Research Report

MSc (Property Development and Management)

Determinants of Listed Property Stock Performance in South Africa

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science (Building).

Johannesburg, 2017

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DECLARATION

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Science (Building) in Property Development and Management to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

Signature of Candidate Date: 29 May 2017

ABSTRACT

Despite the perceived superior performance of the South African listed property market and, even so, the recent introduction of Real Estate Investment Trust legislation to increase its global competitiveness, limited research exists on the market. This report thus examines the drivers of listed property performance from an economic and firm-specific perspective as well as providing an overview of the South African listed property market. The results of the study suggest that investors particularly earn a premium for holding stock with a low ratio of book-to-market value of equity. This study advances the knowledge of the South African listed property market, and further provides investors and fund managers alike with insight on the performance of listed property stock.

ACKNOWLEDGEMENTS

I would like to thank God for giving me the strength and motivation to complete this report.

I am grateful for everyone who assisted me in completing this research: to my supervisor Dr O. Akinsomi, for his comments, guidance and patience throughout the process.

To Dr K. Cheruiyot and E. Langram for the feedback during what seemed like the most difficult part. To the friends and family who have motivated me to stay up for just one more hour, one more page and just a few sentences; especially Kopano Ramoloto, Boipelo Patrick and most importantly my mother Mrs B.C Kentshwang.

And to my superman: my husband Lionel who has seen me through the tears, the failed alarms, the unsaved work, and the long, long breaks - the everything! I could probably write a whole book but I am immensely grateful. To my little guy, Reagile, for giving me the background music to every page I wrote.

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1. CHAPTER ONE: INTRODUCTION

This chapter provides the background to the research; it therefore entails a discussion on the problem statement, the research objectives as well as the significance of the report. Consideration is given to the limitation of the research and the assumptions that have been made. At the end of the chapter, an outline of the report is also provided.

1.1. Introduction

The South African listed property market[1] dates back as far as 1969 when the first property unit trust, Prima Property Trust was first listed (SA REIT[2], n.d). A separate sector for the property market was established on the Johannesburg Stock Exchange in 1976, and by 1980 there were 18 listed property unit stocks on the market (Delport, 2012). Growth Point Properties was one of the first property loan stock companies to be listed on the Johannesburg Stock Exchange in 1987 followed by several others such as Hyprop Investment. Over the following years there were mergers and consolidation of the existing entities that allowed both the property unit trusts and the loan stocks to increase their liquidity (Delport, 2012). The market has grown significantly over the years, with the last ten years seeing the listed property market outperforming the equities, cash and bonds markets thus making it more lucrative for investors (SA REIT, n.d). Investors enjoy the benefits of investing in property without any of the drawbacks associated with the underlying immovable assets such as the requirement for a high initial capital outlay, intensive management and the illiquid and bulky nature of the physical asset amongst other things (Lee, 2010).

As of January 31st 2016, the South African listed property market had a combined market capitalisation of over R463 Billion (U.S. $28 billion), and an average historic yield of 7.33% (Duncan *et al*., 2015). Growth Point Properties had the largest market capitalization at R 62.2 billion (U.S. $3.86 billion), translating to a market share of approximately 14% whilst

[1] By Listed property the author refers to any property stock (Property Unit stock, Property Loan stock or Real Estate Investment Trust admitted into trading privileges on the main Johannesburg Stock Exchange.
[2] South African Real Estate Investment Trust Association

Hospitality B had the smallest market share of 0.08% at a market capitalization value of R389 million (U.S. 29.1 million). New Europe Prop (valued at R 51.1 billion (U.S. $3.17 billion)), Redefine Properties (valued at R 46 billion (U.S. $2.86 billion)), Resilient (valued at R 45.4 billion (U.S. $2.81 billion)) and Fortress-B(valued at R 34 billion (U.S. $2.10 billion)) were also amongst the top five listed property companies (Duncan *et al.,* 2015). As recently as November 2015, Stor-Age, a property fund owner of self-storage assets, listed on the Johannesburg Stock Exchange with a portfolio of more than R 1 billion (Mahlaka, 2015).

Research by Stanlib and Afrifocus showed that in 2014, as much as 48.9% of the South African property investment was in the retail sector, 31.9% in the office sector, 14.9% in the industrial sector, 1.6% in the residential market and 2.7% in other markets (Ndlovu, 2015). There is also a growing tendency for property companies to invest outside of South Africa especially given the recent lacklustre economic performance in South Africa (Ledwaba, 2015). Interestingly, Akinsomi *et al.* (2015), in their study, identify economic uncertainty, legal and title risk, corruption and political factors as some of the factors hindering real estate investment of South African companies into other African countries. Consequently, property investors are more likely to venture out into countries with better risk/reward profiles, economic stability, higher growth rate, investor friendly policies and with a business environment similar to South Africa (Akinsomi *et al*., 2015).

Until recently, South African investors only had two listed property entities available: the property unit trusts (PUT) and property loan stocks (PLS). Both of which, provided investors exposure to the indirect property market (Boshoff and Bredell, 2013). The authors though, highlighted a number of inherent structural differences between these entities: differences in governing acts, gearing limits and tax dispensation which created confusion amongst investors. The Real Estate Investment Trust (REIT) vehicle was introduced in 2013 to create a more level playing field for investors, and to align the listed property market with the international market and make it more competitive. Since 2013, a number of PUT and PLS have converted to the REIT structure whilst some have remained unchanged perhaps owing to the REIT listing requirements - the companies, amongst other requirements, need to have property with a net worth of at least R300 million, have a debt below 60% of its total assets, and 75% of the income must be distributed to its shareholders (SA REIT, n.d).

The South African REIT market, although still at infancy stage, is ranked ninth in the world (EPRA[3] 2015). According to the FTSE EPRA/NAREIT Emerging Index factsheet as of January 2016, South Africa was ranked second out of 22 emerging markets in the world – one of the only 3 African countries included in the index. The total listed real estate market was valued at U.S. $ 25.5 billion, representing 39.65% of the total stock market in South Africa (EPRA, 2016). In comparison, China, ranked first, was valued at U.S. $ 286.90 representing 4 percent of its total stock market whilst the two other African countries Egypt and Morocco were valued at U.S. $ 6.48 and U.S. $ 1.30 billion respectively. The United States of America was ranked number one globally, with more than 409 recognised REITs valued at U.S. $ 913.45 billion (EPRA, 2016). Evidently, the South African listed real estate market has a significant economic value both locally and internationally.

