):

- The applicant must own at least R300 million of property (Three Hundred Million Rands);
- The applicant must keep its debt below 60% of its gross asset value;
- The applicant must earn 75% of its income from rental or from property owned or investment income from indirect property ownership;
- The applicant must have a committee to monitor risk and not enter into derivative instruments that are not in the ordinary course of business;
- The applicant must pay at least 75% of its taxable earnings available for distribution to its investors annually.

Listed Company REITs and Trust REITs both qualify for the REIT tax dispensation and are publicly traded on the JSE REIT board (SAREIT, 2013a).

D. REFLECTION ON REAL ESTATE INVESTMENTS (In conclusion):

Whilst Goddard et al. (2012) made no reference to an individual real estate market segment, it can however be deduced however that the so-called "Yes Era" favoured real estate investments. To give a perspective, the criteria for REITs (or SAREITs) suggests involvement of the middle and/or high real estate market segments, particularly when considering the persisting levels of inequality in the country. It is considered unlikely that both speculative[23] and value[24] investments would have been a conduct of the low real estate market segment, based on affordability level deriving from income levels in Table 1 above. In other words, the Consumer (i.e. space user) as shown on Figure 9 above would thus refer to the low real estate market segment, whilst the Investor/Developer (i.e. space producer) would thus be either the middle and/or high real estate market segments. Typically the middle and high real estate market segments would be concerned with 'income-producing'

[23] Speculative Investments – where the owner accrues no income or cash flows from the property.
[24] Value Investments – where the owner receives net cash flows from the property, typically on a monthly basis.

properties, whilst the low real estate market segment would generally be more concerned with obtaining residential real estate as primary residences for their families. As De Klerk (2013) alluded, sub-prime markets had an effect on 'corporates' investing in low residential real estate market segment housing schemes. This attestation is further made by Goddard et al. (2012) who submitted that the investment banking industry was negatively affected and significantly affected by the collapse of Lehman Brothers ("Lehman") in October 2008. Lehman's loss was apparently a result of having held on to large positions in subprime and other lower-rated mortgage tranches when securitizing the underlying mortgages[25]. The effects of such collapse are said to have impacted negatively on the commercial banking industry also, that it will take years to approach the successes of the "Yes Era", if ever. In his investigation into the effectiveness of using securitization as a means of financing low-cost housing in Gauteng, Dube (2006) indicates greater dependency from government for the success of mortgage-backed securitization schemes, as was the case with Fannie Mae and Freddie Mac (i.e. government sponsored enterprises for mortgage lending - GSE). As was the case in the Clinton administration, the South African government adopted mortgage assistance structures in a form of subsidies (and guarantees), particularly for its BoP residential real estate market segment (e.g. FLISP, PHP, RDP, MDI etc.). These were not directly sub-prime lending structures, as banks still mitigate their risks to its lenders through interest rates, amongst other risk assessment structures. This is over and above other policies such as the NCA, whose sole purpose is to determine affordability levels. As a result, it is crucial to point out that such further required government intervention to the securitization of low-cost housing (i.e. low residential real estate market segment) is most likely to benefit the investors (i.e. "space producers") and not the consumer (i.e. "space user) it is meant to serve. Dube (2006) further concedes that for mortgage-backed securitization to succeed, various policy changes need to be addressed from both sides of the government and investors/developers.

[25] http://en.wikipedia.org/wiki/Bankruptcy_of_Lehman_Brothers

2.6 WAGES, HOUSING PRICE AND COMMUTES

In relation to house prices, Song (1995a) has submitted that hedonic price models have been commonly used to model the relationship between housing prices and the physical attributes and geographical characteristics of homes. As Himmelberg et al. (2005) explains, the sensitivity of house prices to house price expectation increases with the degree to which house prices are expected to rise. In another perspective, Glaeser et al. (2013) had found that individual housing markets in the United States experienced considerable heterogeneity in the amplitudes of their cycles. However, the largest booms and busts, and their timing, seem to have been clustered geographically; and not based on real estate market segments. The great housing convulsion destroyed the view that housing prices would always remain close to construction costs in unregulated markets (Glaeser, 2008) and that house price movements could be completely explained by changes in interest rates (Porteba, 1984).

Glaeser et al. (2010) submits that the empirical connection between mortgage rates and house sprices is not strong enough to explain the dynamics of house prices during the housing boom. On a conceptual level, they argue that the impact of any shift in housing demand on house prices depends on the housing supply elasticity in that market. For markets with inelastic housing supply, increases in housing demand will mainly result in higher house prices instead of increased production of new homes. To the contrary, housing markets with elastic housing supply, increases in housing demand will mainly result in the production of new homes. House prices in these markets are determined by the cost of building a new home. Furthermore, they argue that expected future mortgage rates are important in addition to the current mortgage rate on house prices will be attenuated. Glaeser et al. (2010) view on real estate prices seeks to support McCue and Kling's (1994) view that 60% of the variations in real estate prices are explained by the macroeconomic characteristics, at times using the vector autoregressive ("VAR") model.

According to Goodman et al. (1998) housing submarkets models have typically focused on differential hedonic[26] prices across metropolitan areas. It is submitted that housing market segmentation may be attributable to spatial differences in structural characteristics, neighborhood amenities, or some combination of both. As such, through the introduction of hierarchical linear modeling, the dwelling characteristics, neighborhood characteristic, and submarket interaction are said to be influencing house prices.

[26] Hedonic – relating to, characterized by,or considered in terms of pleasant (or unpleasant) sensation.

Basten and Koch (2015) have also discussed the causal effect of house prices on mortgage demand and mortgage supply in Switzerland. They found that whilst higher house prices increases mortgage demand, banks respond to anything with fewer offers and higher rates, especially later in the boom and for highly leveraged households.

Despite the affordability level on property values of R466,000.00 (Four Hundred and Sixty Six Thousand Rand) as inferred from the earlier metioned LSM groups in Table 1, the DHS had sought to prescribe the property prices for the low residential real estate market segment to be capped at R400,000.00 (Four Hundred Thousand Rand). For the gap market[27], the maximum property price that can be financed through the Financed Linked Individual Subsidy Programme ("FLISP"[28]) is R300,000.00 (Three Hundred Thousand Rand). Furthermore, the DHS had sought to promote what is dubbed the 'Breaking New Grounds' ("BNG") strategy, whereon – *amongst other things* – mixed used developments are encouraged as part of provision of sustainable human settlements. In part, this means that houses of different market segments may be built in close proximity to one another other. The BNG initiative outlined, amongst other things, the following:

- speeding up the delivery of housing as a key strategy for leveraging economic growth and creating jobs;
- reducing poverty and improving quality of life for the poor by making sure that they could use their residential property as a financial asset;
- improving the functioning of the residential property market to reduce the duality between the booming in the first economy and the stagnancy in the second economy; and
- using new residential development as an instrument for spatial restructuring and integrating human settlements.

One of the key strategy spin-offs to the BNG initiative is cross-subsidization of bulk infrastructure resource and/or costs related thereto (e.g. water, roads & storm-water,

[27] Gap market is described as households earning between R3500 and R15 000, are too rich to qualify for a housing subsidy, but too poor to afford a newly built house available on the market.

[28] The FLISP programme acts as a down-payment to qualifying households (i.e. the gap market of the low market segment) with the sole purpose of reducing the initial home loan amount to render monthly installments affordable over the loan repayment term. The intention of FLISP is to instill confidence to the lending financial institution on the low income housing market segment. The mortgage loans are leveraged directly by the government to the qualifying households, with the aim of reducing the financial institution's exposure to the low market segment. www.consumerhousingeducation.co.za

sewerage, electricity etc.) and the sharing of surrounding social amenities. This is meant to encourage easy mobility (commutes) between households of various house prices, in accordance to the income and/or affordability (i.e. wages). In concurrence with the BNG initiative, Mayock (2015) submitted that the Urban Land Institute had found that nearly two-thirds of companies with more than 100 employees acknowledged that high housing prices had a negative impact on the retention of entry-level and mid-level employees. Furthermore, more than half of the companies reporting a shortage of affordable housing neighboring their worksites reported to have lost employees, at least in part, due to long commute times (Riggs, 2007).

Based on his empirical model in determining the relationship between wages, housing prices and commutes, Mayock (2015) found that the value workers place on shorter commutes and lower housing prices is substantial. Mayock's (2015) view corroborates with the principles of BNG initiatives, which seeks to integrate different market segments in an area, as means to addressing issues of inequality from a spatial planning perspective. Also, its implementation somewhat attempts to rectify the much earlier monocentric models that suggest that wages decrease as the distance between employer and the CBD increases, as workers with jobs closer to the CBD must be compensated for paying higher housing costs or enduring the longer commutes (Alonso 1964; Muth 1969; Mills 1972; White 1976). Lucas and Rossi-Hansberg (2002) defines such a phenomenon as the standard urban economic theory, whereon mobile workers substitutes higher wages for longer commutes and more costly housing.

E. REFLECTION ON WAGES, HOUSE PRICES AND COMMUTES (In conclusion):

There has been many (and continues to be more) submissions as to the influences or factors that constitute house prices. Accordingly, the factors are seen as not mutually exclusive from one another but rather complementary. What remains common however, regardless of the measure undertaken (e.g. VAR regressions, indices used as proxy to macro-economic factors etc.), is the fact that the house price performance are inferred to have been the same for all residential real estate market segments. The many narrative presupposes a collective performance of residential real estate market segments, be it conincidental or lag or lead [re]actions. The performances of individual residential real estate market segments are downplayed substantially.

2.7 REAL ESTATE VALUATIONS AND CURRENT ACCOUNT

In their submission, Jinjarak & Sheffrin (2011) argues that it is difficult to gauge causal relationship between current account and real estate prices. Partly due to the fact that real estate appreciation cannot be solely linked current account surpluses, but can also be attributed to different economic environments that vary across time and countries. Further, they (2011) submit that both current account and real estate prices could be driven by other common causes, including equity markets, real interest rates and output growth. For instance, only in England was it possible to prove positive causal relationship between current account deficits and real estate prices; linkages between real interest rate, output growth and real estate prices were found for Ireland but the causation could not be determined. Furthermore, current account surpluses in the U.S. were found to be positively correlated with interest rates. Interest rate shocks have allegedly been a driving force of business fluctuation (Uribe, 2007). Also, it was established that output growth has both a direct and indirect effects on the real estate appreciations, amongst various other observations.

In their quest to empirically determine the dependence of lagged macroeconomic variables on real estate valuations, Aizenman & Jinjarak (2009) found that lagged current account patterns are important in accounting for the real appreciation of the real estate market. The robust and strong positive association between current account deficits and the appreciation real estate prices was determined through regression analysis that account for the real appreciation of housing stock, controlling for lagged variables, including GDP per capita, real interest rate, inflation and the current account. In addition, it was determined that the current account changes interacting with other macro variables are important in accounting for future real valuation of housing (i.e. the residential real estate sector). Real valuation of housing (or residential real estate sector) uses methods such as the Comparable Sales Approach; the Cost Approach and/or Income Approach to determine house prices. Aizenman et al. (2009) established that the importance of current account variations in accounting for real appreciation of real estate prices exceeds that of other variables, including the real interest rate and inflation. Such stability of the conditioning variable accounting for real estate valuations was further explored before and after the global economic crisis of 2008-9, in a panel of 36 countries. Even then, Aizenman et al. (2014) established that the most economically significant variable in accounting for real estate valuation changes turned out to be the lagged real estate valuation appreciation (real estate inflation minus CPI inflation), followed by lagged declines of the current account/GDP, lagged domestic credit/ GDP

growth, and lagged equity market valuation appreciation (equity market appreciation minus CPI inflation). Meaning, real estate valuation is positively and significantly associated with current account deficits in both periods before and after the 2008/9 global economic crisis. The real estate valuation is also said to be positively associated with domestic credit growth, to a lesser degree though than the current account deficit.

