The Impact of Macroeconomic Variables on REIT Returns: A Case of South Africa and Brazil

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Declaration

I declare that this Research Report is my own, unaided work. It is submitted in partial fulfilment of the degree of Master of Science (Building) in the field of Property Development and Management at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university.

Signature of Candidate: 

Sibongile Zwane-317085

Dedication

I dedicate this work firstly to God my redeemer, strength, and protector. I also dedicate this work to my parents Maggie Zwane and my late father Thulani Hector Zwane and my sister Thembi Zwane. I also dedicate this to my grandmother Nostah Bamahlaole Sedibe – Kaile, you have been the greatest inspiration and motivator. I love you and will honour your life for the rest of my days.

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List of Abbreviations and Acronyms

REITS	Real Estate Investment Trusts
BRICS	Brazil, Russia, India, China, South Africa
G6	Group of six (France, West Germany, Italy, Japan, the United Kingdom, and the United States
FII	Fundos de Investimento Imobiliário
BRL	Brazilian real
NAREIT	National Association of Real Estate Investment Trust
JSE	Johannesburg Stock Exchange
PUT	Property Unit Trusts
PLSA	Property Loan Stock Association
SARS	South African Revenue Services
FSB	Financial Services Board
GDP	Gross Domestic Product
EMH	Efficient Market Hypothesis
GFC	Global Financial Crisis
CAPM	Capital Asset Pricing Model
A-REITs	Australian REITs
M&M	Modigliani-Miller
ICAPM	Intertemporal Capital Asset Model
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
OLS	Ordinary Least Squares
ARDL	Autoregressive Distributed Lag
IMF	International Monetary Fund
U.S	United States
U.K	United Kingdom
SUR	Seemingly Unrelated Regression
VAR	Vector Auto Regression
APT	Arbitrage Pricing Theory
ADF	Augmented Dickey-Fuller
VECM	Vector Error Correction Model
DCC	Dynamic Conditional Correlation

MIDAS	Mixed Data Sampling
SVAR	Structural Vector Auto Regression

Abstract

Purpose: The paper aims to study the relationship between macroeconomic variables and the returns of REITs listed on listed on São Paulo Stock Exchange and the Johannesburg Stock Exchange in order to assess the macroeconomic risk factors through empirical findings for foreign investors over the period of January 2014 to December 2017.

Methodology: The analysis will be in two parts. The first part employs a multi linear regression model and estimation using the ordinary least squares (OLS) will be used to determine the relationship between the dependent variable (the REIT Returns) to the independent variables (macroeconomic variables). The second part will make use of the ICAPM which was developed by Merton (1973) and will analyse the impact of time-varying factors such as interest rates, money supply and oil price fluctuations on REIT returns.

Findings: The findings of the study showed that there is an insignificant negative relationship between interest rates and REIT returns in both South Africa and Brazil, an insignificant positive relationship between money supply and REIT returns in South Africa and Brazil. South African REIT returns showed a negative relationship with crude oil prices, however, the Brazilian REIT returns showed a more significant positive relationship with crude oil prices.

Keywords: REITs, South Africa, Brazil, Interest Rates, Money Supply, Crude Oil Prices
JEL: C35, C58, G11, G12

1 Introduction

1.1 Background to the Study

Investment in the listed property market has been proven to be widely successful to investors and portfolio managers, this is due to the established fact that real estate has proven to mitigate risk and improve returns (Kroencke et al., 2018) in a mixed portfolio. The initial behaviour and performance of Real Estate Investment Trusts (REITs) is similar to stocks whilst in the long run they behave similarly to direct real estate (Ntuli and Akinsomi, 2017) for SA REITs.

REITs are transferred with ease from one owner to the other at low transaction costs because shares to REITs stocks are traded publicly (Han and Liang, 1995). Due to the fact that a select few of investors are able to buy direct real estate or finance commercial REITs have become the most viable real estate investment vehicle; investment through REITs does not impose onerous lofty and long-term financial investment like other property invest vehicles (Han and Liang, 1995). REITs blend traits of a variety of markets: the property market – its main source of income is property income, and the stock market - the conditions in which the listed property trades in. It is a common feature that real estate markets with matured, seasoned and REIT structures that have been in existence for a long period of time are highly homogenized with the stock market and macroeconomic fundamentals compared to the less under developed REIT structures (Yunus, 2012)

REITs are known for their tax benefits, but the management of this investment vehicle is limited by regulatory restrictions compared to the stock market (Yokoyama et al, 2017). Han and Liang (1995) stated the following about why REITs have become such a popular means of real estate investment: “REITs provide a mechanism to pool resources that enables investors, especially small

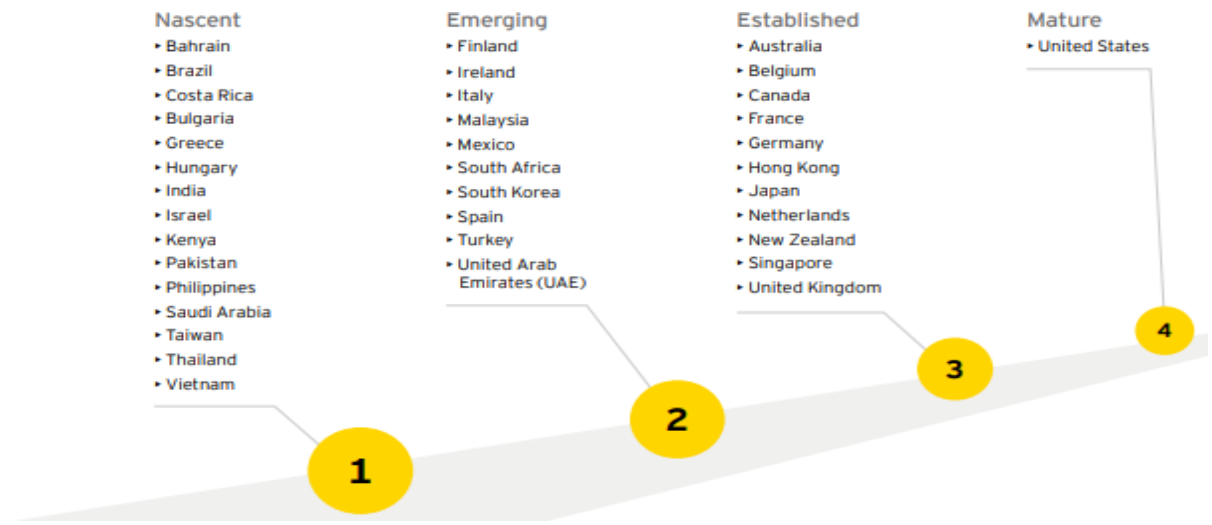
investors, to gain the economic and other benefits of commercial real estate investments. In today's illiquid real estate market, REITs have attracted more and more attention as liquid real estate investment vehicles, even from institutional investors such as pension funds" (Han and Liang, 1995, p235).

Academics and investors have studied the REITs from the late 1970's, studies around REIT performance have shed great insight about this investment vehicle. This paper extends this literature by considering REITs in emerging markets. It is postulated that growth generated from large developing countries such as BRICS, in the next 40 years or so could become larger than the G6 countries and create new demand growth, Gay (2016) cited Wilson and Purushothaman (2003) who have identified that the BRICS countries may become larger in US dollar terms than the G6 in the near future. BRICS investment portfolios may increase due to growing foreign investment (Jain, 2016). South Africa and Brazil have shown impressive growth in their emerging REIT markets, though they may show great growth prospects it is imperative that investors understand their macroeconomic predisposing factors and their impact on returns for the development of their mixed portfolios, strategies and the management of portfolios for their clients. This is particularly significant for investors and fund analysts in order for them to reduce portfolio risks.

The Brazilian REIT is named the "Fundos de Investimento Imobiliário" abbreviated FII, came into being in 1993 and has grown rapidly in these last five years and experienced statute changes in 2008. The REITs grew from 1 billion Brazilian real in 2007 to 11.5 billion Brazilian Real in 2012 (Yokoyama et al, 2017). The South African REITs market was officially listed in 2013 and had performed better than the UK, US, and Asian REITs markets in its first year (Ntuli and Akinsomi, 2017).

In 2013 a number of REIT regimes were established which included: South Africa, Ireland, Kenya, India, Vietnam, Bahrain, and Saudi Arabia (EY, 2017). EY has established a REIT jurisdiction maturity assessment (Figure 1) that categorises the REITs according to their evolution and has classified South Africa as an emerging REIT at the cusp of becoming an established REIT (EY, 2017). Though South Africa is a relatively new regime, but it is maturing at a fast rate with 23 active REITs and a few ancillary rankings from international REITs (EY, 2017). South Africa has performed well on the following metrics: real estate transparency, capital market maturity and corporate governance (EY, 2017).

Figure 1: Stages of REIT regime maturity



Source: EY Global REIT Market

1.2 Problem Statement

REITs have been trading at high valuations and there has been an establishment of listed property the world over, this is an indication of the widespread growth of REITs globally (Brobert, 2016). With these promising conditions and increased popularity of the REIT vehicle it would be ideal to gain understanding of the risk factors that impact the returns of these vehicles especially in emerging markets (Kola, 2016) where the growth has been exponential and the conditions and state of the BRICS countries are priming for even more growth. Until recently South Africa and Brazil were the only BRICS countries with registered REITs on their respective stock exchanges, India recently registered their REIT in 2017. The aim of the investigation is to analyse how macroeconomic parameters impact the REIT returns of the BRICS (South Africa and Brazil) markets, to assist investors and managers manage these unique REITs better.