1.2. Background

The superior performance of listed property stock in relation to other assets as reported in South Africa has not been uniformly evidenced across all other markets. In the US, data on the performance of listed property market has been divided; Sagalyn (1990) found that listed property stock more specifically REITs consistently performed better than the general stock index from the early seventies into the late eighties. Conversely, findings from researchers such as Titman and Warga (1986), Han and Liang (1995), and Chen and Peiser (1999) supported the inferior performance of the listed property market in relation to the stock market. In Asian markets studies, such as Liow (1997), Newell *et al.* (2002) and Newell and Kamineni (2007) also found that, in general, listed property stock performed poorly in comparison to general stock. Notably, Wing *et al*. (2010)'s study over the period 2005 to 2008 for Hong Kong provided contradictory results, confirming that the risk adjusted performance of listed property stock was better than that of both general stock and direct property for the entire period. Even more significant was the enhanced superior performance against stock during the global financial crisis for the latter year of 2008. In contrast, Malaysian REITs did not perform better than stock before and during the global financial crisis period. Infact, listed property stock in Malaysia exhibited negative returns during the entire financial crisis period (San Ong *et al.*, 2012).

[3] European Public Real Estate Association

Abdul-Rasheed *et al*. (2008)'s investigative study on real estate stock performance in Nigeria using real estate stock (and 6 other stocks from different markets along with the All Share Index), found that real estate security performed better than all other stocks including the All Share Index on a nominal basis, but underperformed only the All Share Index on a risk adjusted basis. It was further evidenced that real estate stock, although lowly, correlated with general stock only provided a partial hedge against inflation. It is important to note that the inclusion of only one real estate stock and the time period of 6 years could limit the results of this study being indicative of the market as a whole. Following that, Dauda and Aro-Gordon (2014) replicated this study over a longer period of twelve years and found contrary results with real estate stock exhibiting superior performance both on a nominal and risk adjusted basis and also providing good inflation hedging properties. Brounen and de Koning (2012)'study of 50 years of the REIT industry globally indicates that overall, REITs as a listed property stock have thrived more in European markets than any market in the world. In particular, French REITs not only surpassed general stock but also contributed more to a mixed asset portfolio (Newell *et al*., 2013).

In evaluating the performance of different asset classes, the Capital Asset Pricing Model (CAPM) has been largely regarded as an efficient tool for evaluating capital market behaviour. The theory first developed by Sharpe, (1964) suggests that there is a positive linear relationship between a stock's return and risk. Risk is decomposed into two types of risk: systematic risk which represents market risks which all securities are exposed due to uncertainties in the economic climate, whilst unsystematic risk represents risks that are inherent in the asset itself. In line with portfolio theory, unsystematic risks can be diversified away by holding many assets whose sensitivity will differ and hence offset each other. Since the unsystematic risks can be diversified away, the sensitivity of a security to the systematic risk is the only relevant factor in assessing risk. The price of a security will adjust until there is a linear relationship between its sensitivity to market risk and its return. Widely regarded as an asset pricing model, the CAPM assumes systematic (or market risk) as the only return-generating factor. This assumption regarding market risk and return consequently placed constraints on the investor's ability to earn superior returns.

With the belief that the market is not the only return generating factor, Fama and French (1992) undertook a cross sectional study of general stock and found a weak if not non-existent relationship between market beta and return over a 50-year study period. In fact, they found that the two most significant factors in the explaining returns where size and the book-to-market equity ratio. The combination of the two factors was found to subsume the significance of the two other factors, leverage and earnings-to-price ratio which were found to be significant in cross sectional returns by prior studies. The size of the firm, which is taken as the logarithm of firm's market capitalization, was found to have a negative and significant influence on return, hence asserting what has been largely regarded as a small firm effect. The small firm effect refers to the notion that smaller firms tend to generally perform better than bigger firms. Noted as the stronger factor in explaining stock returns, the book-to-market equity ratio was found to have a significant positive impact on stock return.

Perhaps driven by the combination of the prior empirical evidence on the performance differences between general stock and listed property as well as the influential work of Fama and French (1992), several more researchers have concentrated their studies on specifically identifying the performance drivers of listed property stock. Chui *et al.* (2003) undertook a study to identify the cross-sectional determinants of REITs performance in the US from 1984 to 2000 and found that pre-1990, REIT returns were primarily driven by momentum, size, and turnover and analyst coverage. Momentum effect refers to the phenomenon that asserts that a stock's return is likely to follow a trend, therefore if a stock has previously done well in the past it is expected to do well in the future (Chui *et al.*, 2003). Larger REITs contrary to Fama and French (1992) were seen to outperform smaller REITs, whilst REITs with a high turnover underperformed those with a low turnover. The authors further found a positive relationship between returns and both analyst coverage and a high book-to-market ratio. Post 1990, only the momentum effect and turnover were significantly related to returns. Given its significance, the authors further investigated the impact of firm-specific characteristics on momentum, and found it to be intensified in larger stocks, stocks with lower analyst coverage, and those with a lower book-to-market ratio.

In general, the majority of studies on determinants of listed property returns can be defined into four main categories: firm-specific characteristics, macro-economic factors,

diversification strategies and management strategies. Of course, noting that most of these studies were undertaken in the US markets where the REIT market dates as far back as 1960's (Brounen and de Koning, 2012).

Size, book-to-market ratio, leverage and earnings to price ratio are some of the more dominant firm-specific characteristics. In contrast to Chui *et al*. (2003)'s study of US markets which found the book-to-market ratio to be insignificant post 1990, Ooi and Liow (2004) observed a high ratio of book-to-market value of equity in Asian markets on average, 1.1 in Singapore and 2 in Hong Kong both of which were positively correlated to return. Pham (2010) also observed this positive relationship between return and book-to-market value of equity ratio and further asserts that it is more prominent in REIT than in general stock in Asian markets. Similar results were also reported in Australian markets, with investors placing a premium on stock with a high ratio of book to market value of equity.

In US markets, studies have found contradictory evidence on the impact of size on returns. Mcintosh et *al. (*1991*),* Chen *et al*. (1998), Chen and Peiser (1999), Cheng and Roulac (2007) amongst others, evidenced the small firm effect. On the contrary, Goebel *et al.* (2012) and Ambrose *et al. (*2005) found that large firms tend to outperform smaller firms. What has been consistent across studies, however, is the evidence that the influence of the size effect changes over time and as the markets undergo a structural change; with studies such as Chui *et al.* (2003), Goebel *et al.* (2012) finding the diminished effect of size on returns post 1990. Goebel *et al.* (2012)also suggests that the size effect is only significant during periods of restrictive monetary policies. This diminishing effect of size, although negative, is also observed in Australian markets Yong *et al.* (2009), whereas Asian markets attach a value to large listed property stock (Mohamad *et al*.,2014 and Ali (2006). Olanrele (2014) using one case study as a representative of the Nigerian listed property market also found evidence of the superior performance of large REITs.