Calderon et al. (1999) outlines current account deficit as the outcome of forward-looking dynamic saving and investments decision driven by expectations of productivity growth, government spending, interest rates, and several other factors. According to Aizenman et al. (2014), a growing current account deficit is a signal of a growing gap between the spending of domestic residents (absorption) and their output. For instance, it is described that most households co-finance the purchase of their dwelling through the banking system, greater financial depth and accelerated growth rate of credit tend to increase the demand for houses, probably increasing the real estate valuation. Gede's (2010) model showed that an increased demand for housing may generate trade deficis without the need for wealth effects or trade in capital goods, and that housing booms are larger if the country can run a trade deficit.

F. REFLECTION ON REAL ESTATE VALUATIONS AND CURRENT ACCOUNT (In conclusion):

This section seeks to demonstrate the causal and effect relationships between real estate valuations (i.e. house prices) and many other variables (e.g. current account deficit, equity growth, interest rates, credit/growth GDP etc.). The correlations are fiercely demonstrated by various means, including but not limited to regressional analysis. The cause and effect relationships were conducted in various countries, globally, which explains the differences in applicable economic variables. However, of critical importance is the observation that in many of these findings, there exists a subtle contribution that suggests a cohesive or synchronic reaction of real estate market segments. Meaning, the distinction on the individual performances of real estate market segments, particularly for house prices (i.e. residential real estate), has been downplayed substantially. The researchers' findings on real estate market segments thus raise curiosity as to whether or not such findings would have yielded similar results had their studies being conducted on individual real estate market segments, let alone the residential sector. Following the aim and objectives of this research report, it is the intention to interrogate individual residential real estate market segments, to test for any

deviations from existing research findings. More importantly, it is intended that findings of this research report may provoke for further research studies in the future.

2.8 THE EFFECTS OF INTEREST RATE AND VACANCY RATES

Interest rate is one of the critical variables in determining the price or rent for real estate. In the case of Estonia, Concconcelli (2013) suggested that the growth path of speculative bubble began with a conscious decision by the central bank to decrease interest rates, thus increasing lending. The result is a strong expansion in credit volume and in monetary aggregates, and consequent price increases in asset prices such as real estate. Meaning, the expansionary monetary policy in the form of lower interest rates had stimulated the demand for housing, thereby leading to higher house prices. Moreover, the rise of house prices caused an increase in wealth and led to a higher value of marginal collateral for home-owners who were able to request additional borrowing. Whilst researchers such as Mishkin (2007) acknowledge the role of housing in the conduct of monetary policy, he argues that house prices should only be considered for the effect they have on inflation and employment. This was due to the fact that central banks, he argued, cannot easily identify housing bubbles. Mishkin's (2007) view is shared and further expanded by Allen and Carletti (2010), who had further suggested that interest rates can be used as an instrument to prevent these bubbles, but only in small homogeneous economies (e.g. Sweden), not large ones (e.g. US).

In the period between 2004 and 2006, the rise in interest rate from 1 per cent to 5.35 per cent in the US led to increasing number of households not being able to repay their mortgages. Following the sub-prime mortgage crisis, it was through the reduction of interest rates and guaranteed deposits strategies (i.e. liquidity) – *amongst other things* – that confidence was restored back into the financial systems, as part of the 2008 US Treasury and US Federal Reserve Bank's rescue package to the financial institutions. However, using the structural vector autoregressive model ("VAR"), BjØrnland and Jacobsen (2010) found that unexpected changes in interest rates have an immediate effect on house prices and that the role of housing increases considerably when interest rate and the house prices react at the same time.

G. REFLECTION ON THE EFFECTS OF INTEREST RATES AND VACANCY RATES (In conclusion):

It is widely accepted and/or verified that indeed interest rate (including monetary policy) plays a pivotal role in house prices. It is consequential that the effects would therefore vary

for different market segments, particularly in a high inequality environment. Furthermore, BjØrnland et al. (2010) submission on 'immediate effect' also suggests a cohesive or synchronized reaction of real estate market segments, again individual real estate market segments were downplayed. There appears no clarity as to which market segment gains (or gains no) favor from a reduced interest rate environment. This thus creates an opportunity to interrogate the effects of interest rate on individual real estate market segments, to test for any deterrances.

2.9 SUMMARY TO LITERATURE REVIEW (KEY OUTPUTS)

At the risk of downplaying many other pivotal factors, the critical purpose of this literature review is to demonstrate the levels at which the individual residential real estate market segments have been downplayed, over a period of time. The topics discussed in this chapter exhibits a common theme which presupposes that all real estate market segments react similarly to macro-economic factors (e.g. business cycles, interest rate, current account etc.), with very little or no consideration to the performance of individual real estate market segments. This is notwithstanding the fact that the reaction of real estate market segments may be lagged or coincidental to economic cycle waves. It is observed that subtle inference is made towards real estate market segment performances that presumes a simultaneous effect to many macro-economic factors. A provision however stems from an economics and/or marketing perspective where there is a realization on the importance of understanding customer needs, the heterogeneity of those needs in order to reach customer satisfaction. Market segmentation thus become consequential in addressing customer needs, in this case, housing backlog. Furthermore, residential real estate market segmentation is considered pivotal as it has potential to shape strategies, be it for land use planning (wages, house prices and commutes) or real estate investments (REITs). From a banking perspective, different product offerings and/or qualification criteria can thus be formulated with a certain level of assurance, for what is loosely termed the 'emerging market', or sometimes referred to the 'un-banked market'. It is observed also that indicators such as the current account deficits or interest rates have had an impact on real estate valuations (i.e. house prices), which impact was generalized for all residential real estate market segments.

This research report is not intended to claim any form of uniqueness of study, as there may be various other studies that could potentially determine the correlation between individual residential real estate market segments and economic cycle waves. It is the intention however

to highlight the most resilient residential real market segment, given the high levels of inequality in the country. It is hoped that throughout this process, the research aim and objectives can be met; and could potentially be expanded upon in future research studies.

CHAPTER THREE - METHODOLOGY

3. INTRODUCTION

'If we knew what we were doing,' quipped Albert Einstein, 'it wouldn't be called research, would it?' Since the generic aim of research is 'to find things out' (Saunders, 2007) there is clearly some truth in Einstein's comment.

3.1. RESEARCH APPROACH

In the preceding chapters, attempts have been made that seeks to provide context into the various views made regarding the correlations between real estate market segments and economic cycle waves. The views have provided the effects of economic cycle waves on real estate market segments, *or vice versa*. These include, but not limited to, house prices:

- Being dependant on geographic location and physical attributes;
- Being dependant on supply elasticity;
- Being determined by the production of new homes;
- Explained by changes in interest rate, gross domestic product, etc.;
- Being a function of construction cost in unregulated markets; etc.

In an attempt to meet the research aim and objectives, or even addressing the research questions, this chapter seeks to outline the research strategy employed, i.e. the manner in which research is conducted and the manner in which the research may be conceived in terms of the research philosophy and lastly, the research instruments utilized (or that may perhaps be developed). The purpose of this chapter is to:

- explain the research strategy, including the research methodologies adopted;
- discuss the research philosophy in relation to other philosophies;
- introduce the research instruments that have been utilized.

The discussions in this chapter are premised on determining the most resilient residential real estate market segment, throughout the economic cycle waves.

3.2. RESEARCH PHILOSOPHY or PARADIGM

A research philosophy adopted in any study is dependant on the research question being asked or the hypothesis being tested (Saunders, 2012). According to Wilkinson (2003), choosing a research philosophy allows the researcher to adopt a certain position for their research based on certain assumptions on the research outcomes. Creswell (1994) submitted that researchers make claim about what is knowledge (ontology), how we know it (epistemology), what value goes into it (axiology), how we write about it (rhetoric), and the processes for studying it (methodology). Creswell (2002) further describes 4 (four) philosophical worldviews[29] (as shown in Table 2 below) for research studies, as schools of knowledge claims:

Table 2. Four philosophical worldviews (Creswell, 2002).

Post-positivism	**Constructivism**
• Determination • Reductionism • Empirical Observation and measurement • Theory verification	• Understanding • Multiple participants meanings • Social and historical construction • Theory generation
Transformative	**Pragmatism**
• Political • Power and justice oriented • Collaborative • Change-oriented	• Consequences of actions • Problem-centred • Pluralistic • Real-world practice oriented

Given the proposed 'mixed method research approach', it is anticipated that the research report may lean towards 'Pragmatism philosophical worldview' outcomes. The pragmatism approach is adopted on the basis that research data will be analysed (Wilkinson, 2003), to determine the most resilient real estate market segment throughout the economic cycle waves. According to Saunders et al. (2012), pragmatic philosophy may also lead to the multiple methods research design, in this case, the mixed method research design i.e. combination of qualitative and quantitative research methodologies (Yin, 2003).

[29] Worldviews (also known as Knowledge Claim) - is defined as "a basic set of beliefs that guide action" (Guba, 1990)

Creswell (2003) submits that Pragmatism derives from the work of Peirce, James, Mead, and Dewey (1992). Knowledge claims arise out of actions, situations, and consequences rather than antecedent conditions (as in postpositivism). There is concern with applications-"what works" -and solutions to problems (Patton, 1990). Instead of methods being important, the problem is most important, and researchers use all approaches to understand the problem (see Rossman & Wilson (1985). As a philosophical underpinning for mixed methods studies, Tashakkori & Teddlie (1998) and Patton (1990) convey the importance for focusing attention on the research problem in social science research and then using pluralistic approaches to derive knowledge about the problem.

As a result, for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis in the mixed methods study.

3.3. RESEARCH DESIGN

Redman & Mory (1923) define research as a 'systematized effort to gain new knowledge'. According to Yin (2009), the research design should aim to provide systematic process that links research data with the research question to draw research findings. Based on the intrinsic and dynamic nature of the overall research aim, it is consequential that the research study should follow a 'explanatory sequential' mixed method approach' (Creswell, 2003) in order to embrace the relationship between the economic cycle waves and residential real estate market segments.

According to Creswell (2002), a mixed method research is an approach involving collecting both qualitative and quantitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks. The core assumption on this form of inquiry is that a combination of qualitative and quantitative approaches provide a more complete understanding of the research problem than either approach alone. The rationale for mixing is that neither qualitative nor quantitative methods are sufficient as 'mono-methods' (Saunders, 2007) in order to capture the existing trends in the relationship between economic cycle waves and market segments, and the potential themes that may emanate therefrom.

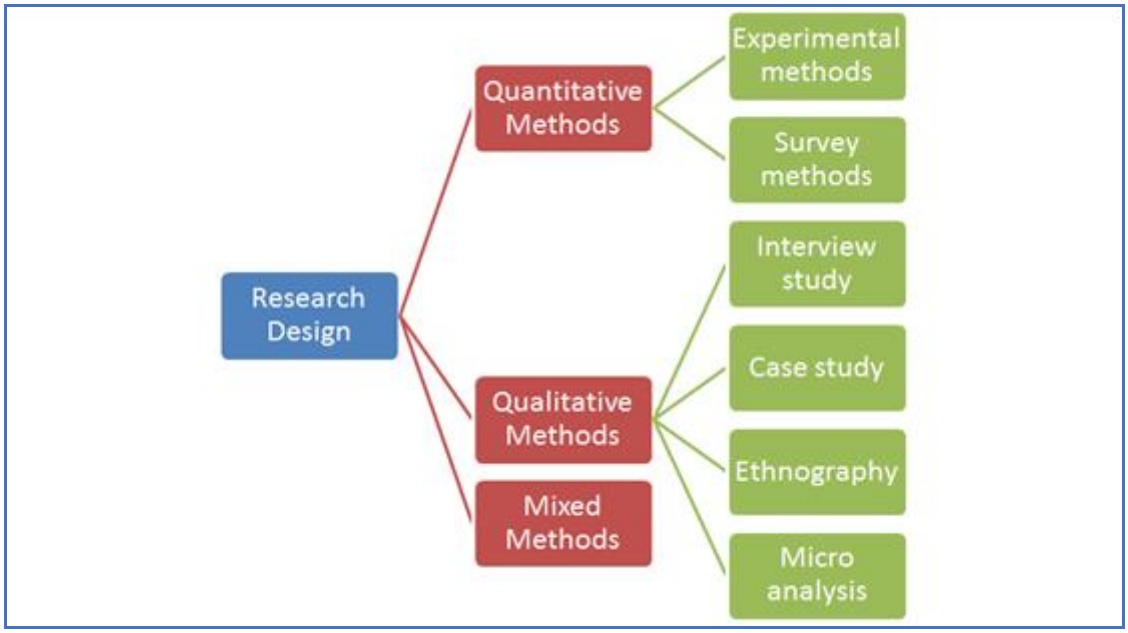

Figure 9. Research design components.