There is scant empirical knowledge on the BRICS REITs markets, most literature has focused its investigation on stocks and bonds (Akinsomi et al., 2018). Furthermore, there is limited studies on the ramifications of varying macroeconomic parameters on REIT returns in BRICS markets, though Kola (2016) investigated this relationship between a BRICS economy (South Africa), a developing economy (Bulgaria) and a developed economy (the U.S). Thus, there exists a shortfall in literature with a focus what the ramifications of macroeconomic parameters and/or variables on REIT performance in South Africa and Brazil which belong to BRICS. Therefore, the research problem is REIT performance are susceptible to changes in macroeconomic variables (Fang et al., 2016; Downs et al., 2003 and Payne, 2003). The study will examine the conclusions of the previous research in the South African and Brazilian economies, who belong to the BRICS cohort.

1.3 Primary Research Question

The primary research question emanates from the need to analyse the performance of REIT returns. The research questions are listed below:

- Which of the selected macroeconomic factors affect the South African and Brazilian REIT markets?
- What is the relationship of these macroeconomic drivers against the REIT returns in South Africa and Brazil?

1.4 Research Contribution

The Sub-Saharan REIT market is still considered to be relatively young, and thus an analysis of this market and the associated risks and returns would be beneficial to both investors and academia. With the growing significance of the sub-Saharan REIT sector, portfolio managers and other investors would benefit from additional insight into the driving components and risk exposures intrinsic to these markets. While a substantial amount of literature exists for REITs in international and established markets, relatively less attention has been directed to BRICS markets. The investigation will thus contribute to the body of knowledge on REITs in emerging countries through empirical evidence. South African REIT market performed better than the UK, US and Asian REITs markets in its first year, and the Brazilian REIT grew from 1 billion Brazilian real in 2007 to 11.5 billion Brazilian Real in 2012.

1.5 Research objective

The investigation will seek to analyse the association macroeconomic risk factors have with REITs performance for a period of less than 5 years, from 2014 to 2017. The second aim is to discern whether the selected macroeconomic variables are drivers of the REITs returns in Brazil and South Africa. Ultimately, the paper aims to compare the performance of REIT returns of two emerging markets, that may not necessarily be similar to one another, for the sole purpose of potential investors foreign and domestic to apply suitable strategies for the mixed portfolio's they make seek to plough significant amounts of money into.

1.6 Delineation

The research will be focused on the South African REIT and Brazilian REIT as listed on their respective stock exchanges, and three selected macroeconomic variables.

1.7 Limitations

Due to the fact that both of the REIT markets being studied are considered to be newly established and emerging or nascent, the study period will only be between 2014 and 2017.

2 Literature Review

2.1 Background to the Literature Review

The National Association of Real Estate Investment Trust (NAREIT) define REITs as "companies that own or finance income-producing real estate in a range of property sectors" (NAREIT, 2019). These companies have to satisfy a number of regulatory prerequisites to qualify as REITs (NAREIT, 2019). "Most REITs trade on major stock exchanges, and they offer a number of benefits to investors" (NAREIT, 2019). "REITs are pooled real estate funds that provide individual investors, as well as institutions, the opportunity to invest in income-producing real estate properties, mortgages, joint ventures, and other hybrid structures" (Chen and Tzang, 1988, p13). The capacity of REITs to operate in the stock market makes them an appealing investment vehicle compared to other forms of property investments.

Though SA REITs were registered on the Johannesburg Stock Exchange (JSE) in May of 2013, listed property asset class has a well-documented in South Africa (SA REIT, 2019). The first two property funds that were listed on the JSE in 1969 and they were created to allow investors to invest in a diversified portfolio of different investment grade properties as though they had invested in the properties directly (SA REIT, 2019). The SA listed property sector consisted of two associations; 1) the Association of Property Unit Trusts (PUT) which was first established in 1984 and 2) the Property Loan Stock Association (PLSA) which was established in 2004. From the abovementioned associations along with the JSE, South African Revenue Services (SARS), National Treasury and Financial Services Board (FSB) were instrumental in the creation of the SA REIT sector in May 2013. The SA REIT facilitates and guides the monetizing and listing of real property

in South Africa and ensures they are on par with REITs all over the world so as to attract international investment. (SA REIT, 2019).

2.2 Factors That May Affect REIT Performance

2.2.1 Introduction

There are a number of driving factors behind REIT yields and risks, for instance according to Kroencke et al., (2018); Li and Wang (1995) identified earnings, term premium and default premium as significant risk determinants for REIT returns, and Ling et al., (2000) found that macroeconomic risk determinants are of minor significance to REIT returns. Mei and Lee (1994) were cited by Kroencke et al., (2018) to have observed that direct real estate and REITs share common risk factors. A return-risk profile of REITs is similar to the return-risk profile of small cap stocks with a significant correlation between listed property and the stock market as compared to between the listed property sector "and the underlying real estate market" (Kroencke et al., 2018).

Numerous comprehensive examinations have explored the possible correlation between stock performance and macroeconomic risk factors, they studied the causality between emerging economies and the following macroeconomic parameters: exchange rates, inflation, interest rates and GDP between 1976 to 1997 (Gay, 2016). The studies have shown that the correlation between stock performance and macroeconomic parameters depend on the variable magnitude of the specific stock market and its incorporation with international markets Gay (2016).

Kroencke et al., (2018) aptly notes that literature has not succinctly narrowed down and/or identified the most common risk factors for the securities market, listed property and direct real estate. Kroencke et al., (2018) found that the macroeconomy accounts for sixty percent of the

disparity in listed property through the equity REIT series, nominal interest rates make up the majority of the variance in the series and output and investment variables are not significant in the equity REIT series. Shocks to macroeconomic parameters such as nominal rates have a pronounced negative influence on the real estate return series. Another investigation that examined the impact of monetary policy shocks on REITs revealed that they react contrary to the with market efficiency theory (Bredin et al. 2007). The research findings elucidated that further analysis into the correlation between property returns and macroeconomic variables is required (Bredin et al., 2007).

Though it must be noted that this observed causal relationship between nominal interest and real estate returns may be as a consequence of the interest rate effect, thus it would be worthwhile to carry out a study that will separate nominal and pure interest and test their significance/effect on real estate (Bredin et al., 2007). Property returns in sub-Saharan Africa have increased much higher compared to other developing countries, foreign investment in real estate has also risen over the few years as well as the research of REITs in sub-Saharan Africa. The Sub-Saharan REIT market is still considered to be relatively young, and thus an analysis of this market and the associated risks and returns would be beneficial to both investors and academia. With the growing significance of the sub-Saharan REIT sector, portfolio managers and other investors would benefit from additional insight into the driving components and risk exposures intrinsic to these markets. While a substantial amount of literature exists for REITs in international and established markets, relatively less attention has been directed to BRICS markets. Explain how you went about the literature review in identifying literature that you considered to be important.

2.2.2 Macroeconomic Factors and The REIT Market

Macroeconomics is the general development and patterns of the economy (Alkali et al., 2018). When the macroeconomic environment is stable it provides an opportunity for the real estate market to grow (Alkali et al., 2018). In addition, Victor and Razali (2002) stated that macroeconomic variables are good determinants of excess returns since they affect a company's cash flows and also impact the risk adjusted discount rate.

The macroeconomic factors under investigation were taken from literature that has investigated whether macroeconomic parameters and stock market performance have an interdependence with real estate returns. Factors that govern the returns for REITs have been studied over the years. When compared to more advanced global markets, REITs have been a recent investment vehicle in developing markets with relatively less empirical studies that examine the economic risk and driving factors of their performance.

Some REIT markets have similar characteristics to the equity market such as maximized returns with consequent high rates of volatility and exposure to market risk, interest rates and general macroeconomic factors. For REIT markets that have shown to have bond market, characteristics like inflation hedging, make them worthwhile investment vehicles (Wong, 2018). REIT markets and their returns are subject to a myriad of risks including unexpected inflation and the term structure of lending rates which are explain about 60% of REIT return variations (Wong 2018). Literature has shown crude oil price fluctuations have a more pronounced impact on emerging markets as compared to more advanced economies and has consequently become the driving force of new and growing economies (Basher and Sadorsky, 2006). Growing economies will experience a great demand for oil and will subsequently consume a big share of the world's oil. (Basher and Sadorsky, 2006). The

Efficient Market Hypothesis (EMH) model postulate that expected variations in money supply have an insignificant impact on stock performance, and unforeseen variations in money supply impact stock prices (Maskay and Chapman, 2007).

The three variables to be studied in the REITs market context will be consistent with literature on stock markets and their economic drivers. Studies on the macroeconomics have centered around developed markets, the current study will focus on emerging countries that belong to BRICS. The three variables chosen are: money supply, interest rate and oil price fluctuations. These variables will be discussed below.

2.2.3 Interest Rates

Interest rate has shown to be an indicative macroeconomic variable that influences the financial market as well as the REITs market, it is also an important policy variable when applying monetary policy decisions (Reddy and Wong, 2018). Interest rates influence the cost of borrowing money, which impacts on the allure of real estate development. Property is primarily financed through long-term debt, the term spread of the debt, i.e. long or short interest rates, will also impact the performance of listed property. Furthermore, the availability of housing finance and financing costs are drivers of credit risk and are anticipated to significantly influence demand for real estate (Reddy and Wong, 2018). Reddy and Wong (2018) embarked on a study to investigate the susceptibility of the Australian REIT market to variations in long-term and short-term interest rates in 5 different asset classes, namely; retail, diversified, office, specialised (non-core) and industrial.