Cheng and Roulac (2007)'s study of US REIT portfolios revealed that contrary to common belief about the risk return profile, the portfolio of REITs regarded as winners consistently have lower risk and higher return. These winners further exhibit the following characteristics:

low volatilities in return and earnings, lower financial leverage, higher profitability, higher earnings-to-price ratios and they trade below book value.

McCue and Kling (1994) found that more than 60% of the change in listed property return in the US was explained by macroeconomic factors with shocks in interest rate as a dominant factor, being negatively related to return. The study was replicated by Brooks and Tsolacos (1999) in the UK, and the results were not as definitive with the authors suggesting that perhaps property related factors such as capitalization rates, property yield, etc. would have more explanatory power as proxy for the economic climate. A follow up study by Leone (2011) thus found that both rental growth and yield were positively correlated to return after the introduction of the REIT legislation in the UK.

The majority of Asian studies on macroeconomic factors have either concentrated their effort on the impact of the global financial crisis (Newell *et al.*, 2009; Wing *et al.*, 2010, amongst others) whilst others have merely looked the performance of listed property relative to general stock (Pham, 2011; San Ong *et al.*, 2012). The studies found that overall the global financial crisis had a significant negative impact on return whilst the performance of the general stock market was positively correlated to listed property returns. Interestingly, Ooi and Liow (2004) and Pham (2010) reported contrasting results on the impact of interest rates on Asian listed property returns - the earlier study reported a negative relationship whilst Pham recorded a positive relationship with both absolute and risk adjusted returns.

Other reported macroeconomic factors include employment which was evidenced to be positively correlated to returns in the US market (McIntosh *et al.*, 1991) although, as noted by West and Worthington (2006), this influence was only observed in particular industries such as construction and water and gas in Australian markets.

Hoskins *et al. (2004)*'s study looked into the influence of macroeconomic factors in property in the US, Australia, the UK and Canada from 1985 to 1999 and revealed that the influence of factors varies both in factor and magnitude amongst the four countries. For instance, whilst

there was a progressively weaker relationship between GDP and property returns in the US, Canada and UK, GDP had a strengthening relationship with returns in Australia. Furthermore, the study revealed a negative relationship between inflation and property returns in all countries bar the UK, where the relationship is seen to decline to insignificant levels.

Ro and Ziobrowski (2009) also examined whether specialization has any impact on the performance of US REIT returns. Their study revealed that specialized REITs, albeit with a higher market risk, do not perform better than diversified REITs. The performance, though, was not statistically significant. Ooi and Liow (2004) also observed this superior performance of focused REITs in seven developing Asian countries. An earlier study by Chen *et al*. (1999) in contrast, found that diversified REITs were more volatile and underperformed specialised REITs in the US. Benefield *et al*. (2009) suggest that the performance difference is determined by overall market conditions; with diversified REITs exhibiting superior performance when overall market conditions are favourable. Markedly, Redman and Manakyan (1995) had previously observed that in the US markets, investment in properties in the Western US, health care properties, and securitized mortgages positively impacted performance. Newell and Kamineni (2007) observed that New Delhi retail stocks, Mumbai residential stocks, and New Delhi office stocks performed better than other real estate stocks in India. Both Redman and Manakyan (1995) and Newell and Kamineni thus allude to the significance of geographical as well as sector diversification in the performance of listed property return.

Ooi and Liow (2004) noted that the exposure to property asset structure as well the exposure to property development companies (which is seen as a high-risk investment) in Asian markets had no significant impact on property returns. Hamelink and Hoesli (2004), in their study, observed that the ratio of book-to-market was more significant when diversification occurs across continents rather than just countries. Furthermore, since diversification in other countries requires active currency risk management, the influence of unexpected changes to exchanges will have a significant impact on returns.

Goebel *et al*. (2012) observed that in US markets, REITs with low institutional ownership tended to perform better than those with high institutional ownership although this difference was only observed during expansive periods. Alias and Soi Tho (2012), in their study of performance differences between Malaysian and UK REITs, established that the externally managed Malaysian REITs performed better than the internally managed REITs of the UK. Contrasting the two management strategies in the US, Ambrose and Linneman (2001) observed that owing to higher financial expenses, externally advised REITs underperformed internally advised REITs, however, this was only prevalent from 1985 to 1992. Brockman *et al.* (2014) confirmed these results and further noted that internally advised REIT tend to be larger measured either by total assets or market value of equity, have lower interest on debt, lower leverage and sell at higher market to book value ratio and have a high institutional ownership. Interestingly it was also evidenced that there was a significant decline in externally managed REITs largely driven by the rise in the preference to internal management. The performance difference was such insignificant post the identified periods due to a surge in institutional ownership.

Despite the significant economic value and ongoing developments in the listed property market, the research into the nature and performance of the listed property market in South Africa has lagged behind. Much of the South African studies have concentrated their efforts on general stock. Van Rensburg (1995, 1996, 2000, 2003a and 2003b) amongst others, has made extensive research on the impact of both firm-specific and macroeconomic factors on the general Johannesburg Stock Exchange market. The study by Van Rensburg (1995) estimated the linear relationship between share prices on the JSE and a set of defined macroeconomic variables and found the unexpected movement in the gold price and the Dow Jones to have a positive correlation with returns whilst the unexpected inflation and unexpected term structure of interest were negatively correlated with returns. In a later study employing vector autoregressive methods and using two residual market factors, Van Rensburg (2000) found that over and above the previously identified factors, the rate on long bonds was negatively correlated with the returns, the All Gold and Residual market factors were priced and positively associated with returns in the JSE. In an attempt to find a structural model for the JSE return, Moolman and Du Toit (2005), using cointegration models (long term relationships) and error correction models (short term relationships) found that in

the short term, there is a positive correlation between the returns of other markets (S and P 500) and the return in the South African market possibly due to the contagion effect.