The research comprises of "mixing or combining qualitative and quantitative research techniques, methods, approaches, concepts or language into a single study" (2011), which is a procedure for collecting, analyzing and mixing both qualitative and quantitative data. This is done so that throughout the research process, so that the research problem can be completely understood (Creswell, 2002).

In a mixed method approach, it is the intention to build the knowledge on pragmatic grounds (Creswell, 2003), asserting truth is "what works" (Howe, 1998). It is the intention to utilize approaches, as well as variables and units of analysis, which are most appropriate in finding the most probable outcome to the research questions (Tashakkori, 1998). As a result, a critical aspect of pragmatism is that both qualitative and quantitative methods are compatible. Thus, both numerical and text data, collected sequentially or concurrently, can better understand the research problem.

For purposes of this research study, an Explanatory Sequential mixed method research design will be utilized. This means that Quantitative methods will be used to explain Qualitative methods (see Figure 10 below).

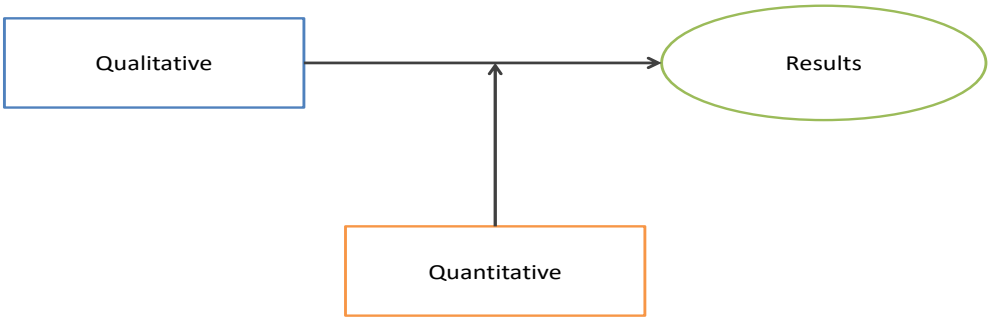

Figure 10. Explanatory Sequential mixed method research design.

The explanatory sequential design is the most straightforward of the major mixed methods designs. According to Rowley (2002) and Yin (2009), an exploratory research methodology should be undertaken when little is known around the research study. For purposes of this research report, the explanatory sequential design is characterized by the collection and analysis of qualitative data followed by the collection and analysis of quantitative data. Priority is typically given to the quantitative data, and the two methods are integrated during the interpretation phase of the study. Generally, when quantitative data precede qualitative data, the intent is therefore to explore with a large sample first to test variables and then to explore in more depth with a few cases during the qualitative phase (Greene, 1989; Morse, 1991; Morgan, 1998). As such, this research report endeavours to address the research questions through the utilization of an Explanatory Sequential mixed methods research design.

3.3.1. DATA COLLECTION AND ANALYSIS

In first phase, data will be obtained by observing and analyzing the content or message of written text i.e. literature review in this instance. Through systematic analysis as well as observation, the frequency of common themes that emerge from the data sources is discussed. This will be followed by a form of correlation quantitative design method (non-experimental design method). The Correlation design is another non-experimental form of research in which the researcher use the correlation statistic to describe and measure the degree of

association (or relationship) between two or more variables or sets of scores (Creswell, 2002). In this case, the statistical data and information relating to economic cycle periods and performance of the residential real estate market segments (i.e. house prices) will be analyzed, in order to determine the impact of such economic cycle waves on individual residential real estate market segments (i.e. low, middle and high). Real estate market segments are quantified by means of both income levels that justifies property prices (or rental levels), i.e. based on affordability levels. Such individual residential real estate market segments are interpreted using both the NDHoS and LSM definitions, to ensure common understanding. The ultimate goal is to determine the most resilient individual residential real estate market segment throughout the economic cycle waves.

Economic indicators such as business cycle are utilized to assess such statistical data, in order to further determine its impact on individual residential real estate market segments. The use of regression analysis will be employed for assessment purposes. Statistical information and data is sourced from various property research companies [e.g. Centre for Affordable Housing Foundation ("CAHF"); Lightstone Property, , Finmark Trust, World Bank etc.] . Action research (Robson, 2002) which includes Observation [i.e. literature reviews (including Journals), media reports and other research reports] is conducted, particularly on the relationship between economic cycles and the residential real estate market segments. Action research is also useful, although it requires the researcher to reflect on the wider theoretical implications of the particular problem that is being addressed in the research project (Coghlan, 2001). Secondary data (historical and current deliverables) is explored, both as part of Action research (Robson, 2002; Saunders, 2007). Thematic coding principle is utilized in order to reduce such secondary data into manageable size i.e. the linking of data with topics, themes, concepts, ideas, and other higher order abstraction so that data can be manipulated, organized and categorized (Hair, 2007).

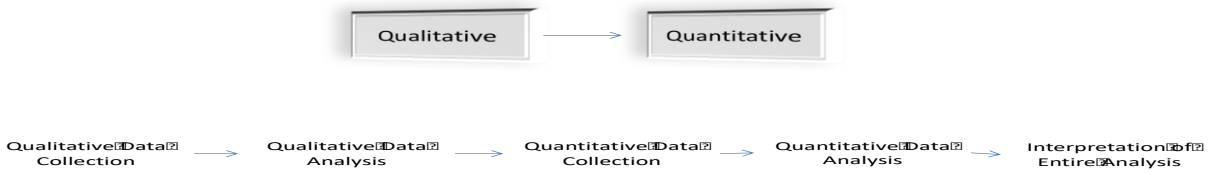

Figure 11. Process flow for Explanatory Sequential Mixed Method Research Design.

Qualitative design will employ the use of Grounded Theory to analyze and make sense of the developing themes from the statistical information and data. According to Strauss & Corbin (1990), this process involves using multiple stages of data collection and the refinement and interrelationship of categories of information. Two primary characteristics of this design are the constant comparison of data with emerging categories and theoretical sampling of different groups to maximize the similarities and the differences of information.

The use of tools such as correlation and/or regression analysis and/or causation (Bryman, 2007) shall be largely dependent on the outcome of common themes emanating from triangulation of data display metrics, if and when applicable. However, the Inter rater reliability and Content & Criterion validity measurements shall be the driving force in ascertain the most resilient residential real estate market segments.

3.3.1.1. QUANTILE REGRESSIONS

Quantile regression, originally proposed by Koenker and Bassett (Koenker, 1978), models the quantiles of the dependent variable given a set of condition variables. Unlike OLS regression which provide only the conditional mean response of dependent variables, quantile regression provides estimates of the linear relationship between a specified quantile of the regressand and the regressors.

The quantiles of house prices in various market segments is modelled in relation to an indicator for the business cycle. The conditional quantile function of y at quantile τ given regressor x can be defined as:

$$Q_y(\tau / x) = \beta_0 + \beta_1 x + F_u^{-1}(\tau)$$

where y is house price index and x is an indicator of the business cycle; β_0 and β_1 are the parameters to be estimated and F_u denotes the common distribution function of the errors. For the πth conditional quantile function, $0 < \tau < 1$, $\hat{\beta}_\tau$ is defined as a solution to the problem:

$$\min_{\beta \in \Re^p} \sum_{i=1}^{n} \rho_\tau \left(y_i - x_i^T \beta \right)$$

where ρ_τ denotes the check function defined as $\rho_\tau(u) = \theta_u$ if $u \geq 0$ or $\rho_\tau(u) = (\tau - 1)_u$ if $u < 0$. The solution to this problem is obtained through linear programming methods, since it does not have an explicit form. Standard errors and covariance are computed using the Huber Sandwich method, with individual sparsity estimates obtained using Kernel methods. One important special case of quantile regression is the Least Absolute Deviations (LAD) estimator, which corresponds to fitting the conditional median of the response variable, that is $\tau = 0.5$. By setting $\tau = 0.1$ we obtain how the 10th percentile of the response variable is affected by the independent variables and so on.

Thus, quantile regression permits a more complete description of the conditional distribution. It is also worth noting that the quantile regression approach is robust method of estimating relationships as it does not require strong distributional assumptions. Despite its usefulness, quantile regression has been precluded from the house price-business cycle debate, as far as it is known. Koenker (2005) provides further analysis of quantile regression.

3.3.2. LIMITATIONS

Throughout the data collection exercise, it was established that there is little or no data on specific market segments on house prices, especially relating to the study area. In essence, there is very little or no evidence on the existence of a databank that contains information on house prices on individual market segment, for over a period of time. As a result, the information and data gather for purposes of this report was predominantly obtained from different sources, which information and data was further inferred to the market segments as earlier defined, to formulate some logic into the information and data.

3.4. RELIABILITY AND VALIDITY

The above research design methodology will assist with realizing trends and patterns from data collected in order to build and/or infer theory. However, in order to produce a quality research report on the relationship between economic cycle waves and residential real estate market segments, the following measures shall be employed:

- **Reliability** – is concerned with the consistency of the research findings (Hair, 2007);
    - There are four methods of measuring reliability:

    - Test-retest - is to administer your test, instrument, survey, or measure to the same group of people at different points in time. Most researchers administer what is called a pre-test for this, and to troubleshoot bugs at the same time. All reliability estimates are usually in the form of a correlation coefficient, so in this instance, the researcher calculated the correlation coefficient between the two scores on the same group and report it as the reliability coefficient (Fixed design).

    - Multiple forms- also referred to as parallel forms and disguised test-retest, but it is simply the scrambling or mixing up of questions on surveys, for example, and giving it to the same group twice. This was done by the researcher to prove the robustness of the survey questionnaires to provide a more rigorous test of reliability (Fixed design).

    - Inter rater reliability - is most appropriate when one use assistants to conduct interviews or content analysis. To calculate this kind of reliability, a percentage of agreement report on the same subject between your raters (or assistants) is produced. The researcher used an assistant to conduct interviews or content analysis to calculate the inter-rater reliability (flexible design).

    - Split-half - is estimated by taking half of the tests, instrument, or survey, and analyzing that half as if it were the whole thing. The results are then compared with the overall analysis. There are different variations of this technique, one of the most common being called Cronbach's (1970) alpha (a frequently reported reliability statistic) which correlates performance on each item with overall score. The research survey questionnaires are designed to demonstrate how well something estimates actual day-by-day behavior; how well something estimates some future event or manifestation that has not happened yet which adopts the Cronbach's alpha reliability

test to each surveyed question correlating its performance to an overall score which in turn allows the researcher to interpret the reliability statistic. Another technique, closer to the split-half method, is the Kuder-Richardson coefficient, or KR-20. Statistical packages on most computers can be utilized to calculate such coefficients (Fixed design).

- **Validity** – is concerned with whether the findings are "really" about what they appear to be about (Robson, 2002).There are four good methods of estimating validity:

- Face validity is the least statistical estimate (validity overall is not as easily quantified as reliability) as it is simply an assertion on the researcher's part claiming that they have reasonably measured what they intended to measure. It is essentially a "take my word for it" kind of validity. Usually, a researcher asks a colleague or expert in the field to vouch for the items measuring what they were intended to measure.