The investigation analysed data over 21 years and observed 3 economic segments; prior to the Global Financial Crisis (GFC), GFC and succeeding the GFC.

The study employed the Capital Asset Pricing Model (CAPM) methodology to ascertain how interest rates and Australian REITs (A-REITs) are correlated (Reddy and Wong, 2018). The results showed that diversified and retail assets are significantly affected by long term and short term interest rates; an inverse effect was observed when long term interest rates were hiked up and a direct effect was observed when short term interest rates fall (Reddy and Wong, 2018). The industrial, office and specialised assets reaction to varying interest rates could not be explained by the model (Reddy and Wong, 2018). The study concludes that interest rates do influence Australian REITs returns. REITs sensitivity to interest rates may differ as a concomitant of the REIT structure, financial debt structure, and the diversification of the REIT portfolio (Wong and Reddy, 2018).

REITs are highly leveraged financial vehicles even though they are tax-exempt which should encourage them to follow the Modigliani-Miller (M&M) theorem, which states that in the absence of taxes a firm should be fully financed by equity (Wong and Reddy, 2018). Wong and Reddy (2018) evaluated how long term and short-term interest rates impact Australian REIT returns. Using the intertemporal capital asset model (ICAPM). The study divided property funds into high debt and low debt rooted on their financial gearing in order to scrutinize the impact of leverage on the REIT performance, it further divided the funds based on their market capitalization into small, medium and large to quantify the impact of size risk. The results showed how high debt funds have greater median returns compared to low debt funds and exhibit a substantial discrepancy in returns, which suggests a risk premium is related to leverage levels.

When interest rates fall the cost of debt will decrease which will drive up earnings and encourage investment in the listed property sector in lieu of stocks and bonds, however when interest rates are hiked up the cost of debt will go up will not necessarily cause a fall in REITs returns (Wong and Reddy, 2018). REITs prefer debt finance as a tool to increase their investment options which require large amounts of disbursements (Wong and Reddy, 2018). Due to the highly leveraged nature of REITs it is important to understand the impact of the cost of debt on the performance of REITs.

Reddy and Wong (2018) has cited numerous investigations that studied how interest rate movements influence the performance of international REITs markets which found that the real estate markets are susceptible to fluctuations in interest rates both in the short and long-term.

Akimov et al. (2015) undertook a comprehensive study to investigate the influence of interest rates on public real estate in the six of the largest global REIT markets. The study focused on the sensitivity of six advanced markets to unforeseen movements in level, slope, and curvature of the yield curve (Akimov et al., 2015). The study employed a hybrid of the (Akimov et al., 2015) to test for the vulnerability of the REIT securities to unanticipated changes interest rate in the U.K, U.S, Hong Kong, Japan, the U.S, Singapore as well as Australia (Akimov et al., 2015). The robust results revealed that long term and short-term interest rate factors have a material influence on returns of public real estate (Akimov et al., 2015). According to Akimov et al. (2015) all six REIT markets showed a significant sensitivity at one period or another, however the sensitivity varied across all markets and over time.

The empirical evidence of the study illustrate that it is essential to look at movements throughout the yield curve of interest rates due to the time-sensitive character to interest rates (Akimov et al., 2015). In addition, the outcome of the GARCH model showed that long term interest

rate impact real estate market in Singapore and Australia, but in the US and Hong Kong markets are sensitive to the slope factor. Japan demonstrated its positive sensitivity to the slope factor, this indicates that the Japanese market decreases/increases in profits when short term interest rates decrease/increase (Akimov et al., 2015). The observed behaviour in the Japanese market may be due to a stagnant economy and an interest rate policy that is approaching zero in Japan during the studied period (Akimov et al., 2015).

In a study by Wong and Reddy (2018) interest rates were found to be a significant influence on REITs compared to other listed financial markets. In addition, a previous investigation which corroborated Swanson et al. (2002) results, found that changes in nominal interest rates contributed to 50% of the variation in REIT returns. Literature has shown that interest rates propel REIT stock prices and returns which is in congruent with financial notion that increased leverage levels will lead to higher market risk thus potentially higher returns (Wong and Reddy, 2018).

An investigation by Yong and Singh (2015) have shown a notable inverse correlation between Australian REITs and long-term interest rates, however, correlation between Australian REITS and short term interest rates was positive and insignificant and there exists an inverse influence of interest rate changes on REITs when the market is stable and growing. The study by Yong and Singh (2015) used a sample period from 1980 to 2013, the REITs performance data was derived on the market capitalization of REITs that were active, suspended, and delisted. The panel and panel quantile regressions models were used to analyse the collective effect of debt leverage and managing structure on REIT returns with regards to their sensitivity in connection with stock market and movements in interest rates and how they differ at varying stages of an economic cycle (Yong and Singh, 2015). The empirical evidence of the study revealed that (Yong and Singh, 2015):

- The influence of market performance is more pronounced for REITs that are managed internally and those with higher debt leverages
- REITs have an inversely proportional relationship with movements to short-term interest rates at the lowest 5% percentiles of returns.
- Movements in long-term interest rates have an inverse effect on REITs at the upper 75% and 95% percentiles.
- The susceptibility of REITs to fluctuations in interest rates differ throughout the ebb and flow of market conditions.
- The long-term debt leverage costs erode the yield of REITs and is observed only during good market performance under altered market conditions.

The above studies have shown that the correlation between interest rates and REIT returns in a number of global markets such as the US, Australia, Asia, and the UK is inconclusive.

Morri and Liu (2017) found that there is no interdependence between REITs price variations and fluctuations in interest rates. Morri and Liu (2017) who presented contrary evidence that found that real estate performance was positively correlated to changing interest rates at different times. Morri and Liu (2017) carried out an examination on the link between US REITs and interest rate volatility between 2009 to 2015. The study analysed the sensitivity of US REITs to movements in interest rates during three sub-periods and the economic conditions that prevailed during these sub-periods. The study employed a series of tools in their methodology; Pearson Correlation, the OLS regression which is an extension of the CAPM model. The results of the investigation confirmed that REITS returns and/or performance sensitivity to interest rates was time-varying in nature.

Akimov and Stevenson (2017) set out to examine the how interest rate fluctuations impact the listed property's market returns, the investigation reviewed six of the biggest listed property markets in the world between 1994 and 2015. The study analyses the interdependency that may exist between property returns and fluctuating interest rates during two periods of financial uncertainty – the Asian financial crisis from 1997 to 1998 and the GFC from 2007 to 2008 (Akimov and Stevenson, 2017). The investigation employed the GARCH-M model to elucidate the data and found that the most significant results were not crisis-driven. Secondly, the low interest rates set by the Central Bank weakened the sensitivity of listed real estate returns (Akimov and Stevenson, 2017).

Victor and Razali (2019) cited Devaney (2001) who employed the GARCH statistical model to study the influence of interest rate shocks on excess REIT returns. Another study cited by Victor and Razali (2019) was an investigation carried out by Liow and Huang (2006) found that a rise in long-term interest rates is linked to lower excess REIT returns.

Interest rates have a significant effect on the discount rate which in turn will inform the returns of stocks and real estate investment trusts. Wong (2018) demonstrates that stock prices can be explained as a function of discounted dividends: Wong (2018) utilized the Autoregressive Distributed Lag model (ARDL) to study the Hong Kong, Singapore as well as Japan REIT markets from 2002 to 2016. The sample period offered the data sample financial data because it spanned all phases of the economic cycle Wong (2018). The results of the investigation showed that the Singapore REITs susceptible to interest rate risk, this is a result of easing restrictions through monetary policy Wong (2018). Hong Kong REITs did not show any evidence of interest rate risk which may be due to more rigorous lending conditions Wong (2018). Results from the Japanese REITs were inconclusive Wong (2018).

A hike up in interest rates will lower the present value of future dividends which will alleviate pressure on prices and consequently on returns (Wong, 2018). Increasing interest rates incites a rise in the cost of debt which will effect cash flows (Wong, 2018). Other literature advocate for spreading credit between short and long-term interest rates, narrow credit spreading may negatively influence performance of the investment fund (Wong, 2018). During periods of recession central banks generally decrease their interest rates which in order to encourage investors to invest in more steady income streams such as long-term bonds (Wong, 2018). Consequently, this will re-divert investments from stock and the real estate market.

Dima (2015) evaluated the impact of monetary policy announcements such as central bank interest rates on bank stock returns between bank stock returns between 2006 and 2014. The investigation employed the CAPM to compute the monthly stock returns then a regression model was used on the secondary data from the 11 commercial banks in Kenya (Dima, 2015). The study showed how sensitivity of interest rate changes on stock performance differed depending on the attributes of the individual banks (Dima, 2015). Dima (2015) also showed that the central bank lending rate/ interest rate fluctuations may have a statistically significant negative correlation on bank stock yields in Kenya. It has to be said that Kenya is a developing country with an inefficient securities exchange, thus a majority of the investment options and decisions are informed by macroeconomic factors like central bank interest rates (Dima, 2015).

A study of the Malaysian equity market which attempted to link the equity market and a myriad of macroeconomic parameters including interest rates, the study also sought to link these macroeconomic parameters and stock returns in terms of intensity and direction with or without the presence of exchange rates (Chia and Lim, 2015). The study used the ARDL bound tests from 1980

to 2011 and data was collected from the International Monetary Fund (IMF) (Chia and Lim, 2015). The results show that in Malaysia the share price is positively affected by interest rate (Chia and Lim, 2015).