Van Rensburg and Robertson (2003a and 2003b) examined several firm attributes in order to identify the style based attributes of the JSE. On a univariate analysis, return was found to be significantly correlated to price to net asset value (-), dividend yield (+), price-to-earnings (-), cashflow-to-price (+) and price to profit (-). The small firm effect, where smaller firms were seen to have higher return was also supported by the study. Unlike previous international studies, Van Rensburg and Robertson (2003b) found that whilst associated with higher returns, smaller firms had lower betas and thus presented less risky investment opportunities. The multifactor analysis was thus only supported by two factors: namely, size and price-to-earnings ratio which were evidenced two be independent of each other. Extending on this work Auret and Sinclair (2006) further tested these variables with a particular focus on whether the inclusion of the book-to-market ratio improved the explanatory power of the 2-factor model proposed by Van Rensburg and Robertson (2003a and 2003b). Although variables such as cashflow-to-price and the book-to-market had greater explanatory power in a univariate analysis, the multi collinearity existing between variables diminished the explanatory power of a multifactor model. Auret and Sinclair (2006) further found that not only was the book-to-market ratio a better indicator of the value premium than price-to-earnings, it subsumed the size and price-to-earnings effect in the multiple regression analysis. Regardless, the multiple regression analysis revealed that none of the variables were seen to be significant at a 5% level, however, at a 10% significance level only the cashflow-to-price factor was significant. Auret and Sinclair (2006) highlight that the high correlation between variables is not surprising when one considers the similarities in the given ratios used in their calculations.

In comparison, the limited studies into the South African property have not been as focused on understanding the performance determinants. Olaleye (2011) investigated the performance of asset classes including real estate over the 1999 to 2009 period and assessed whether the inclusion of real estate in a South African mixed asset portfolio had any benefits. The author found that real estate stock had a high positive correlation to the All Share Index and also outperformed all other asset classes including the All Bond index as well as the T- Bill. The

study also found that the inclusion of real estate stock had diversification as well as return enhancing benefits in a mixed asset portfolio. Akinsomi *et al*. 's (2016) study, on the other hand, found that South African companies that were Broad-Based Black Economic Empowerment (BBBEE) compliant performed better than those that were not compliant. The BBBEE policy was introduced by the government to address the inequalities of the previous government and hence distribute wealth and economic power to previously disadvantaged communities (The Department of Trade and Industry (DTI, 2003).

Given the extensive distinct research on the international performance drivers of listed property stock as well as the research on South African general stock, it can be strongly concluded that it is imperative to be able to identify the performance drivers of any stock. Even so the literature on the South African general stock market departs from the listed property market, highlighting a need for a listed property market focused study. The continued growth as well as the consistent superior performance of the South African listed property market which has also been proven empirically, provides a further motivation for the divergent study in the determinant of returns. By gaining an understanding of what drives listed stock, fund managers and investors alike are able to make informed decision on the appraisal of listed stock to select, manage and dispose of stock so as to maximise their return, as is the aim of any investor.

1.3. Problem statement

Property investors and fund managers aim to maximise their wealth by achieving consistent optimal returns on their investment. Investors thus need to be able to have an understanding of the performance drivers of their assets in order to make informed decisions about security selection, management and disposal. As yet, consensus is yet to be reached regarding the performance drivers of listed property returns and even so little, if any, research has been done in the South African context.

1.4. Research Questions

The following question is addressed:

1. What are the significant drivers of listed property stock returns in South Africa?

1.5. Research objectives

The following research objectives are met;

1. To give an overview of the listed property market in South Africa
2. To identify the drivers of listed property stock returns in South Africa at a firm and macroeconomic level.

1.6. Justification of the study

The findings of the research are important from both an academic and practical point of view. The research advances understanding of the performance dynamic of listed property stock market in relation to accepted literature and provide a basis to carry out further research. For investors and fund managers who are actively involved in their investments this information will enable them to form more efficient portfolios by selecting firms whose attributes are more correlated to returns. Listed property stock can thus be constantly appraised based on the changing economic and firm-specific characteristics to optimise returns.

1.7. Delineation

The research only focuses on property stock for PUT, PLS and REIT companies that have been listed on the Johannesburg Stock and whose data is available on the InetBFA Expert database for a period of more than two years from 2004 to 2015. Stocks for listed holding, development and service property companies have been specifically excluded from this research.

However, the research does not differentiate between the different categories of listing (PUT, PLS and REIT) for companies neither does it differentiate between those companies that converted to the REIT structure.

1.8. Limitation

The following limitation of the research is noted:

Three of the 5 financial variables are only available on an annual basis, their calculations are derived from audited financial basis which are only released yearly. To avoid having to interpolate this data to smaller frequencies and introducing misspecification in the model, all other variables were collected on an annual basis. The use of annual data, however, results in only 187 observations, which not only reduces the efficacy of the model but also precludes the use of portfolios.

1.9. Assumptions

The research is based on the following assumption:

As most of the international studies have been based largely on the REIT market, this research assumes that the findings also apply to listed property stock in general. The majority of the South African REIT have been formed due to PUT and PLS adapting the REIT structure. West and Worthington (2006), Ooi and Liow (2004) amongst others, also apply the findings on the REIT structure to listed property stock in general.

1.10. Outline of the study

The research report is structured as follows:

Chapter 1 (Introduction) provides the background and purpose of the research including an outline of the objectives, limitation and assumption. The justification of the research is also elaborated upon.

Chapter 2 (Literature Review) gives an overview of the listed property market in South Africa and also provides a critical appraisal of scholarly journals, books, articles, theses, websites and papers on the drivers of returns of listed property stock

Chapter 3 (Methodology) provide an explanation of the type of data collected, the collection process and the methodology used to analyse the data and, subsequently, any ethical consideration that may have risen in the process.

Chapter 4 (Data Presentation and Analysis) presents analysis and discussion of the findings and ultimately answers the questions posed in the research.

Chapter 5 (Conclusion) based on the findings and conclusions, recommendations are made and any gaps in the literature are identified for further research.

2. CHAPTER 2: LITERATURE REVIEW

The literature review aims to provide both the theoretical and empirical overview of listed property stock performance, in order to provide a framework and better understanding of performance drivers in the South African context. It includes first an overview of the South African property market, a review of the theoretical underpinning of asset performance before examining the empirical evidence in the different markets.

2.1. Benefits of listed Property

Direct property presents a predictable asset class with inflation hedging abilities (Brounen and Eichholtz, 2003). Ciochetti *et al*. (2002) argue that investing in direct property as an asset class has several problems; high transactional costs associated with the purchase of the assets, intensive and costly management and periodic maintenance of the asset. Francis and Ibbotson (2009) further add that real property is a highly illiquid asset owing to its heterogeneity. In addition, direct real estate markets have largely lacked transparency which have contributed to their increased transactional costs. Indirect property investment, therefore, offers investors exposure to direct property markets without some of the problems of liquidity, high transactional costs and intensive management (Higgins and Ng, 2009).