- Content validity refers to the ideas of conceptualization and operationalization. If the researcher has focused in too closely on only one type or narrow dimension of a construct or concept, then it is conceivable that other indicators may have been overlooked. In such a case, the study lacks content validity. There are different ways to estimate for such validity. One of the most commonly used approaches is a reliability approach where scores are correlated in one domain or dimension of a concept of the pre-test with scores on that domain or dimension with the actual test. Another way is to simply assess inter-item correlations.

- Criterion validity is using some standard or benchmark that is known to be a good indicator. There are different forms of criterion validity: concurrent validity seeks to determine the actual day-by-day behavior estimates; predictive validity on the other hand seeks to determine some future event or manifestation that has not occurred.

- Construct validity is the extent to which items are tapping into the underlying theory or model of behavior. It is how well the items hang together (convergent validity) or distinguish different people on certain traits or behaviors (discriminant validity). It is the most difficult validity to achieve. The researcher has to either do years and years of research or find a group of people to test that have the exact opposite traits or behaviors to be measured (Cronbach, 1970).

- **Generalizability (external validity)** – refers to the extent to which the findings of the enquiry are more generally applicable outside the specifics of the situation studies (Robson, 2002).

For purposes of this report, it is conceived prudent to utilize both split-half reliability and construct validity methods. Various other forms of reliability and/or validity methods may be applied at a minimal level.

3.5. SUMMARY TO RESEARCH APPROACH (in conclusion)

The mixed methods research design for this research study undertaken involves the use of both qualitative and quantitative analytical techniques, which was guided either a priori, a posterior, or iteratively. The research design is based on the pragmatism paradigm, which involves the analysis of both data types, qualitative and quantitative data. The qualitative analysis phase precedes the quantitative analysis phase and the findings from the initial analysis phase will inform the subsequent phase or more than two phases (iteratively). The mixed analysis is guided by an attempt to analyse data in a way that yields an analytical generalisation.

The data collected in chapter four provides the research findings and analysis. Objective discussions of findings with regard to the sustainability, validity and importance underlying the study as well as how the findings identified fit into the existing body of literature and how it compares with the theoretical framework discussed in Chapter two will be analyzed against the identified data.

CHAPTER FOUR – FINDINGS AND ANALYSIS

4. INTRODUCTION

The research uses an explanatory sequential research design methodology to address the aims and objectives, including the research questions. For ease of reference, the research aim, objectives and questions are as follows:

- **Research Aim**

The study is aimed at adding value to the existing body of literature, by unpacking the performances of individual residential real estate market segments, to determine whether or not their respective outcomes would concur with initial submissions made previously, by researchers alike.

- **Research Objectives:**

i. To assess and discuss the performance of individual residential real estate market segments in relation to economic cycle waves;
ii. To determine the most resilient individual residential real estate market segment;
iii. To identify and outline the potential benefits and/or importance of undertaking a detailed analysis of individual residential real estate market segments in relation to economic cycle waves; and

Research questions:

i. What has been the performance of individual residential real estate market segments in relation to economic cycle waves?

ii. Which individual residential real estate market segment is likely to be considered most resilient?

iii. What could potentially be the benefit, if any, in understanding individual residential real estate market segments at such levels of analysis?

The research study mainly uses two variables to determine the most resilient residential real estate market segment i.e. house prices and business cycle indices. Residential real estate market segmentation is clearly defined beyond the prescripts of SAARF, to ensure common understanding and analysis. Tables, charts and graphs are produced as part of the Quantitative

analysis. As indicated in Chapter 3 of this research report, priority is given to the quantitative data, and the two methods are integrated during the interpretation phase of the study. Generally, when quantitative data precede qualitative data, the intent is therefore to explore with a large sample first to test variables and then to corroborate the literature review as part of action research (Robson, 2002) during the qualitative phase (Greene, 1989; Morse, 1991; Morgan, 1998).

4.1. DATA AND EMPIRICAL ANALYSIS

4.1.1. MARKET SEGMENTS

Over and above the well-established Living Standard Measures ("LSM") as determined by the South African Audience Research Foundation ("SAARF"), a further residential real estate market segmentation was constructed based on household incomes, in order to provide some form of structure for analysis. The further LSM segmentation seeks to corroborate the principles enshrined in the National Credit Act (No 34 of 2005), which fundamentally provides guidelines for household affordability. The following categorization was constructed:

Table 3. Market Segmentation.

Market Segment	**Gross Household Income**	**House Price**	**Averaged Property Size (in square metres)**
Low	<R15 000.00	<R450 000.00	97.76
Middle	R15 000.01 - R30 000.00	R450 000.01 - R850 000.00	344.53
High	>R30 001.00	>R850 001.00	482.70

Based on the real estate market segmentation above (Table 3 above), performances for each residential real estate market segment, as measured through house prices, was further structured per quarter as of 2005 until end 2015, to determine quarterly performances (i.e. pre-during-post the 2008/9 economic recession). The intention was to determine the extent to which each residential real estate market segment was affected by the changes in economic cycle waves, not using specific indicators. Such quarterly performances were thus assessed using various regression analysis in order to determine the impact that the economic cycle

waves may have affected each residential real estate market segment (i.e. house prices), over the past 10-year period.

4.1.2. HOUSE PRICES

In adopting a mixed method research approach for a study, various forms of data collection can be utilised. For purposes of this study, secondary data on house prices of the study area for a period between 2005 and 2015 was obtained from Lightstone Property ("Lightstone"), which data was corroborated with that of the Centre for Africa Housing Finance ("CAHF").

The house price data (i.e. house price, property size, purchase date etc.) is arranged on a quarterly basis for a period between 2005 (Q1) and 2015 (Q4). Both house price and property sizes are averaged also on a quarterly basis for a period between 2005 (Q1) and 2015 (Q4), then further grouped on an annual basis. The weighting is thus computed on an annual basis, in order to determine each weighted average house price and property size for analysis. Below are extracts of data utilised for analysis, for each individual residential real estate market segments:

- <u>High residential real estate market segment data:</u>

Suburb	TRF_RptPu	TRF_RptPurchDate	PROP_RptSize	TRF_RptPu	Avarage Q price_H		PROP_RptSize	Avarage Q price_H		weights	weightedprize	cumweightedprices_hi
Joubert Par	2300000	20050228	995	2300000			995			0,055987	128769,9752	2069610
Bellevue	1070000	20050301	248	1070000			248			0,013955	14931,35269	1786606
Yeoville	1700000	20050301	633	1700000			633			0,035618	60550,30385	1886246
Bellevue Ce	950000	20050317	562	950000			562			0,031623	30041,63853	1621560
Braamfonte	3900000	20050318	1615	3900000			1615			0,090873	354405,8069	2218733
Berea	1600000	20050326	1734	1600000			1734			0,097569	156110,736	2036030
Marshallstc	2140000	20050330	695	2140000			695			0,039106	83687,82354	2168122
Marshallstc	4260000	20050330	1391	4260000	2240000	8	1391	984,125		0,078269	333426,7387	1703877

- <u>Middle residential real estate market segment:</u>

Suburb	PROP_RptS	TRF_RptPurchPrice	PROP_RptSize	weights	weightedprize	cumweightedprices_m	TRF_RptPurchDate	TRF_RptPurchPrice		PROP_RptS
Bellevue	495	650000	495	0,026445	17189,33647	564288,4	20050105	650000		495
Reynolds Vi	847	490000	847	0,045251	22172,77487	555131,1	20050131	490000		847
Johannesbu	65	463680	65	0,003473	1610,172027	599549,2	20050203	463680		65
Reynolds Vi	791	470000	791	0,042259	19861,63052	618956,3	20050204	470000		791
Johannesbu	63	491200	63	0,003366	1653,253553	611370,4	20050209	491200		63
Johannesbu	76	551520	76	0,00406	2239,316166	607420,2	20050216	551520		76
Jeppestowr	248	675000	248	0,013249	8943,263169	605901,2	20050223	675000		248
Braamfonte	272	613320	272	0,014531	8912,439363	607473,1	20050330	613320	550590,00	272
Doornfonte	467	700000	467	0,024949	17464,4727	675139	20050407	700000		467
Braamfonte	55	500000	55	0,002938	1469,174057	637398,6	20050415	500000		55
Johannesbu	125	760000	125	0,006678	5075,328561	681913,7	20050504	760000		125

- Low residential real estate market segment:

SCH_Name	PROP_RptS	TRF_RptPu	PROP_RptSize	TRF_RptPu	TRF_RptPu	Avarage Q price_H	PROP_RptS	Avarage Q price_H	weights	weightedprize	TRF_RptPurchDate	cumweightedprices_low
SS LA PLAGI	91	110000	91	20050103	110000		91		0,000433606	47,69664742	20050103	220858,11
SS TYGERBE	130	25000	130	20050104	25000		130		0,000619437	15,48592449	20050104	234526,95
SS PRINCET	111	100000	111	20050104	100000		111		0,000528904	52,89038824	20050104	221737,85
SS PORTMA	153	115000	153	20050104	115000		153		0,00072903	83,83841272	20050104	201359,95
	248	122000	248	20050104	122000		248		0,001181695	144,1668096	20050104	201443,86
SS HESSELD	113	58000	113	20050105	58000		113		0,000538434	31,22915356	20050105	224034,87
SS MONTM	96	140000	96	20050105	140000		96		0,00045743	64,04025387	20050105	202377,13
SS BRIAN M	90	92000	90	20050106	92000		90		0,000428841	39,45337069	20050106	210760,19
SS BRIAN M	114	160000	114	20050106	160000		114		0,000543199	86,91177311	20050106	226829,46
SS ALGARVI	83	30000	83	20050107	30000		83		0,000395487	11,86460061	20050107	232267,51
SS PARK MI	132	90000	132	20050107	90000		132		0,000628967	56,60701012	20050107	223905,25

Detailed data depicting the above extracts are attached as part o the Appendices to this report (refer to Appendix B). Ideally, it is the intention to assess the effects of business cycle on house prices for individual residential real estate market segments. The inverse whereon the effects of house prices of individual residential real estate market segments may be a subject for future research studies.

4.1.3. BUSINESS CYCLE INDICATORS (SOUTH AFRICAN RESERVE BANK)

All series are converted to logarithm and differenced to obtain growth rates. The house price and business cycle indicator data are illustrated in Figure 12. The effect of the 2008/2009 global economic recession is evident with the downturn in the business cycle indicator. Visual inspection reveals little evidence that house price move closely with the business cycle. Some descriptive statistics for house price growth are provided in Table 4 below. These suggest that the low residential real estate market segment has the highest mean growth rate over the period followed by the middle residential real estate market segment and then the high (“upper”) residential real estate market segment, which latter recorded a negative average growth. In terms of standard deviations, the high residential real estate market segment records the highest, followed by the middle residential real estate market segment and then the low residential real estate market segment. The Jarque-Bera statistic (Jarque, 1980; 1981) suggests a normal distribution for the low and middle residential real estate market segments, as well as the property size variables for the low residential real estate market segment whereas the remaining series are not normally distributed.

Figure 12.Quarterly house price and quarterly business cycle indicator over the period 2005(Q1) to 2015 (Q4).

Table 4. Descriptive statistics for quarterly house price growth series; period 2005 (Q1) to 2015 (Q4).

	Mean	Std. Dev.	Maximum	Minimum
Low segment	0.0147	0.1174	0.3334	-0.2587
Middle segment	0.0034	0.0412	0.0835	-0.1087
High ("upper") segment	-0.0047	0.4227	0.7707	-1.4014
Size_low	-0.0162	0.1148	0.2846	-0.2192
Size_Middle	0.0010	0.2732	0.6691	-1.1498
Size_High	-0.0231	0.6497	1.8509	-1.1617
BCI	0.0064	0.0164	0.0272	-0.0536

4.1.4. UNIT ROOT- STATIONERY

Prior to fitting the regression models, it is important to ensure that each of the series is stationary; that is, does not have a unit root. The use of nonstationary series could result in spurious regression; that is a regression that seems good under standard measures, in terms of

its coefficients and R-square, but in actual fact does not make sense (Brooks, 2014). The Augmented Dickey Fuller test ("ADF") – one of the most widely used in the empirical literature – is employed to test for the presence of unitroot in each of the series. An ADF tests the null hypothesis of a unit root is present in a time series sample. Table 5 reports the results, which indicates that the log of the weighted house price indices, along with the property size variables, are all stationary at levels. Both the coincident and leading indicators are also stationary at levels, while the lag indicator becomes stationary at first difference. It is worth noting that although the house price indices are stationary at levels, it remains necessary to compute the first difference in order to observe the percentage changes of house prices. Similarly, first difference of property size and the business cycle indicators are computed in order to interpret the regression coefficients in terms of elasticities.