Yunus (2012) investigated two securities market, namely: the property market and stock markets and, their relationship with macroeconomic drivers such as interest rates in developed countries. The study analysed securitized property markets in Canada, U.S., Holland, Japan, Switzerland, the U.K, France, Italy, Australia and Germany from January 1990 to December 2007 (Yunus, 2012). The investigation made use of several time-series tools, namely: Granger causality test, cointegration tests and unit root tests. The study established that the co-integration of the interest rates noted an indirect relationship with property returns.

Movements in interest rates and stock market values may create the impression that the U.S equity REITS are risky and volatile and deter financial leverage as a tool for financing US equities (Kawaguchi et al., 2017). Kawaguchi et al. (2017) seeks to present corroborative evidence for the premise that "market timing in REIT leverage choices led to a positive, rather than negative, relation between equity value and volatility of stock returns during the period 1994–2006" Kawaguchi et al. (2017). This is done by investigating (Kawaguchi et al., 2017):

- Whether lending rates and bank rate spreads are proficient drivers of the variation in equity REIT yields and,
- Is it plausible for equity REIT yields to behave more volatile in an environment where the spread between the return on commercial mortgages and the 10-year Treasuries fall (observed throughout the Greenspan era)?

Merton's equity volatility model and GARCH models were employed over a sample period from 1985 to 2012 of the US equity REITs market. The findings show a significantly negative "REIT stock price elasticity of variance" Kawaguchi et al., (2017) prior and following the Greenspan era (Kawaguchi et al., 2017). However, this behaviour did not appear in the time of the Greenspan era (spans 1994–2006) due to the decreasing interest rate at the time of the Greenspan era (Kawaguchi et al., 2017). According to literature low lending rates and lending rate spreads will lead to a wealth shift from equity to debt holders Kawaguchi et al. (2017).

A study by Allen et al., 2000 found empirical evidence that REIT performance is swayed by short term and long term interest rate movements, but they could not deduce whether REITs can influence their exposure to interest-rate volatility through leverage, management strategy, asset structure, degree of specialization or leverage. The study used a sample of 46 publicly traded REITs from 1992 to 1996 and analysed the data using the seemingly unrelated regression (SUR) framework.

2.2.4 Money Supply

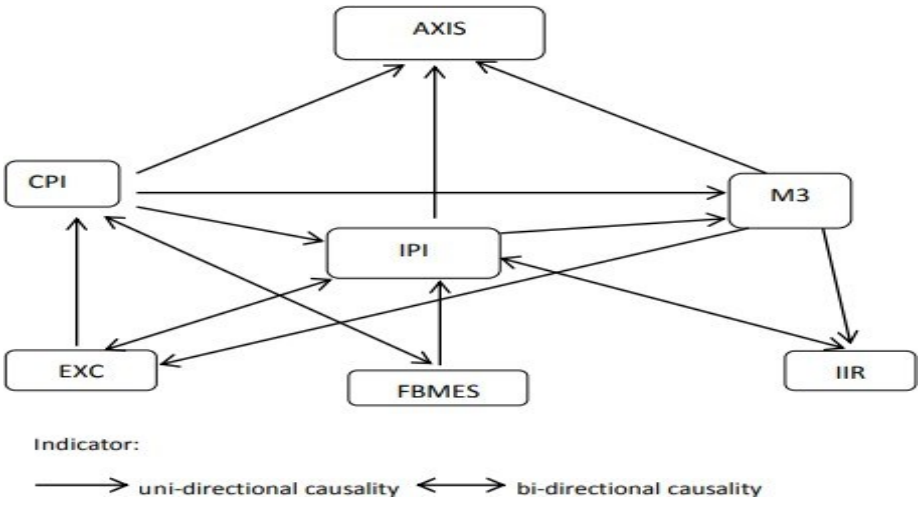
"Money is a collection of liquid assets that is generally accepted as a medium of exchange and for repayment of debt. In that role, it serves to economize on the use of scarce resources devoted to exchange, expands resources for production, facilitates trade, promotes specialization, and contributes to a society's welfare." (Singh et al., 2011, p217)

The link between money supply aggregate and real estate price has yielded ambiguous results (Hussin et al., 2017). It is thus a worthwhile exercise to investigate their relationship and determine if the correlation is negative or positive. The effect of money supply on REIT returns and price has been explored in literature (Hussin et al.,2017). A rise in money supply may lead to an increase in

corporate returns and thus increase future cash flows and the real estate (Hussin et al., 2017). Contrarily, a rise in money supply may bring about a rise in the discount rate which may lead to a fall in the price of the stock market (Hussin et al., 2017). The link between money supply and REIT returns may be negative through the correlation between money supply and inflation (Hussin et al., 2017); increase in the money supply faster than GDP growth will increase inflation and inflation and REIT returns are negative correlated.

An investigation to examine the impact of the short- and long-term dynamics between Islamic REITs and macroeconomic variables, including money supply, in Malaysia (Hussin et al., 2017). The study employed an estimation of Vector Auto Regression (VAR) model over a span of 6 years from 2007 to 2013. The research also showed that money supply to be Granger cause for the AXIS-REIT in the short term (Hussin et al., 2017). Hussin et al. (2017) displayed the Granger causality of a myriad of variables, including money supply (**M3**), in the diagram below:

Figure 2: Short term Granger Casual Relationship



Source: Hussin et al., 2017

The above diagram illustrates a definite relationship between money supply and REITs. Literature has postulated that money supply may impact real estate prices as follows (Hussin et al., 2017):

- Money supply may have a direct correlation with property share price via its effect on the economy.
- Portfolio balance model has illustrated a positive correlation as it proposes a rise in the money supply may cause a shift in the structure of the portfolio from non-interest-bearing money to financial assets;
- Money supply may impact real estate share prices negatively via its impact on inflation

A study by Rjoub et al. (2009) postulated that stock market performance is impacted by unanticipated shocks to nominal money supply; a nominal growth in money supply may cause to substantial unpredictability in inflation and may cause a detrimental result for the stock market. The nominal rise in money supply may cause investors to redirect investments towards other real assets (Rjoub et al.,2009), which may be a probable consequence for REITS and money supply. The study by (Rjoub et al.,2009) made us of the arbitrage pricing theory model (APT) to analyse data from the Turkish stock market with a sample period between January 2001 and September 2005. The investigation found a material pricing correlation linked to stock yields and a myriad of macroeconomic parameters including money supply (Rjoub et al.,2009). It found a significant impact money supply has in elucidating stock market returns (Rjoub et al.,2009).

A study by Gan et al. (2006) has shown that New Zealand stock index is determined by a number of macroeconomic parameters including money supply. The study could not find proof of changes in money supply and other macroeconomic parameters to explain the stock index. The study

employed the Granger-causality test as well as the Johansen multivariate co-integration test to elucidate the correlation linked to the New Zealand Stock Index and macroeconomic parameters between 1990 and 2003. The analysis revealed a direct relationship linked to the New Zealand stock market and interest rate, real GDP, interest rate as well as money supply (Gan et al., 2006).

Flannery and Protopapadakis (2002) investigated 17 different macroeconomic announcements on equity returns in a developed market. The GARCH model was used to analyse the sensitivity of equity returns to macroeconomic announcements. Flannery and Protopapadakis (2002) found that money aggregate was priced into equity returns. However, the unplanned money supply pronouncements had an impact on the initial and secondary moment of stock yields.

It's believed that variations in money supply have a significant influence via portfolio changes and their impact on real economy activity, which is believed to be a significant driver of stock prices (Habibullah and Baharumshah, 1996). Developing Asian markets such as Taiwan, Singapore and Singapore, the stock market is closely coupled with money supply because money supply can be a predictor of the stock market and vice versa (Habibullah and Baharumshah, 1996). Habibullah and Baharumshah (1996) embarked on the investigation to analyse the informational efficiency of stock price on the Kuala Lumpur Stock Exchange, so as to test for the efficiency markets hypothesis. The stock price indices analysed in the study were as follows: Composite, Industrial, Finance, Property, Plantation and Tin (Habibullah and Baharumshah, 1996). The research spans 5 years from 1992 to 1997. The tri-variate co-integration technique was used in the analysis of the investigation revealed that the stock price indices in Kuala Lumpur and macroeconomic variable especially money supply and national output are not co-integrated (Habibullah and Baharumshah, 1996). Changes in money supply have immediate impacts on stocks through portfolio changes and

indirectly through economic activity, which are both elementary determinants of stock prices Habibullah and Baharumshah (1996).

Habibullah and Baharumshah (1996) showed a correlation between money supply and the stock market among developed and less developed markets, namely; United States, Singapore, Japan, Korea, Australia, Malaysia, Taiwan, the Philippines, Hong Kong, New Zealand as well as Thailand, corroborates with the efficient markets hypothesis. Chia and Lim (2015) embarked on a study of the Malaysian equity market which attempted to link the equity market and a myriad of macroeconomic parameters including money supply, and whether these linkages are similar in intensity and direction with or without the presence of exchange rates and compare the results to previous similar studies. The study assessed the causalities using the autoregressive distributed lag bounds tests from 1980 to 2011 (Chia and Lim, 2015). The study found that in Malaysia the share price is positively impacted by money supply (Chia and Lim, 2015). However, the outcome from the error correction mechanism show that real share performance as elucidated by Granger model is influenced by real money growth and real interest rate growth (Chia and Lim, 2015).