The Johannesburg Stock Exchange (2010) further lists the following benefits of investing in listed property markets;

- Investment in a diversified property portfolio that is expertly managed.
- The investment vehicles are exempt from tax allowing the companies to distribute most of their income before being taxed.
- Exposure to a regular income stream
- Investment vehicles are well regulated.
- Prices are determined by transparent market forces

2.2. Overview of the South African Listed Property Market

Before the introduction of Real Estate Investment Trust in 2013, South Africa had two property investment entities; namely, Property Unit Trusts and Property Loan Stocks.The following paragraphs highlight some of the features of the current investment vehicles in South Africa.

Property Unit Trust

According to the Collective Investment Schemes Control Act No. 45 of 2002 Section 47 a Collective Investment Scheme in Property (CISP) or more commonly, a Property Unit Trust is defined as follows;

(1) In this Part, unless the context indicates otherwise, "collective investment scheme in property" includes a scheme the portfolio of which consists of property shares, immovable property, assets determined under subsection (2) or any investment permitted under section 49. "Fixed property company" means a company all the issued shares of which are included in a portfolio, and the principal business of which consists in the acquisition and holding of (a) urban immovable property or any undivided share or interest therein or (b) such other immovable property or any undivided share or interest therein or "property shares" means shares in and of- (a) a fixed property company; or (b) a holding company which has no subsidiaries other than fixed property companies which are wholly owned subsidiaries as referred to in section l(5) of the Companies Act, 1973[5] (Act No. 61 of 1973); and

(2) The registrar may, for the purposes of this Part, determine assets other than those referred to in the definition of "collective investment scheme in property" which may be included in a portfolio of a collective investment scheme in property.

[5] This Act has now been replaced by the Companies Act 71 of 2008 which came into effect in May 2011.

Regulatory Framework

The CISP are governed by both the Collective Investment Schemes Control Act No. 45 of 2002 (CISCA) and by virtue of being listed, the Johannesburg Stock Exchange regulations.

Ownership and Management

The CISP or PUT is collectively owned by smaller investors who each have a share in the portfolio based on their contribution (National Treasury, 2007). As per the Collective Investment Schemes Control Act No. 45 of 2002, only an external company and or persons registered under the act is allowed to manage the assets and decide on the investment strategy of a CISP (National Treasury, 2007). The diagram below adapted from Fourie (2009) presents the possible corporate structure of a CISP.

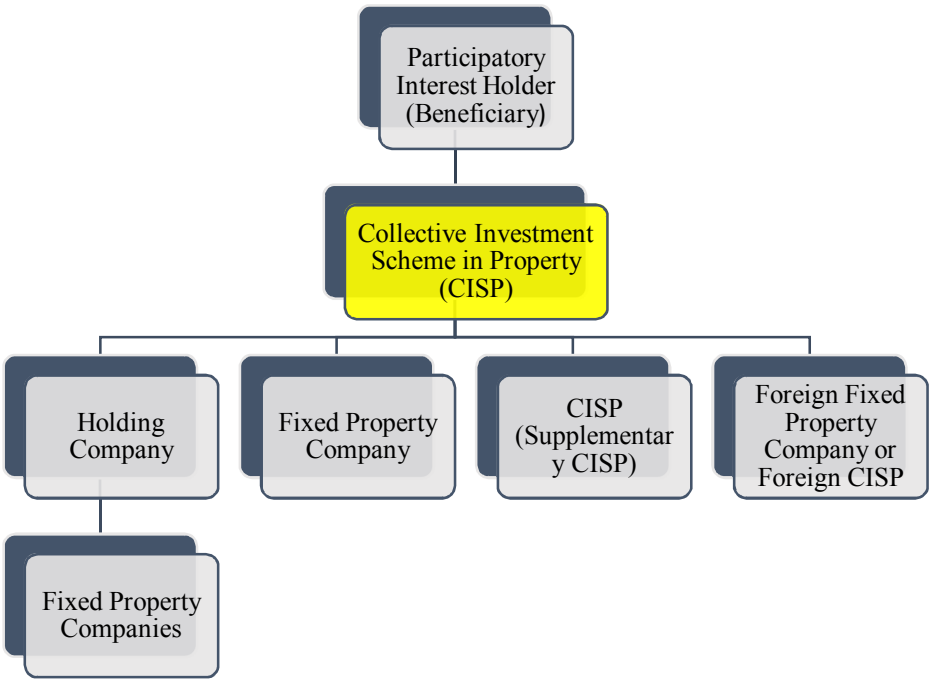

Figure 1: Diagram representing the possible corporate CISP structure as adopted from Fourie (2009)

Gearing limits

Collective Investment Schemes Control Act model deed for a CISP states that the maximum of indebtedness incurred in relation to the immovable property in the portfolio shall not exceed more than 30% of its underlying asset value.

Income Distribution

Collective Investment Schemes Control Act model deed for CISP requires that all income generated by a CISP from either rentals, income earned from investing in other companies and sale of assets be paid out to beneficiaries and/or participatory interest holders.

Tax dispensation

By definition of a CISP being regarded as a vesting trust and paying all its income to its beneficiaries and/or participatory interest holders, Fourie (2009) and the National Treasury (2007) state that no income tax shall apply either on income earned nor on the sale of disposable property on both directly and indirectly owned property.

Property Loan Stocks

Unlike a CISP, property loans stocks (PLS) are regarded as companies and thus governed by the Companies Act 61 of 1973[6] (National Treasury, 2007).

[6] This Act has now been replaced by the Companies Act 71 of 2008 which came into effect in May 2011.

Regulatory Framework

The PLS is also governed by the individual company Memorandum of Association and Articles of Association and where a stock is listed, by the Johannesburg Stock Exchange (National Treasury, 2007).

Ownership and management

The National Treasury (2007) state that investing in a PLS will attract one-part debenture and one part equity. The debenture will earn the investor interest generated from profits from any rental income, property sale and services rendered on the portfolio owned by the company.

In contrast to the CISP, the PLS can either manage its portfolio or elect an external party to manage its portfolio. Whereas the CISCA limits CISP to only owning property shares, PLS can invest in joint ventures and other subsidiaries. The diagram below adopted from Fourie (2009) presents the possible corporate structure of a PUT.