Table 5. Augmented Dickiey-Fuller test.

	ADF			
	Levels (Intercept)	Levels (Intercept and linear trend)	First Difference (intercept)	First Difference (Intercept and linear trend)
Log Low	-3.6256***	-3.8575**	-9.09704***	-9.1332***
Log Middle	-3.2890***	-5.2754***	-10.5485***	-10.4126***
Log High	-7.2238***	-7.1949***	-9.0544***	-8.9444***
Size Low	-2.7816*	-3.0024	-8.1161***	-8.4271***
Size Mid	-5.0371***	-4.9887***	-10.7100***	-10.5921***
Size High	-8.8919***	-8.7750***	-13.6523***	-13.4660***
Coincident indicator	-1.8061	-3.5788**	-3.3032**	-3.2183*
Lag indicator	-2.2914	-2.8568	-2.9914**	-2.9917
Leading Indicator	-3.1712**	-3.3447*	-3.9901***	-3.9312**

Notes: ADF denote Augmented Dickey Fuller. Critical values for ADF are 1% (-3.43) 5% (-2.86), 10% (-2.57), based on MacKinnon (MacKinnon, 1996) one-sided p-values. ***, **, * denote stationary at 1%, 5%, and 10%, respectively.

4.2. EMPIRICAL ANALYSIS

4.2.1. BASELINE RESULTS

The contemporaneous relationship between house prices and the business cycle is first examined using the following ordinary least squares regression.

$$Y_t = \beta_0 + \beta_1 X_t + \beta_1 S_t + u_t$$

where Y is house price index , X is an indicator of the business cycle and S captures the effect of property size on the house prices; β_0 and β_1 are the parameters to be estimated and u is the random error term. The results appear in Panel A of Table 6. A negative and significant coefficient appears only the high price sector, suggesting that the business cycle has a negative impact on house prices in the high residential real estate market segment [-5.6833, p=(1.499409)]. In other words, house prices in the low and medium residential real estate market segments do not respond to movements in the business cycle, on the average. This could potentially mean that house prices in the high residential real estate market segment are perceived as superfluous and unrealistic, particularly when considering the fact that the high ("upper") residential real estate segment has empirically indicated a negative average growth over the period between 2005 (Q1) and 2015 (Q4). It is perceived further that the demand for housing in the high residential real estate market segment is considerably much lesser than both the low and middle residential market segments. In other words, the high residential real estate market segment has more housing options, even in other residential real estate market segments. Thus there is more supply for housing for the high residential real estate market segment than there is for both the low and middle residential real estate market segments. A brief synopsis to the high inequality levels in the country. As a result, any shift and/or movement in the business cycle may potentially serve to 'self-correct' house prices in the high residential real estate market segment, a situation not observed in both the low and middle residential real estate market segments. It can thus be suggested that the business cycle serves to rectify the anomalies in house prices, in this case, house prices observed in the high residential real estate market segment. The results suggest that both the low and middle residential real estate market segment house prices may not be exposed to

anomalies of the high residential real estate market segment house prices. The causes for these anomalies or disparities may be subject of future research on the topic.

Property size also has a negative impact on house prices in the high residential real estate market segment, which is contrary to what is generally expected. Theoretically, the relationship between house prices and property size should be positive. However, the intuition is that a negative relationship depicts high demand for housing in the low and middle residential real estate market segments, especially when considering the population distribution, in correlation to the high levels of inequality. Amongst other factors, it is may be the perception that bigger property sizes lead to higher maintenance costs, hence the negative impact on house prices as a 'pushback'. Interestingly however, property size does not significantly influence house prices in the low and middle market segments, as the estimated coefficients (-0.1393 and -0.0169) are not statistically significant. House price affordability appears to be the driving force, which almost places property sizes as an ancillary factor for the low and middle residential real estate market segments. On the basis of these findings, the production of relevant housing stock in relation to its demand becomes a critical success factor ("CSF") on the part of the Developer/ Investor.

The autoregressive parameters for house prices in the low and middle residential real estate market segments are statistically significant at 5% and 10%, respectively. The intuition is that current house prices are based on immediate past preceding house prices.

It is instructive to note that the AR terms are intended to capture any possible serial correlations in the house prices and their significance is a confirmation that this has been taken care of. The Durbin-Watson test statistic is close to 2 and confirms the absence of any first-order serial correlation in the model. The Breusch-Godfrey Serial Correlation LM test also confirms the absence of serial correlation at four lags. The ARCH LM test shows that residuals are homoskedastic, that is, there is no evidence of time-varying variance. The adjusted R-squared values are low and suggest that regressors (business cycle and property size) explain only a small fraction of the variation in house prices in the various market segments; that is, approximately 16.%, 41%, and 35% in the low, middle and high residential real estate market segments, respectively.

The overall regression F-statistics reported is a measure of the null hypothesis that all the slope coefficients in the respective regressions are equal to zero (Stock, 2012). The reported

values indicate that the null hypothesis of joint insignificance is rejected at 10% for the low residential real estate market segment and 1% for the middle and high residential real estate market segments. In other words, at least one of the coefficients in the various regressions is nonzero.

4.2.2. QUANTILE REGRESSIONS

While the OLS regression models are concerned with the conditional mean of the dependent variable, it would be interesting to also model other aspects of the conditional distribution. To this end, we proceed and employ quantile regression (10 quantiles for each market segment). The results are shown in Panel B of Table 6; the estimates use the Huber sandwich method for computing the covariance matrix, while the kernel method is used to obtain the individual sparsity estimates. The bandwidth uses the Hall-Sheather formula.

Table 6 shows the quantile coefficients, along with the standard errors in parenthesis. The first quantile shows a negative and significant relation between house price and business cycle for the high residential real estate market segment only, buttressing the significant relationship from the OLS coefficient, while insignificant relations are recorded for the low and middle residential real estate market segments. Negative and significant coefficient is recorded for the middle residential real estate market segment at the second quantile. The median estimators show insignificance for the low and middle residential real estate market segments while the high residential real estate market segment is significant. Interestingly, at higher returns, the high residential real estate market segment records negative and significant parameters in the sixth, seventh, eighth and ninth quantiles, which is consistent with the OLS estimate. The seventh and eight quantiles are significant for the low residential real estate market segment while the middle residential real estate market segment shows no significance at the right tail of the distribution. These dynamics may potentially be understood when further analysis is undertaken on sub-market segments, a quest for future research studies.

Panel C of the table reports the Koenker and Machado (1999) goodness-of-fit measure (pseudo R-squared) for the median regressions.

Table 6. Quantile coefficience.

	Low	Medium	High
		Panel A: OLS Regression	
C	0.0038	13.4061***	14.3264***
	(0.0133)	(0.1637)	(0.0316)
Size	-0.1393	-0.0169	0.1304*
	(0.1601)	(0.0280)	(0.0650)
BCI	0.9848	-0.1277	-5.6834***
	(0.8006)	(0.5536)	(1.4994)
AR(1)	-0.3938**	0.6470***	-0.1511
	(0.1474)	(0.1307)	(0.1593)
R-squared	0.1635	0.4058	0.3468
F-Stat	2.4766*	8.6499***	6.7247***
Durbin-Watson stat	1.8848	2.3458	2.02806
Serial Correlation LM (4)	5.1442	4.3864	7.0980
	[0.2728]	[0.3562]	[0.1308]
ARCH LM Test (4)	1.4447	2.5560	0.3707
	[0.8364]	[0.6346]	[0.9848]
		Panel B: Quantile [BCI]	
0.1	-0.0384	-0.8983	-4.8512**
	(1.4512)	(0.5366)	(2.2757)
0.2	0.7361	-0.7144*	1.7853

	(1.3970)	(0.4080)	(3.4110)
0.3	1.3931	-0.5550	-1.2336
	(1.0570)	(0.4784)	(2.4939)
0.4	1.4925	-0.7604	-0.6314
	(1.0634)	(0.7135)	(2.7228)
0.5	1.6554	-0.7472	-4.3745*
	(1.0577)	(0.7699)	(2.3377)
0.6	0.9607	-0.8849	-5.4552**
	(1.2335)	(0.9131)	(2.1944)
0.7	1.8322*	-1.9240	-6.5774***
	(1.0772)	(1.2321)	(2.2919)
0.8	2.3119**	-0.8512	-7.8013*
	(1.0719)	(1.4352)	(4.1752)
0.9	1.0933	-0.4379	-10.3769**
	(2.0358)	(2.0520)	(4.8946)

Panel C: Goodness-of-fit

Pseudo R-Squared	0.1008	0.0494	0.1607
Adjusted R-squared	0.0559	0.0018	0.1187
Slope Equality Test	0.2912	0.1664	1.9507
	[0.8645]	[0.9202]	[0.3771]

Notes: [ ] contains *p*-values; ( ) contains standard errors.

4.2.2.1. QUANTILE PROCESS

Figure 13 reports the process coefficients estimated at 10 quantiles, along with 95% confidence intervals. In the case of the low residential real estate market segment, the coefficient estimates show a clear positive relationship between the quantile value and the estimated business cycle coefficient for quantile 2 and beyond. The high residential real estate market segment show a negative relationship while the middle residential real estate market segment show a relatively flat relationship between the quantile value and the estimated business cycle coefficient.

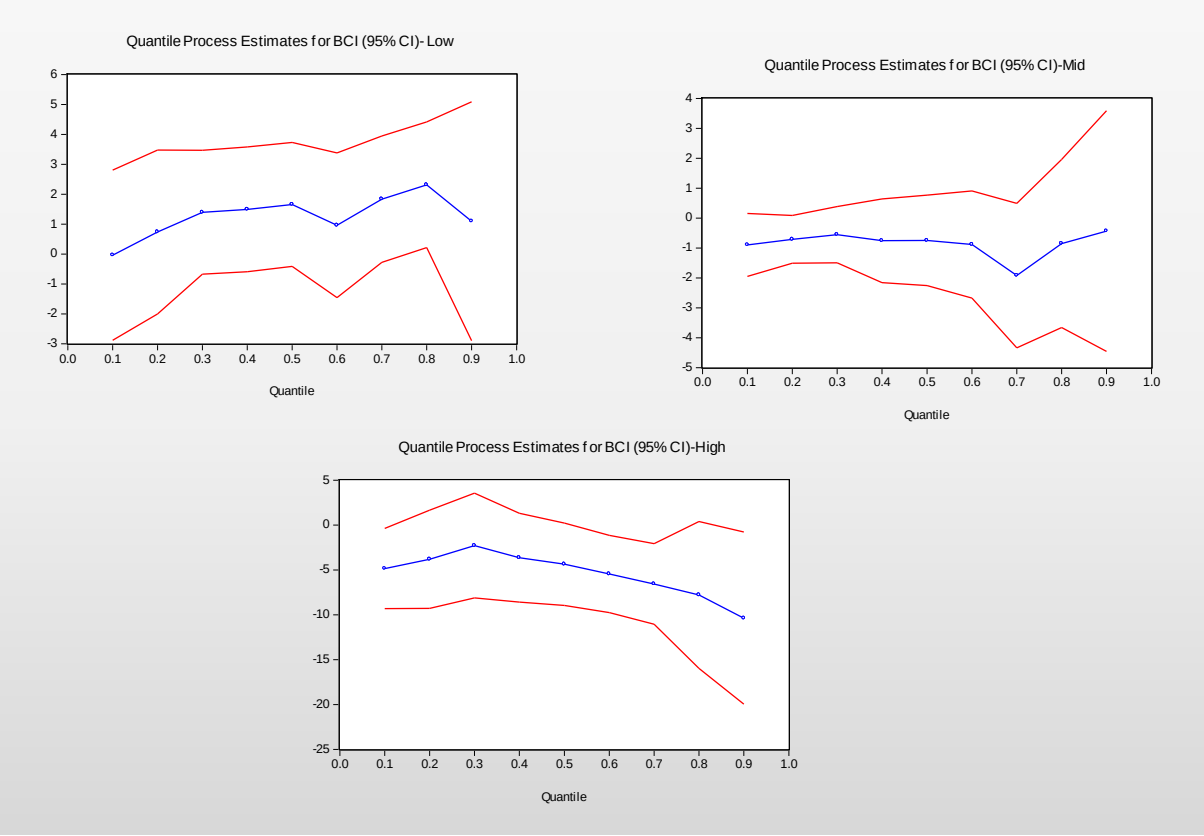

Figure 13. Quantile process estimation.