Yunus (2012) who studied the securitized property market, stock markets and macroeconomic drivers in developed countries and his studies showed that co-integration amongst the variable stocks of money supply, GDP, inflation and the stock market had a direct correlation with real estate returns. The investigation examined property markets of Switzerland, the U.S, Italy, France, Japan, Germany, Canada, Australia, the U.K and Netherlands from January 1990 to December 2007. Yunus (2012) employed time-series tools to conduct the study, namely: unit root test and the cointegration tests.

Usman and Adejare (2014) studied a myriad of macroeconomic variables including money supply using data from 1970 to 2010 to determine the influence of these variables on economic activity which in turn would impact listed property performance in Nigeria. The investigation has revealed these variables have a consequential impact on the economy which was determined using a regression analysis tool Usman and Adejare (2014). Onyeiwu (2012) revealed a statistically sound and direct impact of money supply on GDP, who employed the OLS method using data from 1981 to 2008. The study focused on the effect of Nigeria's Central Bank monetary policy announcements, suchlike money supply, on GDP and invariably of real estate returns. However, Udude (2014) employed the Johansen Co-integration test and Augmented Dickey-Fuller (ADF) Unit Root Test with a vector error correction model which also revealed an insignificant impact of money supply on the economic wellbeing of Nigeria (Olanrele, 2019). Udude (2014) analysed the correlation between the Nigerian monetary policy and an economic upswing, the sample period was from 1981 to 2012. The inconclusive results from the studies above may be due to the components of the monetary tools studied.

Olanrele (2019) investigated the correlation between the Nigerian REITs and money market indicators which are made up of broad money supply and four other indicators. The study analysed the data using the vector error correction model, cointegration test and the vector aggression test with a sample period from 2008 to 2017 (Olanrele, 2019). The study deducted that there is a significant impact of the money market indicators on the REITs dividend returns, which is more significant in the short-run compared to the long-run (Olanrele, 2019).

Miao (2016) conducted a study that explored factors that influence five global real estate markets, the quantile regression model for a sample period between 2000 and 2015. According to Miao, (2016) monetary policy has a significant influence on the economy such as a rise in the money supply would positively impact the prices of assets. Furthermore, money supply has been shown to positively impact property returns in Hong Kong and Singapore in a study conducted by Miao (2016). The same study by Miao (2016) showed an insignificant link between money supply and the U.K, Australian and the U.S real estate markets. Miao (2016) found that markets that have a fixed- exchange-rate monetary policy regime (Hong Kong and Singapore) their property markets are influenced by money supply.

This may be cause by the automatic interest rate adjustment which then impacts the supply of money via the purchase of the country's currency during a pressurized time in the country's economy (Miao, 2016). Countries with an interest rate monetary policy regime are influenced by bond yields and instead of money supply (Miao, 2016).

Alatiqi and Fazel (2008) dispute the premise that money supply and stock market values have a stable causal link. Alatiqi and Fazel (2008) embarked on an empirical study to support their difference of opinion based on the Granger causality and Co-integration tests. The investigation used figures between 1965 and 2005 to argue the hypothesized idea that money supply and the stock market are linked. The evidence corroborated their argument and found no causal link from money supply to the stock returns and observed an indirect correlation between unexpected news in the increase in money supply and the stock market (Alatiqi and Fazel, 2008).

2.2.5 Oil Price Fluctuations

With recent and consistent volatility in the oil price, there has been numerous literature that has studied the influence crude oil prices exerts over the financial and stock markets (Cevik et al., 2018). A myriad of studies has investigated the effect of crude price fluctuations and their relationship with stock market returns and the performance of sector-specific stock returns (Cevik et al., 2018). It should be noted that high oil prices impact inflation forecasts which increases nominal bond yields, and in turn move bond prices. A rise in oil prices increases domestic income for an economy that exports oil, which can cause increased demand for funding and investment in the finance market, which leads to an increase in asset value and the opposite may occur for oil importers (Nazlioglu et al., 2019). Oil price variations have been shown to have significant impact on a myriad of markets, variations tend to be an indicator of a world economy that is facing difficulties (Nazlioglu et al., 2016).

Various literature has shown that oil shocks impact macroeconomic variables and equity markets (Killins et al., 2017). Killins et al. (2017) indicated that the preliminary work by Hamilton (1983) showed that movements in the oil price in the US exert an influence on the following components of the macro economy; unemployment, real gross national product, GDP deflator for non-farming income, money supply, wages, and import prices. Antonakakis et al. (2016) investigate the dynamic link between housing and oil market returns between 1859 to 2013 in the US. The data was empirically analysed using the dynamic conditional correlation (DCC) model. The empirical findings revealed that housing and oil market returns are inversely proportional, except during recessionary periods in the 19th century where the relationship was directly proportional (Antonakakis et al.,2016). Economic growth will result to positive real housing and oil returns Antonakakis et al. (2016).

Le and Chang (2015) analysed the link that may occur between oil price variations and how they have an impact on the stock market values. A myriad of investigations studied the effect oil prices may have on stock prices, however, a majority of these studies have centered around developed markets and have ignored developing and under-developed markets (Le and Chang, 2015). Secondly, many studies have concentrated on the short-term effect of oil price movements on stock prices but have neglected to study the long-term impact (Le and Chang, 2015). And lastly, current literature has not considered that there may be structural breaks which may cause variations in the correlation of these two variables in an extended period (Le and Chang, 2015). Le and Chang (2015) used a sample of three countries whose economy is greatly impacted by oil. First is Singapore which is an oil refiner, then Malaysia which exports oil and lastly Japan which is an oil importing country (Le and Chang, 2015). The study covered a period of 16 years from 1997 to 2013 and utilized the vector autoregressive technique. The study revealed no causality between oil prices and the stock market at a significance level of 5% (Le and Chang, 2015). Malaysia and Singapore showed a positive response to changes in oil prices, the Japanese market showed that the direct feedback to oil price fluctuations is not significant (Le and Chang, 2015). In the long-term the effect of oil price fluctuations was negative in the Malaysian stock market (Le and Chang, 2015).

Literature has shown that fluctuations in oil price are responsible for about 6% of the fluctuations in stock returns when they investigated 13 European countries and the U.S. but found that Norway (which exports oil) demonstrated a direct correlation between stock returns and oil price increases (Killins et al., 2017). Literature has also shown that unexpected movements in oil prices have adverse effects on the economy in both developed and undeveloped countries, more predominantly for oil importers (Nazlioglu et al., 2015).

REITs have been shown to have an impact on financial asset markets with its worldwide capitalization sitting at just over 1200 billion dollars (Nazlioglu et al., 2016). Oil price shocks and variations have also been proven to affect financial markets this relationship has spilled over to real estate market (Nazlioglu et al., 2016). There has very little investigations on the influence of oil price movements on REITs (Huang and Lee, 2009) may be the only people to have tested the correlation between REITs and shocks in oil prices. Nazlioglu et al., (2016) took the study further and investigated the relationship between oil price and REITs at a sub-sector level, namely: hotel, retail, residential, mortgage, healthcare and warehouse/industrial. The study covered a sample period from 2005 to 2013. Nazlioglu et al., (2016) stated the significance of investigating the relationship between oil price changes and REITs below:

- The knowledge will inform and assist regulators in evaluating systematic risks in the property market
- Risk management as well as hedging schemes are depended on risk transmissions reflected by volatile spill overs, thus this will help in effective portfolio diversification and hedging decisions.

Nazlioglu et al., (2016) employed a hybrid methodology to study the smooth structural shifts of oil prices which is an adaptation of the Toda and Yamamoto Granger causality procedure with an embedded Fourier approximation. Nazlioglu et al., (2016) found that oil prices affect all REIT asset classes except mortgage REITs. The association between oil price growth and real estate performance has generally centered around developed markets because data is easily available and they are some of the biggest importers of crude oil due to the major industries they house (Nazlioglu et al., 2016). Literature has deduced the following train of thought in terms of the correlation between oil prices and housing markets (Nazlioglu et al., 2016):

- House prices will drop through the recessionary effect of increasing oil prices which results in less demand for housing.
- An increase in oil price will give rise in the cost of construction and operational costs of a building that causes an increase in the prices in the house market due to a lack of supply of housing.
- Monetary policy employed to ease inflationary pressure due to oil price increases may decrease the liquidity of the housing market which will cause a decline in house prices because of the decreased demand for housing.
- Inflationary impact of oil prices may lead to an increased demand for housing which causes an increase of house prices when housing is used as hedging against inflation.
- Rises in oil prices may cause a rise in investment opportunities in the oil market which will divert investments from housing to oil which cause a fall in the demand for housing which in leads to a decline in their value.
- Monetary policy and/or economic growth may be the common drivers in the oil and housing markets.

Salisu and Gupta (2019) authored a paper on the performance of the housing market in emerging economies in response to oil price shocks. Salisu and Gupta (2019) have studied three emerging economies that also belong to BRICS, namely: China, India, and Russia. The authors analyse the impact of oil such as oil-specific supply and demand, inventory accumulation and global demand instead of just the oil price. The MIDAS methodology employed makes use of a mixed frequency strategy to analyse the impact of oil price fluctuations on the housing markets (Salisu and Gupta, 2019). A mixed frequency approach was used to accommodate the data sets, housing data in the

countries of study are released quarterly, and the data on oil shocks is released monthly (Salisu and Gupta, 2019).