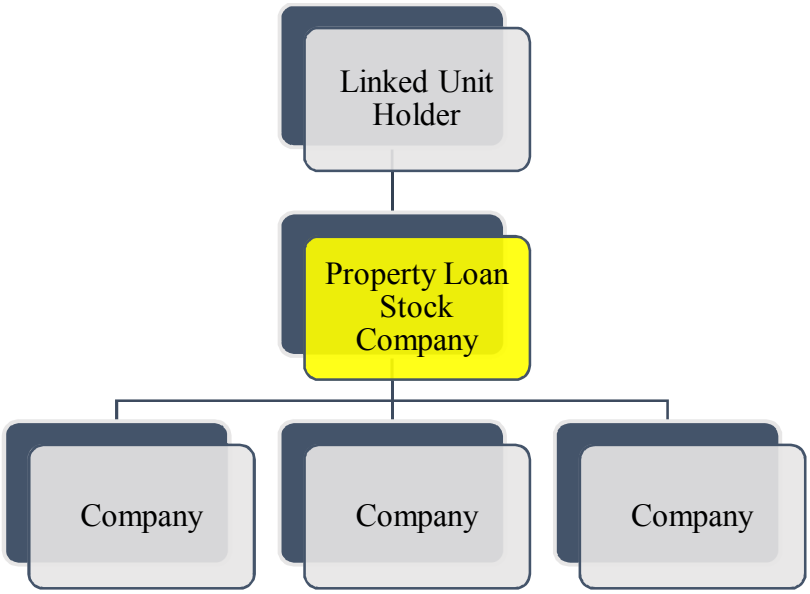

Figure 2: Diagram representing the possible corporate PUT structure as adopted from Fourie (2009)

Gearing Limits

Boshoff and Bredell (2013) state that the gearing limit of each PLS is as prescribed in the Articles of Association.

Income distribution

Unlike other companies, a PLS is allowed to distribute all of the generated income (National Treasury, 2007).

Tax dispensation

The company status of the PLS thus requires that for tax purposes the PLS is liable to pay income tax at the current corporate rate (Fourie, 2009), furthermore the PLS is also liable to pay capital gains tax on any sale of immovable property.

Boshoff and Bredell (2013) argue that the inherent differences between PLS and PUT have not only created confusion but have led to an unequal playing field for investors. Accordingly, the REIT structure was introduced in 2013 to align South Africa's property market with international standards, protect investors and ensure transparent and good governance within the listed property market.

Real Estate Investment Trust

The SA REIT (SA REIT, n.d) association describes a REIT as an investment vehicle that allows for the ownership and management of property assets in a portfolio.

In order to register as a REIT, the following requirements must be met

- A company must have a portfolio of at least R300 million
- A company must have a gearing ratio of less than 60%
- 75% of a company's income must be generated from property assets

- 75% of a company's income must be distributed to investors
- A company must not enter into agreements that are not in line with its ordinary line of business
- A company must appoint a risk monitoring committee

According to SA REIT Association (SA REIT Association, n.d) two types of REITs exist; the company REIT and the trust REIT. The company REIT is governed by the Companies Act 61 of 1973[7] with the REIT structure written into its articles of association. The Company REIT can be managed either internally or externally. The Trust REIT structure was created to allow companies currently listed as PUT to convert to the REIT structure and is such registered with the Registrar of Collective Investment Schemes. The management of the trust REIT is governed by the Collective Investment Schemes Control Act. The trustees of the REIT protect the interest of the shareholders and the REIT itself is managed externally as per the requirement of CISCA. Boshoff and Bredell (2013) state that the REIT structure is exempted from both income and capital gains tax and thus tax is only charged on the investors individually. Nevertheless, this is only applicable if a REIT pays out 75% of its profits as dividends to its shareholders.

The table below summarizes the differences between the PLS, PUT and REIT.\

Table 1: Summary of differences between PLS, PUT and REITs

	REIT	**PUT**	**PLS**
Debt Ratio	< 60% of Gross Asset Value	< 30% of Gross Asset Value	Prescribed in the company's articles
Income/Tax	None if > 75% of taxable earnings is distributed to investors	No tax paid on income that flows to investor	Interest paid to debenture holders is tax deductible
Management	Dependent on REIT type	Managed externally	Externally or Internally managed
Other Investments	Can invest in other listed companies	Cannot invest in other listed companies	Can invest in other listed companies
Capital Gains Tax	No CGT	No CGT if profits distributed to the investors	Pay CGT

[7] This Act has now been replaced by the Companies Act 71 of 2008 which came into effect in May 2011.

2.3. Evidence of performance determinants from other markets

Macro-economic factors

The influence of macroeconomic factors on listed property in developed markets has been extensively researched by several studies. McCue and Kling (1994) investigated the influence of macroeconomic factors to real estate returns in the United States of America from 1974 to 1991. An auto regressive model was adopted in order to model the long lag inherent in real estate returns. The study found that the identified macroeconomic variables combined explained a significant portion (60%) of the variation in real estate return. Nominal interest rates alone accounted for more than a third of the real estate return variation whilst investment and output had very little impact on the real estate returns possibly due to the feedback effect between the variables themselves. Shocks to nominal interest rates were found to have a significant negative influence on returns. Naranjo and Ling (1997)'s later study however found that only the growth rate in real per capita consumption, the real T-bill, term structure of interest rates and unexpected inflation were found to be significant and positively correlated with US real estate returns.

On the contrary, Brooks and Tsolacos's (1999) study in the UK market, focusing on the influence of similar macro-economic factors as that of McCue and Kling (1994) found that it cannot be strongly concluded that the identified factors significantly affect return as no significant lag effect was found between the identified variables and return. The researchers argue that this may be due to the chosen variable not reflecting any information regarding the macroeconomic and business conditions that affect property returns. Consequently, the researchers proposed that the impact of property related indices such as capitalization rates and growth in both property yield and rentals be explored. Nevertheless, it is noted that the error variance decompositions employed in the study revealed that shocks to the term spread and unexpected inflation have a contemporaneous effect on property returns.

Following on the work of Brooks and Tsolacos (1999), Leone (2011) explored the impact of both economic and property factors on listed property specifically focusing on REITs. Three

sample periods were used in order to determine the impact of determined factors on property returns and whether identified linkages persisted after the introduction of the REIT structure in the United Kingdom. Unlike Brooks and Tsolacos (1999) the findings reveal that returns are sensitive to macroeconomic and property variables. The influence of FTSE All Share Index returns, the UK IPD All Property Returns, Industrial Production was positive and persistent throughout the study period whilst the term structure of interest rates was also persistent but negatively correlated to returns. UK IPD All Property Rental Growth, the UK IPD All Property Equivalent Yield and the Sterling US Dollar exchange rate had no explanatory power before the REIT structure was introduced but were all positively correlated to returns after the introduction of the REIT structure.