4.2.2.2. SLOPE EQUALITY TEST

Next, we perform the Koenker and Basset (1982a) test for the equality of the slope coefficients across quantiles; that is, three quartile limits (tau={0.25, 0.5, 0.75}). Table 6 show the results of the slope equality test for median regressions relating house prices in the various market segments to the business cycle. The Wald test result compares the slope coefficients for the median against those estimated at the upper and lower quantile. The Chi-square statistics, along with probability values in square brackets are 0.291195 (p=0.8645),

0.166382 (p=0.9202), and 1.950742 (p=0.3771) for the low, middle and high residential real estate market segments, respectively. In all three cases, we see that the Chi-square statistics are not statistically significant at conventional test levels. Thus, it can be concluded that the coefficients do not differ across quantile values and that the conditional quantiles are identical.

REFLECTION ON DATA AND EMPIRICAL ANALYSIS (In conclusion):

The aim of the research study is to determine the most resilient residential real estate market segment throughout economic cycle waves. Various tests such as OLS regression model, Augmented Dickey Fuller test, the Huber-Sandwich tests, Slope Equality tests - *amongst others* - have been employed to assess an undeterred individual residential real estate market segment. Amongst others, some of the findings or emerging themes were:

- The little visual evidence that house prices move closely with business cycles, a proxy for economic cycle waves;
- The highest mean growth rate displayed by the low residential real estate market segment, which was followed by the middle and high residential real estate market segments, respectively;
- The high residential real estate market segment recorded a negative average growth;
- The low residential real estate market segment showing the least standard deviation, which was followed by middle and high residential real estate market segments, respectively;
- The low residential real estate market segment maintaining a normal distribution in both house price and property size, followed by the middle residential real estate market segment which only recorded a normal distribution in house price only and not property size;
- A negative and significant coefficient observed in the second quantile of the middle residential real estate market segment, as seen on OLS regressions.

These are but few of the outcomes or themes that empirically provided a lead towards the necessity of conducting this research study. This is considered critical as the predominance of

the literature reviewed makes various suggestions contrary to the current outcomes or revelations in this research study.

CHAPTER FIVE – CONCLUSION AND RECOMMENDATIONS

5.1. INTRODUCTION

Overall, this section intends to present the main conclusions emanating from the findings of this research study. At high level, the aim of this research study was to determine the most resilient residential real estate market segment throughout the economic cycle waves. Whilst the area of jurisdiction was mainly the innercity of Johannesburg, South Africa, it was the intention to show that individual residential market segments perform autonomeously to the effects of the economic cycle waves.

5.2. RESEARCH OBJECTIVES

As a result, the key objectives of this research report are to:

i. To assess and discuss the performance of individual residential real estate market segments in relation to economic cycle waves;

ii. To determine the most resilient individual residential real estate market segment;

iii. To identify and outline the potential benefits and/or importance of undertaking a detailed analysis of individual residential real estate market segments in relation to economic cycle waves; and

5.3. ANALYSIS OF RESEARCH QUESTIONS

As a result, the research question, linked with research objectives, are themed as follows:

i. **THEME 1** – Analysis on the performance of individual residential real estate market segments in relation to economic cycle waves:

- Holistically, it is observed that each residential real estate market segment display contrasting performances from the much generalized uniformity. Also, each individual residential real estate market segment displays contrasting performances from one another, nearly revoking the much suggested generalized and/or uniform performance. The impact of business cycle on house prices refute a congruent effect at individual residential real estate market segment level and may prove further refute submarket segment level.This is notwithstanding the possible effect of house prices on economic cycle waves, at an individual residential real estate market segment perspective or submarket segment thereof.

ii. **THEME 2** – Analysis of individual residential real estate market segment likely to be considered the most resilient:

- The low residential real estate market segment appears to have been most resilient market segment. The low residential real estate market segment exhibited the "desired resilience" (Weakley, 2013), with subtle combination of both Equilibrist resilience (Simmie, 2010) and Transformative resilience (Holling, 1973; 2001; Gotham, 2010);
- The middle residential real estate market segment appears to have been a partially resilient market segment. The middle residential real estate market segment can thus be justified to have displayed aspects of Equilibrist resilience (Simmie, 2010); and
- The high residential real estate market segment appears to have been the least resilient residential real estate market segment. This residential real estate market segment has thus displayed aspects of Evolutionary or Transformative resilience (Holling, 1973, 2001; Gotham, 2010).

This study takes into cognizance that further detailed analysis on submarket segments may reveal further clarification to the above-said findings.

iii. **THEME 3** - The potentially be the benefit in understanding individual residential real estate market segments at such levels of analysis:

- A well-balanced approach for sustainable integrated human settlements;
- Better planning in the quest to eradicate housing backlog in the country;
- Structured product development (and potential collaborations) for the residential real estate roleplayers (e.g. Banks, Government, REITs, Private Sector etc.);
- Scheduled and reasonably controlled supply and demand structures, in relation to construction activities;
- Improved and structured communications and co-operations with a particular target market;
- Well defined planning and ease in decision-making processes;
- Effective and practicalization of the National Development Plan ("NDP");

- Improved interactions with communities on a more structured basis.
- Dissecting the residential real estate market segments (or any other real estate sector) may seems as a tedious process, but has the potential to yield sustainable outcomes;
- The process assist in developing more critical and analytical thinking in problem solving, particularly with decision-making and/or strategy formulation; and
- Adequate product development for residential real estate operations i.e. end-user financing, project financing, banking systems, REITs products, etc.

5.4. SUMMARY OF FINDINGS

Following from the extensive analysis discussed in both Section 4 and 5 of this research report, the following constitutes some of the key highlights that serves to capture some of the main findings:

- The low residential real estate market segment appeared to have been the most resilient residential real estate market segment amongst other residential real estate market segments. This is a market ssegment that is regarded as the 'Bottom of the Pyramid' (Prahalad, 2010), which consumers only seek to fulfill higher order needs (Maslow, 1954), either to build social capital for cultural reasons, or as a means to compensate for deficiencies in other areas of their lives;
- Adopting the Pareto principle, the research study has revealed a 57/43 ratio split, in favour of the low residential real estate market segment being the most resilient throughout the economic cycle waves. The middle and high residential real estate market segments proved to be partially and least resilient to the economic cycle waves, respectively;
- Also, adopting Vogel's (2012) inference that house prices are influenced by GDP, further detailed exploration may be required to determine the percentage levels in high inequality environments;
- This research study further vindicates Goddard's (2012) view that "markets do not move in unison";

- It is worth noting that the 2008/9 global economic recession predominantly affected the securitization models and not particularly the low residential real estate market segment. For instance, the contagion effect (Hatemi-J, 2011) affected banks and investors, real estate market segments above the BoP residential real estate market segment;

- Whilst Baxter (2008) submitted that South Africa had weathered the 2008/9 global economic recession, the empirical evidence from this research study depicts that the low residential real estate market segment was the most resilient market segment of all. As a result, despite factors such as the low levels of external debts, appropriate fiscal and monetary policies and flexible rates, there appears to have been a costant house price growth in the low residential real estate market segment as opposed to both the middle and high residential real estate market segments;

- Strategies such as the so-called 'Corridors of Freedom'could be attainable if aligned with finding of this research study. Structured planning and communications for individual residential real estate market segment is a pivotal process, to adequately deal with issues of wages, house prices and commutes (Mayock, 2015);

- In an attempt to apply FinMark Trust's (SA, 2013) submission, it can thus be inferred that those with more access to credit facilities (i.e middle and high residential real estate market segments) are likely to be deterred by the effects of economic cycle waves than those with least access to credit facilities (i.e. low residential real estate market segment);

- The low residential real estate market segment displayed a subtle combination of both Equilibrist resilience (Simmie, 2010) and Transformative resilience (Holling, 1973, 2001; Gotham, 2010) that can lead towards sustainability in a high inquality environment (Holling, 1973; Walker, 2006, 2008; Harrison, 2014)

Given the revelations on performance of individual residential real estate market segments from a South African context, there exists a curiosity gap for countries such as the Seychelles and Namibia, which countries rank the highest in terms of their respective inequality levels.

Amongst other factors, this research report has established little evidence that suggests that house prices move closely with business cycles. As result, individual residential real estate

market segments performed vastly different from one another when tested at various levels, for instance:

- The low residential real estate market segment showed the least standard deviation, which low residential real estate market segment superceded both the middle and high residential real estate market segments, respectively;
- The low residential real estate market segment was the only residential real estate market segment that displayed positive coefficiences throughout all quantiles of the OLS regressions. However, such positive coefficiences were significant in both the 7th and 8th quantiles. Nonetheless, a negative and significant coefficient was observed in the 2nd quantile of the middle residential real estate market segment, as seen on OLS regressions. The high residential real estate market segment has been plagued by substantial occurrences of negative, and at times, significant coefficiences;
- The high residential real estate market segment recorded a negative average growth.

These are but few factors that nullifies the earlier suggested uniform effect (i.e. congruent or synchronized effect) between the residential real estate market segments and economic cycle waves. It has thus been proven through this research study that indeed the individual residential real estate market segments do not respond congruently to the effects of economic cycle waves, particularly given the South African context of high inequality levels.

5.5. RECOMMENDATIONS and AREAS OF FUTURE RESEARCH

This research study has revealed that different researchers have constantly made a generalized view regarding the performances of residential real estate market segments. This research study has proven the necessity and/or importance of testing individual residential real estate market segment, to formulate a structured approach or strategy. Further analysis can be conducted on sub-market segments of the individual residential real estate market segments, for detailed strategy formulation and./or planning. The research study thus supports initiatives of dissecting real estate market segments, in order to formulate appropriate strategies, *amongst other things*.

The research study sought to add value to the existing literature by making further analysis to residential real estate market segments, using business cycle indices as proxy for economic cycle waves. This research study has proven, *amongst other things*, that house prices do not

necessarily move in close ties with business cycles. Future research studies may therefore include but not limited to:

- The effects of house prices of individual residential real estate market segments on economic cycle waves, exploring various other indicators as proxy for economic cycle waves (e.g. Gross Domestic Product, Current Account, Buisness Cycle etc.);
- The causes of anomalities or disparities between individual residential real estate market segments to the economic cycle waves. Particularly given the fact that individual residential real estate market segments in the high inequality environments do not respond congruently to the economic cycle waves;
- Robust mortgage finance systems for individual residential real estate market segments in high inequality environments;
- Discussion of input factors affecting product development of individual residential real estate market segments.