The Mixed Data Sampling (MIDAS) regressions econometric tool prevents the loss of information that may have been missed if the oil shocks data were averaged out to lower the frequency to that of the housing data (Salisu and Gupta, 2019). The effect of oil price variations on housing prices is dependent on whether the oil shock occurs on the supply or demand side (Salisu and Gupta, 2019). The authors analysed the impact of house returns from both the oil supply shock and oil demand shock and the findings propose that the housing market reacts differently to different oil shock variants. It is also essential to take note that in net oil-exporting countries the housing market serve as a good hedge strategy against the risk of oil shocks, but this is not true for net oil-importing countries (Salisu and Gupta, 2019). The empirical evidence of the study indicate that housing returns suggest that housing returns behave differently to a myriad of oil shocks (Salisu and Gupta, 2019):

- In net-exporting countries housing returns are a good hedging instruments against oil price risk, however, housing returns in net oil-importing countries do not hedge against oil price risk,
- The MIDAS framework provides a better predictability tool as compared to other models like ARDL, and
- The study serves a good base for future investigations to future studies to expand the analyses to more economies that export and import oil in order to provide more evidence of this oil shock-housing returns dynamic relationship.

The unstable crude oil prices that occurred between 2003 and 2008 demonstrated the importance of crude oil prices on the economy's growth and development especially on oil importing countries (Alkali et al., 2018). It is thus important to continue to explore the effect and role oil price fluctuations have on the real estate market (Alkali et al., 2018). Killins et al. (2018) used the SVAR methodology to empirically analyse the correlation between oil shocks and house prices in Canada and the US. The SVAR investigation yielded the following results:

- The model showed that changes oil supply as well as aggregate demand shocks do not have a significant impact on house prices in Canada and the US.
- The precautionary demand for oil shows a statistically sound influence on the prices of the housing market in Canada as compared to the US, this implies that a nation's oil trading positioning (whether it is an importer or exporter) is a factor in the investigation.
- The results of the investigation have "captured the asymmetric pricing when the phase of the housing cycle is accounted for" (Killins et al., 2018, p24).

A study conducted by Bastianin et al., (2016) set out to examine and contrast the key components of the correlation between stock market temperament and oil price fluctuations in the G7 economies, namely: Germany, Canada, France, Japan, the U.S, Germany, the U.K as well as Italy. The G 7 countries were studied because these countries are strong and developed economies which generate 64% of the world's net wealth and 46% of the world's GDP (Bastianin et al., 2016). The autoregression model employed in the research was the structural autoregression model, which analysed data from February 1973 to January 2015. The countries respond in a similar manner to oil specific demand shocks but behave differently in the long term (Bastianin et al., (2016).

Khiabani. (2015) investigated the Iran housing market in an attempt establish the effect oil price movements have on the market in Iran, which is a net oil exporter. Focused on the performance of housing prices against the price of oil between 1988 and 2013. The Bayesian SVAR model was employed to identify and estimate the variables followed by the Bayesian Monte Carlo integration.

Evidence from the study revealed that a statistically sound proportion of the fluctuating housing market can be explained by oil price shocks (Khiabani, 2015).

2.3 Key Findings of the Literature Review

Literature above has revealed a significant effect of interest rates, in the long term and short term, on REITs returns; escalating short term interest rates cause positive returns and escalating long-term interest rates lead to a fall in returns Reddy and Wong (2018). Dima (2015) also showed that the reserve bank lending rate/ interest rate variations may have a significant negative correlation on bank stock returns in developing countries. It has established a relationship between money supply and real estate performance; a rise in money supply may cause an increase in corporate returns and will in turn increase future cash flows and the real estate (Hussin et al., 2017). Money supply impacts property share price via its effect on the economy or inflation. Finally, the effect the fluctuating price of crude oil has on the property market varies subject to a country's status: whether it is an oil exporter or an oil importer. A rise in oil prices increases domestic income for oil exporters which can cause increased demand for investment in the financial asset market (including bonds), which in turn causes an increase in the price of assets the opposite may occur for oil importers (Nazlioglu et al., 2019).

The above literature suggests that REITs and the property market as whole, are unable to separate their performance from extraneous forces such as economic factors, and the study of these factors in order to affect their exposure to these factors to affect their degree of market risk (Allen et al., 2000). This will be of great value for investors who operate in financial risk forecasting and developing hedging strategies environments.

3 Research Design

3.1 Research Philosophy

Due to the quantitative nature of the study, the investigation will take on a positivist philosophy because the investigation will make use of statistical models and analysis to elucidate the nature and direction of the relationship between the variables.

3.2 Research Approach

A deductive research approach was adopted in the study were also integrated. The study will be testing the established theory and will allow for generalization of the results. The quantitative models to be used will ensure the reliability and validity of the findings.

3.3 Research Methodology

A mono-method will be the employed research design, the investigation makes use of quantitative data collection and analysis techniques.

3.4 Research Strategy

The action research strategy will be employed to study the research questions. The study will be a deliberative exploration of the relationship between the selected variables.

3.5 Research Methods

ICAPM was developed by Merton (1973) analyses the impact of time-varying factors such as interest rates, money supply and oil price fluctuations on expected returns (Guesmi and Teulon, 2014). The study will make use of short-term interest rates, crude oil prices and money supply from the South African and Brazilian economies.

$$E(R_t) - \alpha = \beta_1[E(R_{mt}) - \alpha] + \beta_2[E(R_{ht}) - \alpha \quad (1)$$

where $E(R_t)$ is expected return on an asset at time t, $E(R_{mt})$ is expected return on the market portfolio at time t, $E(R_{ht})$ is the return of a REIT portfolio (Wong and Reddy, 2018) and α is risk- free rate. The following model has been used to test the ICAPM model as prescribed by Gibbons (1980:1982) which adds a changing state variable to the model (Wong and Reddy, 2018):

$$R_t = \beta_0 + \beta_1 R_{mt} + \beta_2 \Delta S_t + \varepsilon_t \quad (2)$$

where ΔS_t is the changing state variable S at time t and ε_i is error term (Wong and Reddy, 2018). The second part employs a multi linear regression model and estimation using the ordinary least squares (OLS) will be used to determine the relationship between the dependent variable (the REIT Returns) and the independent variables (macroeconomic variables):

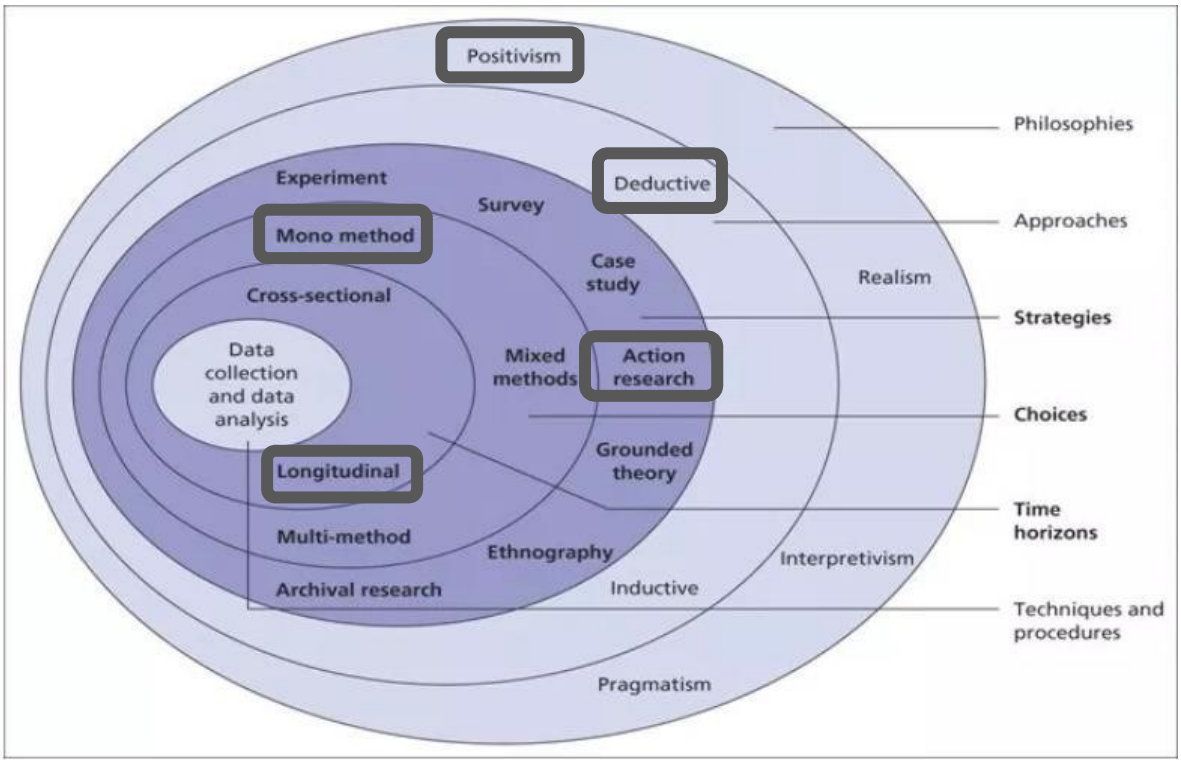
$$REIT_r = \beta_1 + \beta_{IR} + \beta_{MS} + \beta_{CO} + \varepsilon_i \quad (3)$$

where $REIT_r$ is $Dependent\ variable - REIT\ returns$, β_1 is the constant, β_{IR} is $Independent\ variable\ 1 - Interest\ Rates$, β_{MS} is $Independent\ variable\ 2 - Money\ Supply$, β_{CO} is $Independent\ variable\ 3 - Crude\ Oil\ Price$ and ε_i is the error term.

3.6 Time-horizon

A longitudinal research design was chosen which will assist to evaluate the relationship between the parameters over a period of time (Saunders et al., 2017). The research design will not be time constrained because the study will make use of published data (Saunders et al., 2017).