Ooi and Liow's (2004) study on Asian real estate stocks found that the macro-economic factors (interest rate, Asian financial crisis and overall market conditions) were more significant than firm-specific factors in explaining risk adjusted returns of real estate. The interest rate, which was proxied by the change in 3-month Treasury bill yield (or 3-month savings deposit rate where the T bill was not available), was found to be negatively correlated to return in six markets (Singapore, Thailand, South Korea, Malaysia, Hong Kong and Indonesia) whereas in Taiwan a positive correlation was found. In contrast, the results of the influence of the general economic conditions was found to be strongly and positively correlated to risk adjusted returns, consistent in seven all markets. On the other hand, the Asian Financial crisis (recessionary years from 1998 to 2002) had a significant negative impact on risk adjusted returns in only six countries, whereas in Thailand the impact, although positive, was not significant. Overall, both the macroeconomic and firm-specific factors explained between 47.7 % to 74.3% of risk adjusted returns. However, the study makes no mention of how endogeneity was controlled for given that 3-month Treasury bill was used in calculating the dependent variable (risk adjusted return) and one of the independent variables, interest rate.

Further research into macro-economic factors can de decomposed as follows;

Interest rate

Bredin *et al*. (2007) argue that the monetary changes influence the demand of the underlying real estate asset and, subsequently, the rentals, thus any changes in the rentals of the property will be reflected in the value of the property and the associated share price. The impact of policy changes on REIT returns can be understood with regard to the impact on future earnings, the subsequent rate used to discount the expected earnings and the changes in the risk premium (Bredin *et al*., 2007). Bredin *et al*. (2007)'s study of the influence of US monetary changes hence found a significant negative relationship between monetary changes and REIT returns, but there was no evidence of asymmetry in the response to monetary changes. The study also revealed that changes in interest rates impacted on the return volatility of REIT returns.

Allen *et al*. (2000) investigated the relationship between the long and short term interest rates and the return of both equity and non-equity REITs in the American market. The yield on 1-year bonds was used as proxy for the short-term interest rate whilst the 10-year constant maturity treasury securities was used as proxy for the short-term interest rates. The influence of the S and P 500 Composite index as proxy for the overall market condition was also examined. The study found a significant negative correlation for both the long and short term interest rates to the equity and non-equity REITs. Interestingly, it was found that only the non-equity REITs were significantly and positively correlated to overall market conditions. Since several researchers have argued that macro-economic factors are more significant in explaining returns, rather than including the firm-specific characteristics, Allen et al. (2000) investigated the influence of firm-specific characteristics to the returns sensitivity of real estate stock to interest rates. Leverage and specialisation of the firm were found to positively affect the firm's response to changes in the long-term interest rate whilst management structure only affected the sensitivity to short term interest rates.

Ratcliffe and Dimovski (2007) later replicated the Allen *et al*. (2000) study in Australia for listed property returns, using the 90-day Bank Accepted Bill (BAB) as proxy for the short-term interest rate whilst the 10-year Commonwealth Government Bonds were used as proxy

for the long-term interest rate. The authors found a significant negative coefficient for the long-term interest rates whereas the short-term interest rates, although positively correlated, were found to be insignificant in explaining listed property return. The return for listed property was strongly and positively correlated to overall market condition which was proxied by S and P/ASX200 Accumulated Index. West and Worthington (2006) in their study also found that only long term interest rates were significant in explaining listed property returns. Yong et al. (2009), however, did not find a consistent significant relationship between Australian REITs and either long or short term interest rates but where the relationship was found to be significant in the sub period analysis, a positive relationship with short term interest rates and a negative relationship with long term interest rates was evidenced.

Lizieri and Satchell (1997), when modelling property returns in the UK using a regime based model, found that a nonlinear relationship exists between property returns and interest rates, however, it is noted that high interest rates have much more adverse impact on returns. When interest rates are high, returns fall drastically and also tend to be more volatile. Regardless, when interest rates are low, prices although rising tend to be more volatile.

Inflation

The interest in studying the impact of inflation on real estate return has largely been driven by the widely-accepted belief in the inflation hedging properties of real estate in a mixed asset portfolio. Simpson *et al*. (2007) contended that prior studies have assumed that real estate returns respond the same to both rising and declining inflation and thus examined their impact on real estate return. The study was done in relation to the prevailing US monetary policy to better understand the relationship between the two variables. The results revealed a significant positive association between REIT returns and both rising expected and unexpected inflation. On the other hand, a significant negative association was evident between REIT returns and both decreasing expected and unexpected inflation. In line with Naranjo and Ling (1997) the impact of unexpected inflation on returns is more severe than that of expected inflation, the rise of which has a more severe impact on returns than the fall.

The asymmetric relationship, as discussed by Simpson *et al*. (2007), could be due to the credibility of the government in controlling interest rates. If, during an expansionary period, investors anticipate rising prices, it is likely that the REIT prices will also rise. But if investors perceive contractionary policies to further drive down prices, REIT returns will go down.

West and Worthington (2006), however, found that for Australian markets, inflation was only significant in explaining direct real office markets. Both the expected and unexpected inflation had a positive relationship with the direct office market. The impact on listed property returns, although negative, was not found to be significant.

Employment

Specifically, looking at the impact of employment on property returns, Liang and McIntosh(1998) found that the positive correlation between employment and real estate return is only observed in the short term. The researchers argue that although it is not unreasonable to assume that higher employment would result in increased demand and consequently rising rentals, the changes in rental valuation are far more complex and driven by the interplay between demand and supply. The study also found some correlation between employment volatility and return volatility. It is also noted that employment growth tends to reduce both property return and volatility. West and Worthington (2006), exploring the impact of employment by industry sector on listed property return in Australia, found that returns were positively associated with employment in the following particular industries: energy, gas and water supply, communication, wholesale and retail trade, and construction.

Whilst there has been extensive research done to explore the relationship between real estate and macro economy, it is noted that the economic relationships are not constant throughout the different markets. Hoskins *et al*. (2004), in their study of international markets, found that whereas there were similarities in the linkages between returns and economic variables, the differences in coefficients in the individual time series for each country is indicative of the non-uniformity of explanatory determinants across markets.

Firm-specific determinants of listed property returns

Bodie *et al*. (2009) argue that the market return of any stock is a combination of the macroeconomic environment and each individual's mean sensitivity to the underlying environment. Several researchers such as Cheng and Roulac (2007), Goebel *et al*. (2012), Alias and Soi Tho (2012) and Liow (2010) amongst others, have thus explored the impact of firm-specific characteristics such as size, leverage, book-to-market ratio to better explain the performance difference between listed property entities.

Size

Commonly represented by the logarithm of the total assets owned by a firm, size is perhaps the most widely reported firm-specific characteristic. Kishore (2002) found the size effect to be more prominent in listed property markets than general stock in Australian markets. The smaller listed property stock exhibited superior performance. In contrast, Ambrose and Linneman's (2001) study found that larger US REITs, which are defined by a high market capitalisation, tend to have higher profit margins and rental revenue ratios. The study also found that larger REITs had reduced average weighted cost of capital; every billion dollar increase in market capitalization resulted in a 2.2% decrease in capital costs. Several other researchers also support this positive relationship between size and return; in particular, Mohamad *et al.* (2014) consistent across Taiwan, Thailand, Malaysia, Hong Kong, Japan and Singapore; Alias and Soi Tho (2012) in both Malaysian and UK REITs; Liow (2010), and Ro and Ziobrowski (2011) persistent in Asia, Europe and North America.