5.6. CONCLUSION

In addressing some of the residential real estate market segment challenges in high inequality environments, the research study has revealed the importance of understanding individual residential real estate market segment performances. Some of the emerging themes from the research study indicates the importance of assessing residential real estate market segments individually, given the fact that contrasting results were discovered despite previous reports that suggested a uniform effect to business cyles. It is a consideration that developing sustainable and integrated developments require adequate planning and/or informed decision-making processes. Dissecting the residential real estate market segments into individual residential real estate market segments has thus proven to be a critical success factor for planning & control, or even monitoring & control throughout economic cycle waves. Decision making and/or predictions may thus be formulated on the basis of historical performances, making further allowances through sensitivity analysis processes, *amongst other contingencies*.

In conclusion, it is viewed that this research study has met the desired aim and objectives, particularly in an attempt to add value to the existing body of literature. A more structured approach to the analysis of residential real estate market segment is of paramount importance,

as planning and decision-making are generally based on available information and data. It is therefore submitted that residential real estate market segments need to be considered or assessed individually, in order to formulate adequate strategies for integrated and sustainable human settlements.

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APPENDICES

APPENDIX A

Wits HREC approval form

APPENDIX B

Working Data

date	Avarage Q price_L	Avarage Q price_m	Avarage Q price_H	Leading indicator	Coincident indicator	Lagging indicator
2005 Q1	105974,621	550590	2240000	90,51333333	87,88	103,0466667
2005 Q2	128973,742	598356,9	1182200	92,47666667	89,97333333	102,19
2005 Q3	135652,37	588000	1634166,667	94,13	92,22	102,6133333
2005 Q4	189329,5855	527426,25	1186935,154	94,43	93,68666667	103,58
2006 Q1	172830,8354	573349,1667	1489870,917	94,54333333	95,37	102,4466667
2006 Q2	185481,23	551934,4627	1316737	97,12666667	97,03	104,6533333
2006 Q3	154920,5253	554179,8113	2065000	98,78666667	99,02	105,3966667
2006 Q4	169475,8423	584209,4576	1397081,278	97,52333333	101,39	106,3433333
2007 Q1	198225,2822	564495,2	1568113,8	96,60333333	104,1833333	108,51
2007 Q2	236810,3086	582267,3333	1442154,25	96,09333333	104,8533333	109,57
2007 Q3	190863,6554	581559,6774	1530535,714	95,30666667	105,4666667	111,3
2007 Q4	185558,2217	605896	1697357,385	94,14	106,5666667	112,5733333
2008 Q1	163426,911	607411,8833	1347646,714	93,16666667	107,5233333	117,6833333
2008 Q2	177378,1023	603372,9231	1480000	91,99666667	108,14	119,6

2008 Q3	167331,3253	611610	1087142,857	88,74666667	106,7966667	124,0866667
2008 Q4	167984,2301	574761,9048	1973409,091	82,68	102,6266667	127,24
2009 Q1	149682,7105	606260,8696	1875000	80,70666667	97,27	122,0466667
2009 Q2	171475,2747	580333,3333	2767500	82,96333333	95,14333333	116,0766667
2009 Q3	164507,0184	603918	2380213,75	85,84333333	94,41333333	108,14
2009 Q4	191444,5765	595090,6667	1575000	92,48666667	96,12	103,02
2010 Q1	186746,0606	615193,871	2649020	99,11666667	97,92666667	101,1133333
2010 Q2	175292,6538	590157,8947	2309525	101,0266667	99,21333333	99,93
2010 Q3	189508,9843	595625	1382500	100,01	100,4433333	100,12
2010 Q4	185686,7097	582407,4074	1900000	99,84333333	102,4166667	99,47333333
2011 Q1	192570,39	571213,5556	4000000	101,6366667	104,16	97,99333333
2011 Q2	148667,9421	590658,6818	985000	101,1766667	105,4433333	98,91666667
2011 Q3	172995,4127	594777,7778	1996000	99,64333333	106,1733333	98,06333333
2011 Q4	158696,177	593461,5385	1458000	98,80666667	107,3833333	99,21666667
2012 Q1	179757,881	575337,6667	1318683,6	99,88	108,6333333	99,6
2012 Q2	186593,75	594115,3846	2850000	98,12333333	110,89	98,9
2012	182505,1111	636862,069	1617366,071	98,27333333	111,8233333	97,45666667

Q3						
2012 Q4	200417,7518	615282,6087	1550000	99,87333333	112,2033333	97,58666667
2013 Q1	193296,6636	629642,8571	1607500	100,1833333	111,2033333	98,99666667
2013 Q2	198213,9262	652903,2258	1414333,333	99,26333333	113,18	100,6866667
2013 Q3	206856,8273	632066,6667	1912500	99,21333333	114,2766667	103,13
2013 Q4	202369,7926	618576,9231	1368333,333	99,19333333	115,76	103,06
2014 Q1	189592,3037	645588,2353	1735500	98,3	114,75	101,44
2014 Q2	221825,7267	608162,5	1668571,429	96,62666667	114,0633333	100,35
2014 Q3	199072,9866	600103,6	1651590	97,35666667	113,9166667	101,5966667
2014 Q4	204229,4315	610681,8182	2197252,4	97,60666667	115,6733333	102,35
2015 Q1	221286,0606	646290,3226	1317133,333	95,96666667	116,2233333	101,9633333
2015 Q2	220984,9157	648600	1048571,429	95,17	115,04	101,93
2015 Q3	217332,6995	626046,5116	1612142,857	92,89	114,7433333	101,2566667
2015 Q4	199228,0108	638392,8571	1829298,2	93,1	115,95	100,9

Business Cycle Indices (source: SARB)

Month	**Leading indicator**	**Coincident indicator**	**Lagging indicator**	**Leading indicator**	**Coincident indicator**	**Lagging indicator**	Leading indicator	Coincident indicator	Lagging indicator
	Index: 2010=100	**Index: 2010=100**	**Index: 2010=100**	**Index: 2010=100**	**Index: 2010=100**	**Index: 2010=100**	Index: 2010=100	Index: 2010=100	Index: 2010=100
2005/01/31	90,9	87,6	103,1						
2005/02/28	90,3	87,9	103,2						
2005/03/31	90,3	88,1	102,9	90,5	87,9	103,0	90,51333333	87,88	103,0466667
2005/04/30	92,2	89,1	101,9						
2005/05/31	92,7	90,0	101,9						
2005/06/30	92,5	90,8	102,8	92,5	90,0	102,2	92,47666667	89,97333333	102,19
2005/07/31	93,5	91,4	102,0						
2005/08/31	94,4	92,3	103,2						
2005/09/30	94,5	92,9	102,7	94,1	92,2	102,6	94,13	92,22	102,6133333
2005/10/31	94,3	93,1	103,6						
2005/11/30	94,4	93,7	103,7						
2005/12/31	94,6	94,3	103,5	94,4	93,7	103,6	94,43	93,68666667	103,58
2006/01/31	94,2	95,0	101,7						
2006/02/28	94,5	95,4	102,3						
2006/03/31	95,0	95,8	103,3	94,5	95,4	102,4	94,54333333	95,37	102,4466667
2006/04/30	96,1	96,6	103,4						
2006/05/31	97,4	96,9	105,0						
2006/06/30	97,8	97,6	105,6	97,1	97,0	104,7	97,1266	97,03	104,65333

							6667		33
2006/07/31	99,2	98,3	105,5						
2006/08/31	99,0	99,0	105,7						
2006/09/30	98,2	99,8	104,9	98,8	99,0	105,4	98,7866 6667	99,02	105,39666 67
2006/10/31	97,9	100,5	105,8						
2006/11/30	97,6	101,5	106,0						
2006/12/31	97,1	102,2	107,2	97,5	101,4	106,3	97,5233 3333	101,39	106,34333 33
2007/01/31	96,6	103,3	107,6						
2007/02/28	96,2	104,4	107,9						
2007/03/31	97,0	104,8	110,0	96,6	104,2	108,5	96,6033 3333	104,183 3333	108,51
2007/04/30	96,2	104,8	110,2						
2007/05/31	96,5	105,2	109,0						
2007/06/30	95,6	104,6	109,5	96,1	104,9	109,6	96,0933 3333	104,853 3333	109,57
2007/07/31	95,7	105,2	110,7						
2007/08/31	95,6	105,6	111,0						
2007/09/30	94,6	105,6	112,2	95,3	105,5	111,3	95,3066 6667	105,466 6667	111,3
2007/10/31	94,6	106,3	111,9						
2007/11/30	94,8	106,6	111,8						
2007/12/31	93,1	106,7	114,0	94,1	106,6	112,6	94,14	106,566 6667	112,57333 33
2008/01/31	93,2	107,1	116,2						
2008/02/29	93,5	107,6	118,8						
2008/03/31	92,8	107,9	118,1	93,2	107,5	117,7	93,1666 6667	107,523 3333	117,68333 33

2008/04/30	92,4	108,6	118,4						
2008/05/31	91,7	107,9	119,5						
2008/06/30	91,8	107,9	120,9	92,0	108,1	119,6	91,99666667	108,14	119,6
2008/07/31	91,4	107,3	122,6						
2008/08/31	88,1	107,1	123,9						
2008/09/30	86,8	106,0	125,8	88,7	106,8	124,1	88,74666667	106,7966667	124,0866667
2008/10/31	84,5	104,6	127,3						
2008/11/30	82,3	102,6	127,9						
2008/12/31	81,2	100,7	126,5	82,7	102,6	127,2	82,68	102,6266667	127,24
2009/01/31	80,2	98,7	125,0						
2009/02/28	81,1	97,0	120,8						
2009/03/31	80,9	96,2	120,3	80,7	97,3	122,0	80,70666667	97,27	122,0466667
2009/04/30	81,7	95,5	118,3						
2009/05/31	83,0	95,2	116,6						
2009/06/30	84,3	94,8	113,3	83,0	95,1	116,1	82,96333333	95,14333333	116,0766667
2009/07/31	84,4	94,7	110,6						
2009/08/31	85,7	94,0	108,2						
2009/09/30	87,4	94,6	105,6	85,8	94,4	108,1	85,84333333	94,41333333	108,14
2009/10/31	90,1	95,3	104,0						
2009/11/30	92,7	96,1	102,3						
2009/12/31	94,7	97,0	102,7	92,5	96,1	103,0	92,48666667	96,12	103,02
2010/01/31	97,9	97,6	101,3						

2010/02/28	99,0	97,8	100,9						
2010/03/31	100,5	98,5	101,2	99,1	97,9	101,1	99,11666667	97,92666667	101,1133333
2010/04/30	101,7	98,5	100,2						
2010/05/31	101,5	99,2	100,9						
2010/06/30	99,9	100,0	98,7	101,0	99,2	99,9	101,0266667	99,21333333	99,93
2010/07/31	99,9	100,4	100,1						
2010/08/31	100,0	100,3	100,4						
2010/09/30	100,1	100,7	99,8	100,0	100,4	100,1	100,01	100,4433333	100,12
2010/10/31	99,7	101,6	100,0						
2010/11/30	99,3	102,6	99,7						
2010/12/31	100,5	103,0	98,7	99,8	102,4	99,5	99,84333333	102,4166667	99,4733333
2011/01/31	100,8	103,6	98,1						
2011/02/28	102,1	104,2	97,4						
2011/03/31	102,1	104,7	98,5	101,6	104,2	98,0	101,6366667	104,16	97,9933333
2011/04/30	101,2	105,4	98,7						
2011/05/31	100,4	105,3	99,2						
2011/06/30	102,0	105,6	98,9	101,2	105,4	98,9	101,1766667	105,4433333	98,91666667
2011/07/31	100,7	105,2	98,7						
2011/08/31	99,1	106,1	97,4						
2011/09/30	99,2	107,2	98,1	99,6	106,2	98,1	99,64333333	106,1733333	98,0633333
2011/10/31	98,8	106,9	99,0						
2011/11/30	98,8	107,3	99,5						