Figure 3: Research Onion by Saunders (Saunders et al., 2017)



Source: Saunders et al., 2007

3.7 Ethical Risks and Mitigation Strategy

It is imperative to comply with strict research ethics in order to ensure that no harm, embarrassment, or any disadvantage occurs to any subjects of the study (Saunders et al., 2007). The study will not encroach on any person(s) or organisation(s) rights. However, an ethics application will be submitted to the university.

3.8 Research Timeline

The table below depicts the planned time frame for the rest of the research study.

Table 1: Research Time Frame

Stage	Activity	Estimated Duration	Start Date	End Date	Deliverable
Research design and planning	Finalize research problem/questions	N/A	N/A	N/A	Confirmed research problem/questions
	Develop research design	N/A	N/A	N/A	Draft research design section for final report
	Prepare research proposal	N/A	N/A	N/A	Research proposal/ethical approval submission
Literature review	Search, capture and synthesize relevant literature	3 weeks, 4 days	28 August 2019	23 September 2019	Notes and other output from the review process
	Prepare draft literature review	2 days	23 September 2019	28 September 2019	Draft literature review section for final report
Data collection	Finalize sampling plan	2 days	30 September 2019	01 October 2019	Sampling plan
	Develop data collection instrument				Draft and finalized data collection instruments
	Carry out data collection	2 weeks	22 October 2019	04 November 2019	Raw data
	Write up data collection				Draft data collection section for final report
Data analysis	Prepare data for analysis	3 weeks	05 November 2019	25 November 2019	Clean data for analysis
	Analyse data				Notes and other output from analysis
	Draw conclusions/ recommendations	1 week	26 November 2019	02 December 2019	Draft data analysis and findings section final report
Writing up	Final draft of report	2 weeks, 4 days	03 December 2019	20 December 2019	Final draft
	Review draft with supervisor				Notes of feedback
	Final editing	1 week, 1 day	23 December 2019	31 December 2019	Final report
	Printing, binding, and final submission	2 days	01 January 2020	03 January 2020	Final submission of report

4 Data Analysis

4.1 OLS Regression

The following tables present the performance of the REIT markets in South Africa and Brazil against three macroeconomic variables over a period of 4 years, from 2014 to 2017. A multivariable regression was carried out to investigate this relationship. The regression analysis followed a two-step process which has been detailed below. The first step involved a univariate regression of all the macroeconomics variables, the second step was a roll-over of two variables followed by a multivariate regression of all three variables. The regression commenced with a straight-line equation of all three macroeconomic variables (equations 1 & 6, 2 & 7, 3 & 8). The second step was a regression of interest rate and money supply (equation 4 & 9). Lastly, a multivariate regression of all three macroeconomic variables (equation 5 & 10) was performed. The results are shown in the tables below.

4.1.1 South Africa

Table 2: South Africa Linear Regression Results

Model	Variable	Eq1	Eq2	Eq3	Eq4	Eq5
Regression	Constant	2.418 (0.629)	0.409 (0.646)	0.529 (0.290)	2.252 (0.673)	1.86 (0.737)
	Interest Rate	-2.8602 (0.704)			-2.7204 (0.726)	-2.2085 (0.783)
	Money Supply		0.216 (0.868)		0.130 (0.922)	0.219 (0.873)
	Crude Oil			-1.867 (0.736)		-1.754 (0.766)
	R2	0.30%	0.10%	0.20%	0.30%	0.50%
	Adjusted R2	-1.9%	-2.1%	-1.9%	-4.1%	-6.2%
	Standard Error	3.420	3.425	3.422	3.458	3.493
	t-Stat	-0.382	0.168	-0.339	-0.353	-0.277
					0.098	0.160
						-0.300

Table 2 presents the regression statistics that tested the relationship between the South African REIT index performances against three macroeconomics from 2014 to 2017. The beta coefficients illustrated a direct correlation between money supply and SA REIT returns, and an indirect correlation between SA REITs and the two other macroeconomic variables, interest rates and crude oil prices.

The study has found that money supply caused a positive effect in property returns, while interest rates recorded a negative impact on property returns. A decline interest rates lowers the cost of debt of a leveraged firm (i.e. REIT fund) which will lead to an expansion of the REIT portfolio which will increase its income thus its returns, and vice versa (Akimov and Stevenson, 2017; Olanrele et al., 2019). A rise in crude oil prices for a net-importing country increases may cause an energy price inflation which will increase the chances of a housing market downward adjustment, through an increase in household income and expenditure which lead to a decline in housing demand (income effect) (Killins et al., 2017). The results show that the model from equation 1 to 5 are not statistically significant with p-values between 0.290 and 0.922. The three-predictor model could only account for only 0.50% (R^2 = 0.50%) of the variance in the performance of SA REITS.

The standard deviation conveys how precise the model's predictions, the statistic indicates show that the data points are 3.44 from the straight line on average. The σ (standard error) must be </= 2.5 to produce a sufficiently narrow 95% prediction interval, the standard error of 3.44 tells us that the model needs to be more precise. The model has presented a t-stat much lower than 2 which corroborates the p-value that the model is not statistically significant.

4.1.2 Brazil

Table 3: Brazil Linear Regression Results

Model	Variable	Eq6	Eq7	Eq8	Eq9	Eq10
Regression	Constant	1.369 (0.538)	0.337 (0.706)	1.097 (0.006)	0.895 (0.694)	0.315 (0.888)
	Interest Rate	-2.396 (0.905)			-5.417 (0.789)	-2.157 (0.913)
	Money Supply		0.993 (0.340)		1.036 (0.330)	1.31 (0.211)
	Crude Oil			7.633 (0.088)*		8.458 (0.065)**
	R2	0.00%***	2.00%	6.20%	2.10%	9.50%
	Adjusted R2	-2.1%	-0.1%	4.20%	-2.2%	3.40%
	Standard Error	2.719	2.692	2.634	2.72	2.645
	t-Stat	-0.12	0.965	1.745	-0.269	-0.11
					0.985	1.269
						1.895

Table 3 has presented whether the individual macroeconomic parameters predict the performance of the SA REIT index from 2014 to 2017. The beta coefficients illustrate a direct relationship between Brazil REIT performance and two macroeconomic variables: money supply and crude oil prices. And there exists an inverse correlation between Brazil REITs and interest rates. The outcome demonstrates that the models for interest rate and crude oil are not statically significant with p-values between 0.211 and 0.913. Crude oil exhibits the lowest p-values at 0.088* in equation 8 and 0.065** in equation 10, which have been marked with an asterisk. Crude has shown to be the most significant variable amongst the three macroeconomic variables. The three-predictor model could only account for less than 10% (R^2 = 9.50%) of the variance in the performance of Brazilian REITS.

The standard error of the model conveys how precise the model's predictions, the statistic indicates show that the data points are 2.682 from the regression line on average. The standard error must be </= 2.5 to produce a sufficiently narrow 95% prediction interval, the standard error of 2.682

tells us that the model may be satisfactorily precise. The model has presented a t-stat lower than 2 which corroborates the p-value that the model is not statistically significant, except for equation 8 and the crude oil variable in equation 10 which have t-statistics close to 2.

4.1.3 Interest Rates

Interest rates have been shown to be an indicative macroeconomic variable that influences the financial market as well as the REITs market (Reddy and Wong, 2018). However, in this study the results show that interest rates are not an indicative variable (p = 0.704) of the SA REITs returns and only account for only (R^2 = 0.30%) of the variance in the performance of SA REITS. Furthermore, interest rates and REIT returns are negatively correlated in both the South African and Brazil markets. The same rings true for the Brazilian REITs with a statistical significance value of 0.905 (p-value = 0.905) and an R^2 value of 0.00%. REITs sensitivity to interest rates may differ as a combination of the REIT structure, financial debt structure, and the diversification of the REIT portfolio (Wong and Reddy, 2018). It should be noted that the SA and the Brazilian REIT structures are not very diversified and are mainly equity REITs, thus they will be prone to risks that the stock market is prone to.

4.1.4 Money Supply

Economic theory suggest that interest rates and money supply are closely linked and that is why a two-variate regression model was done. With respect to the correlation REIT performance may have with money supply, findings indicate an insignificant positive relationship in both the South African and Brazilian REIT markets. However, the positive relationship accounts for only

0%*** of the variance (see equation 6). Money will have a positive effect on REITs via its general impact on the economy. Secondly, a rise in money supply brings about a shift in the structure of the portfolio from non-interest-bearing vehicle to financial assets (Yunus, 2012). Miao (2016) found that property markets with an interest-rate focused monetary policy are not informed by money supply. South Africa and Brazil both employ an interest-focused monetary policy.

4.1.5 Crude Oil

The findings of the study revealed that in South Africa the REIT returns have a negative and insignificant relationship with crude oil prices. An increase/decrease in the oil price may discourage/encourage consumer spending, as an indication of expected economic shrinkage/growth which in turn decrease/increase sales volumes or a decrease/increase in leases of properties held by South African REITs. However, the Brazilian REIT returns revealed a positive relationship and its p-values (0.088* and 0.065**) were the only variables that etched close to a significant p-value. An increase/decrease in the oil price may encourage/discourage consumer spending, as an indication of expected economic growth/slump which in turn increase/decrease sales volumes or an increase/decrease in leases of properties managed by the Brazilian REIT regime. These empirical findings corroborate literature that found that the housing market net oil-exporting countries serve as a good hedge strategy against the risk of oil shocks, this will ring true in the case of the Brazilian REIT market and not the South African REIT market because South Africa is an importer of oil (Salisu and Gupta, 2019).

4.2 Intertemporal CAPM

The results from the regression analysis results were subsequently input for the ICAPM model below for South Africa and Brazil.

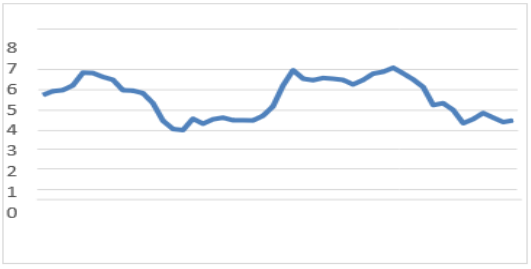
Table 4: ICAPM Results

Country	South Africa		Brazil	
Parameter	**ICAPM**	**Market return**	**ICAPM**	**Market return**
Interest Rate	1.663	0.066	1.464	0.109
Money Supply	1.664	0.570	1.463	0.776
Crude Oil	1.665	-0.002	1.461	0.001

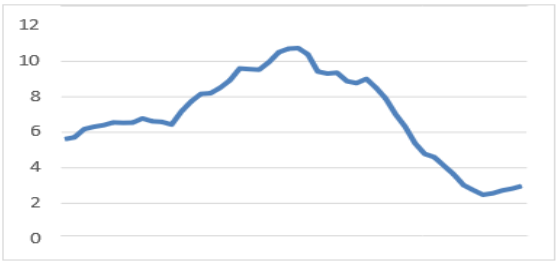
The beta coefficients from the regression analysis were inputs used in the ICAPM model. Literature purports that increasing short-term interest rates should contribute to positive returns. The ICAPM model illustrates that escalating short term interest rates should produce positive returns and is comparable to results reported by Reddy and Wong (2018). Money supply provides better market returns in Brazil compared to South Africa, however, the ICAPM model revealed better expected returns in South Africa than in Brazil. This may be due to the fact that South Africa has a more stable economy compared to Brazil, which is demonstrated by the CPI-inflation rate depicted in the figure below. South African has between stable in the 4 to 7% band, Brazil has been slightly erratic between the 2 and 10.5% band.

Figure 4: SA and Brazil CPI-Inflation (2014 to 2017)

SA CPI-Inflation Rate

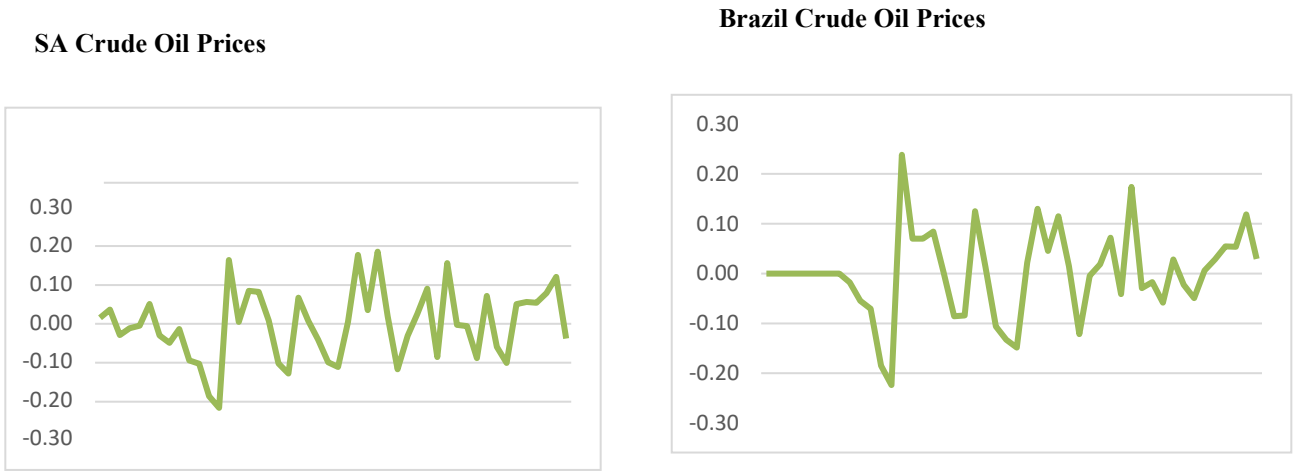


Brazil CPI-Inflation Rate



Source: Author (Data from OECD)

Figure 5: SA and Brazil Crude Oil Prices (2014 to 2017)



Source: Author (Data from OECD)

Figure 4 illustrates the volatility of the crude oil prices in the South African and Brazilian Markets. Despite the volatile nature of these markets, according to the ICAPM model, they should produce positive REIT returns for both South Africa and Brazil. The study on crude oil prices should be investigated over a longer period to establish whether the overall crude oil price trend is positive or negative in order to attain a definitive link between crude oil prices and REIT performance in South Africa and Brazil.

5 Conclusions, Recommendations and Further Work

5.1 Overall Conclusion

This study investigated the impact and correlation between macroeconomic parameters and REIT performance in South Africa and Brazil between 2014 to 2017. The study focused on the following three macroeconomic variables: interest rates, crude oil prices and money supply. The study investigates two of the REIT structures within the BRICS constituent. Results of the investigation revealed an insignificant indirect correlation between interest rates and REIT returns in both South Africa and Brazil, an insignificant positive correlation between money supply and REIT returns in South Africa and Brazil. South African REIT returns showed an inverse relationship with crude oil prices, however, the Brazilian REIT returns showed a more significant direct relationship with crude oil prices. The findings of the study support literature in terms of the impact of macroeconomic parameter on REIT performance.

5.2 Hypothesis Findings

Hypothesis one, two and three were tested through literature and data analysis. Both literature and data analysis produced the same findings. On the analysis side, the hypotheses were exemplified by OLS regression and ICAPM techniques. The findings on hypothesis one are consistent with most prior studies by Yunus (2012); Akimov and Stevenson (2017) and Olanrele et al., (2019), showed that interest rates have a negative relationship with property returns. Similarly, findings by Yunus (2012) and Rjoub et al., (2009) which showed how money supply has a positive correlation with real estate performance were corroborated in this paper. Findings on the third hypothesis was consistent

with prior and similar studies by Antonakakis et al., (2016), Killins et al., (2017) and Nazlioglu et al. (2016) which purport that there is an inverse relationship between crude oil prices and the real estate market in countries that net-import oil and that the relationship is positive in countries that net oil-export oil.

5.3 Contribution of study

The above research will contribute to literature in academia as well as inform the investment decisions of investors and regulators.

5.3.1 Academia

The investigation outlined above seeks to add valuable empirical knowledge to the existing literature in academia on the effect macroeconomic parameters have on REIT performance in the BRICS cohort. The study also opens the opportunity to further perform comparative research between the more established REIT(s) such as a South with younger REIT(s) such as India. This knowledge will be useful for policy makers and regulators in informing monetary policy decisions, monitor the stability of the markets in BRICS economies and, evaluate and forecast financial risks that may present in the REIT markets.

5.3.2 Industry

Investors and players in industry may use the study to inform their arbitrage and hedging strategies in the BRICS markets to maximise their returns. The behaviour displayed by the macroeconomic variables in the study will inform risk management strategies, the results show that REIT returns can be forecasted using macroeconomic variables: industry should invest in REITs that can hedge against the impact of fluctuating crude oil prices in South Africa and invest in the REITs market when there is an increase in the supply of money in Brazil. It will inform investors when it would be best to direct funds into the REITs of the respective BRICS countries during the business cycle.

5.4 Recommendations

Developing markets exist in volatile economic environments and the effects of this volatility affect a broad spectrum of sub-markets. The REIT market has proven itself to be an appealing investment vehicle in the real estate space both locally and globally due to its high potential for growth. Following the findings of this study, it is recommended that:

- Portfolio managers and investors should be cautious to fluctuations in these variables because they may amplify the volatility of REITs returns.
- Diversify into portfolios with foreign REIT funds that hedge the negative effects of unfavourable macroeconomic risks.
- The findings of the study have shown that the different BRICS REIT markets react differently to the various macroeconomic variables, asset managers should explore the BRICS REIT markets for better diversification of their portfolio's
- Both the South African and Brazil Markets are influenced the most by money supply, asset managers should consider hedging strategies against volatile monetary policy in the emerging markets.

Asset managers will price REITs more effectively due to the cyclical/economical nature of REIT thus managing risks better and maximising REIT performance.

5.5 Further Work

It is suggested that the following study be replicated over a longer period of time, such as ten years, which would be similar to studies in developed markets. The effects of short-term and long- term interest rates, construction index, consumption risk and GDP have been investigated at length in more mature REIT markets such as the American and Australian markets, but have not been thoroughly interrogated in South Africa or Brazil. Given that the above study investigated South Africa and Brazil, this study could be extended to the three remaining BRICS countries, namely: Russia, India, and China. A further study may investigate the performance of different asset classes or the different property funds perform against the changing macroeconomic variables to study/observe how the funds/asset classes respond to the macroeconomic shocks. Both the South African and Brazil Markets are influenced the most by money supply, further research on the impact monetary policy has on the supply, demand, and eventual REIT performance. The study may be replicated but make use of a different analysis tool; use of thee ARDL bounds test which will also test if a cointegration equilibrium exists between the REIT returns and the macroeconomic variables. It is suggested that the following study be replicated, and a second measure of performance will be added. Dividend yield will be the second measure of performance alongside returns where correlation of the two measures may be tested for correlation.

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