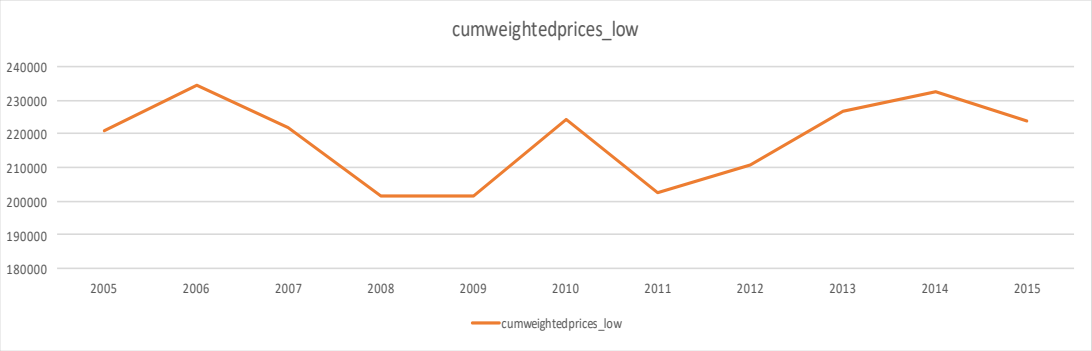
2011/12/31	98,8	108,0	99,2	98,8	107,4	99,2	98,80666667	107,3833333	99,21666667
2012/01/31	99,0	108,0	100,2						
2012/02/29	100,4	108,5	99,6						
2012/03/31	100,3	109,4	99,0	99,9	108,6	99,6	99,88	108,6333333	99,6
2012/04/30	98,7	110,1	99,2						
2012/05/31	98,3	110,9	99,2						
2012/06/30	97,3	111,7	98,3	98,1	110,9	98,9	98,12333333	110,89	98,9
2012/07/31	97,7	111,6	97,7						
2012/08/31	98,4	111,8	97,0						
2012/09/30	98,7	112,1	97,6	98,3	111,8	97,5	98,27333333	111,8233333	97,45666667
2012/10/31	99,7	111,7	97,1						
2012/11/30	100,2	112,9	97,8						
2012/12/31	99,8	112,0	97,9	99,9	112,2	97,6	99,87333333	112,2033333	97,58666667
2013/01/31	100,3	111,3	98,2						
2013/02/28	100,5	110,8	99,2						
2013/03/31	99,7	111,5	99,7	100,2	111,2	99,0	100,1833333	111,2033333	98,99666667
2013/04/30	99,6	112,4	100,1						
2013/05/31	99,4	113,5	100,4						
2013/06/30	98,8	113,7	101,5	99,3	113,2	100,7	99,26333333	113,18	100,6866667
2013/07/31	98,8	114,2	102,5						
2013/08/31	99,5	114,4	103,3						
2013/09/30	99,4	114,2	103,7	99,2	114,3	103,1	99,2133	114,276	103,13

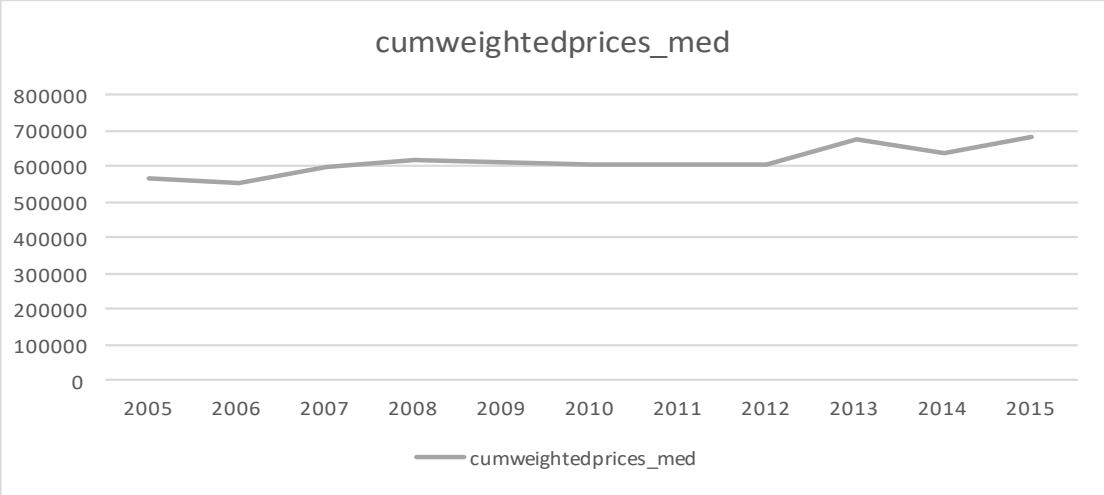
							3333	6667	
2013/10/31	99,6	115,5	103,5						
2013/11/30	99,2	116,0	103,8						
2013/12/31	98,8	115,8	101,9	99,2	115,8	103,1	99,1933 3333	115,76	103,06
2014/01/31	98,7	115,4	101,5						
2014/02/28	98,6	114,8	101,8						
2014/03/31	97,6	114,1	101,0	98,3	114,8	101,4	98,3	114,75	101,44
2014/04/30	96,4	114,4	100,9						
2014/05/31	96,9	113,9	99,9						
2014/06/30	96,6	113,9	100,2	96,6	114,1	100,4	96,6266 6667	114,063 3333	100,35
2014/07/31	96,5	113,4	101,8						
2014/08/31	97,6	113,6	101,4						
2014/09/30	98,1	114,7	101,6	97,4	113,9	101,6	97,3566 6667	113,916 6667	101,596666 67
2014/10/31	98,1	115,4	102,0						
2014/11/30	98,4	115,7	102,9						
2014/12/31	96,3	115,9	102,2	97,6	115,7	102,4	97,6066 6667	115,673 3333	102,35
2015/01/31	96,3	115,7	101,8						
2015/02/28	96,1	116,4	102,3						
2015/03/31	95,5	116,6	101,8	96,0	116,2	102,0	95,9666 6667	116,223 3333	101,963333 33
2015/04/30	96,2	115,5	102,2						
2015/05/31	94,9	114,8	102,1						
2015/06/30	94,4	114,9	101,5	95,2	115,0	101,9	95,17	115,04	101,93
2015/07/31	93,0	114,8	101,1						

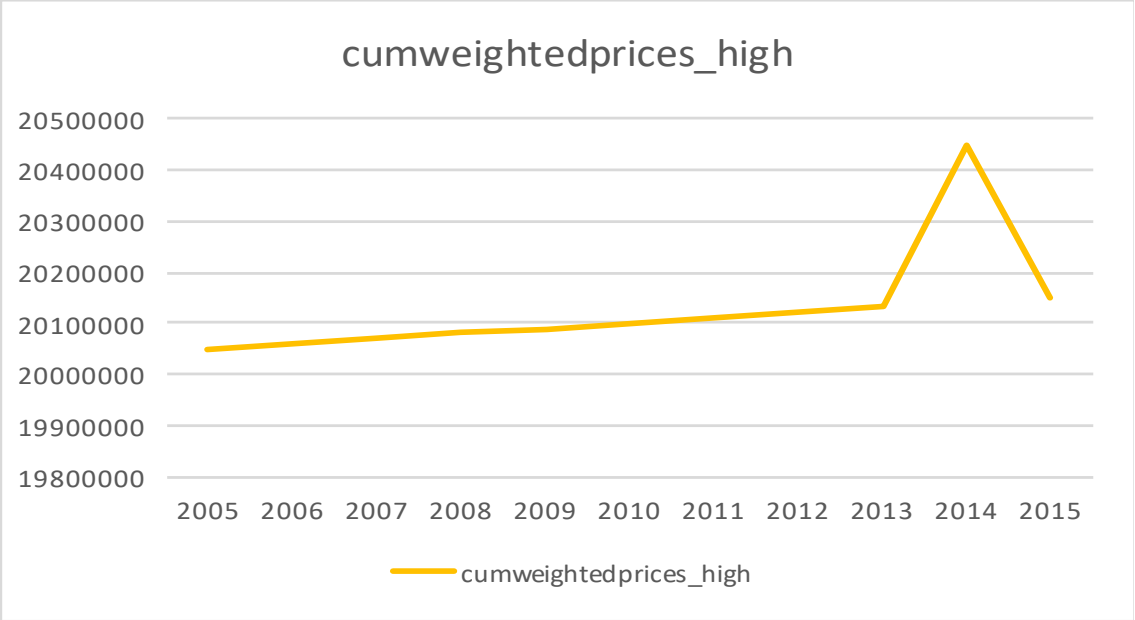
2015/08/31	92,7	114,6	101,6						
2015/09/30	92,9	114,9	101,1	92,9	114,7	101,3	92,89	114,7433333	101,2566667
2015/10/31	93,2	115,3	101,0						
2015/11/30	93,2	115,9	101,4						
2015/12/31	92,9	116,7	100,2	93,1	116,0	100,9	93,1	115,95	100,9
2016/01/31	92,0	116,5	100,2						
2016/02/29	91,6	117,2	99,6						
2016/03/31	91,7	117,2	99,8	91,8	116,9	99,9	91,79666667	116,9433333	99,85
2016/04/30	90,9	117,3	100,7						
2016/05/31	90,8	118,1	99,7						
2016/06/30	91,6			91,1	117,7	100,2	91,06666667	117,725	100,2

Cumulative Weighted House Prices for Each Residential Rela Estate Market Segment.

cumweightedprices_low	cumweightedprices_	cumweightedprices_high	cumweightedprices_low	cumweightedprices_med	cumweightedprices_high
220858,1097	564288,3816	20050660,92	6,188971074	-1,622806842	0,048894628
234526,9542	555131,0711	20060464,62	-5,453150992	8,00137845	0,050900749
221737,8453	599549,209	20070675,54	-9,190084842	3,236955083	0,049786777
201359,9492	618956,3476	20080668,09	0,041674298	-1,225595263	0,049324224
201443,8645	611370,4479	20090572,72	11,21454266	-0,646125529	0,049521244
224034,8727	607420,2274	20100521,82	-9,667130021	-0,250080625	0,050859741
202377,1302	605901,1871	20110744,9	4,142296542	0,259431508	0,049651423
210760,1911	607473,0856	20120730,17	7,62443205	11,13892019	0,048974595
226829,4587	675139,0278	20130584,21	2,397420469	-5,59001873	1,565222126
232267,5145	637398,6297	20445672,57	-3,600273302	6,983861891	-1,443009786
223905,2492	681913,6697	20150639,52			






cumweightedprices_high
20500000
20400000
20300000
20200000
20100000
20000000
19900000
19800000
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
cumweightedprices_high

Averaged Property Sizes

medsize		lowsize		hisize
357,125		159,5605		984,125
223,95		169,3694		319,8
283,8333		173,16		622
221,5556		141,2979		351,3846
281,9444		124,5611		956,1667
353,3731		113,724		381,2143
378,1698		129,4773		333,6
337,4576		110,3438		185,8333
415,6143		88,62624		484,3
255,7315		79,29383		385,25
330,7957		93,26425		399
280,2614		83,15617		407,0769
375,1667		86,18101		372,7143
375,9231		89,27907		402,5
397,5938		86,37751		516,1429
296		92,07531		419,0909
322,8261		85,43421		423,7778
345		85,30769		668,5
406,55		82,07362		488
408,4333		109,1		423
435,8065		95,79798		603,8
449,5789		89,30769		313
382,8125		106,3937		498,5
383,4074		95,15323		156
347,2778		100,67		993
342,1364		85,89474		484,25
397		91,07342		603,875
380,6923		76,12389		513,2
406,5		93,24603		495,4
311		85,5625		494
311,7586		94,67901		455,2857
346,5217		86,17518		409,625
353,25		87,64545		487
342,7742		86,71141		336,3333
368,1556		98,56115		492,8333
718,8077		92,73333		241
227,6471		80,1037		1513,4
255,0313		84,18667		483
255,44		89,0604		345,875
307,5		82,9863		425,6667
253,2903		83,14394		342,6667
273,7111		76,6506		258,4286
289,3256		79,47541		378,5714
372,6429		79,47312		365,1