Ooi and Liow's (2004) study of determinants of risk adjusted performance in seven Asian markets, provides evidence that together with size, book-to-market ratio is one of the most significant factor in explaining real estate stocks. Unlike Mohamad *et al*. (2014), a negative relationship was found between returns and size in four countries; namely, Malaysia,

Singapore, South Korea and Taiwan. Conforming to Mohamad *et al. (*2014*),* a positive relationship was observed in Thailand, Hong Kong and Indonesia.

In explaining the size effect, both Yang (2001) and Ambrose *et al*. (2005) have applied the notion of economies of scale. Yang (2001), in his study, confirmed the existence of economies of scale which as elaborated by Ambrose *et al*. (2005) enables large companies to lower their costs whilst achieving growth and significantly increasing their profitability. Yang (2001), however, argues that this efficiency is only optimized at asset values of between seven to nine million dollars. Others have argued that the size effect is not persistent across time, rather diminishing in power as market matures. Chui *et al*. (2003), driven by the structural change of the REIT market after 1990, examined the cross-sectional determinants of US REIT performance over two periods; pre and post 1990. The study found that post 1990 size had no significant bearing on US REIT performance. Yong et al. (2009) also found similar results in Australia – the explanatory power of size diminished after 1996; possibly because post 1996 REIT growth in Australia was more driven by mergers between small and large REITs rather than acquisition of new assets. Pre 1996, unlike other studies, a negative relationship was observed between size and return.

Conversely, Goebel *et al*. (2012), using portfolios sorted by their exposure (High, Medium and low) to different firm characteristics after controlling for momentum (which is regarded as a dominant factor), found that before controlling for the monetary policy, size has no significant impact on return. Large REITs thus only outperform smaller REITs during restrictive monetary environments whereas no significant difference in returns is observed during expansive periods.

Leverage

In the early stock studies by Fama and French (1992), a positive relationship is found between stock returns and leverage; higher leveraged companies are thus expected to demonstrate superior performance. It is noted that the REIT structure in some markets such as the United Kingdom, South Africa and the Netherlands places limits on the debt to cover ratios of firms whilst in markets such as Canada and the United States, no limits exists

(Boshoff and Bredell, 2013). Nevertheless, the impact of the ratio of debt to equity on REIT returns has produced mixed results. Cheng and Roulac (2007) used a multifactor model based on firm-specific characteristics and found a significant correlation between lower debt ratio and high return. With the exception of Hong Kong and Indonesia, Ooi and Liow (2004) found that in Asian countries, high geared stocks had lower risk adjusted returns compared to those with low debt. Still, as noted by Brockman (2014), internally advised REITs tend to have lower debt ratio than externally managed REIT whilst Capozza and Sohan (1995) found that smaller REITs tend to be less leveraged. In contrast Brounen and de Koning (2012) across the European, US and Asian market and Yong *et al*. (2009) in Australia found that leverage was not a significant explanatory factor in REIT performance. Notably, Allen *et al.* (2000) found that leverage amongst other factors increased the sensitivity of firms to macroeconomic factors, creating more pronounced losses and gains.

Book-to-Market Equity Ratio

Earlier stock studies by Fama and French (1992) argued that the book-to-market effect was much stronger than the size effect. Hamelink and Hoesli (2004) observed that across markets, post 1990 the influence of the book-to-market ratio to listed property returns became increasingly important. Lee *et al*. (2008) also found a significant and positive relationship between listed property returns and book-to-market ratio of equity; a higher book-to-market ratio is expected to generate superior performance. Chui *et al*. (2003), however, found that the significance of book-to-market ratio for the US market fell away after the structural change of the 1990s. Chen *et al*. (2009), though, did not find any significance of book-to-market in explaining REIT returns for their entire study period from 1978 to 1994 for US markets.

Goebel (2012) initially found no significant relationship between return and the book-to-market ratio from a univariate analysis. However, when controlling for momentum, only portfolios with low momentum report a performance difference between high and low book-to-market ratios, with high book-to-market ratio exhibiting superior performance. Further analysis reveals that high book-to-market ratios only outperform low book-to-market ratio

portfolio during expansive periods. Nevertheless, the relationship disappears during restrictive periods. Fama and French (1992) also noted that the relationship between leverage and book-to-market ratio can be explained as follows:

1. the market is pessimistic about the prospects of cheaper stock (high book-to-market ratio),
2. Due to the poor prospects, the price of the cheaper stock is thus discounted relative to its earnings thus imposing high market leverage.

In their study, Cheng and Roulac (2007) identifying the characteristics of REITs in the US market find that companies which are classified as winners with high profitability tend to trade below the average book-to-market ratio of 1.41. The companies as suggested although achieving stable profits are undervalued by the market. Ooi and Liow (2004) observed that in Tawain, Hong Kong, Singapore and Malaysia the book-to-market ratio was not significant in explaining listed property stocks whereas Indonesia, Thailand and South Korea, the book-to-market ratio was positively related to return. Similar results were reported in Australia, although when the sub period analysis was done, the book-to-market ratio was not significant in explaining during the 1997 to 2002 period (Yong *et al*., 2009).

Earnings-to-price Ratio

In their study of the cross-sectional determinants of expected stock return, Fama and French (1992) noted that the positive relationship between earnings ratio and return was displayed only when the earnings ratio was positive, however, such a relationship disappeared when size and book-to-market ratio were introduced to the explanatory model. It can thus be inferred that the initial correlation between return and earnings ratio is due to the correlation between book-to-market and earnings ratio, as most of the firms with a high earnings-per-price ratio also have high book-to-market ratio (Fama and French, 1992).

Cheng and Roulac (2007) observed that REIT winner portfolios exhibit higher earnings-to-price ratio amongst other characteristics. Addae-Dapaah *et al*. (2013) state that high price-to-

earning stock is associated with value investment strategies whilst low price-to-earnings ratio are associated with growth strategies. In contrast to Yong *et al*. (2009)'s study which found a growth premium in the Australian market, Addae-Dapaah *et al*. (2013) find evidence of a value premium. Furthermore, it is argued that the performance difference between the two investment strategies cannot be attributed to differences in riskiness but rather to the investment behaviour and agency costs (Addae-Dapaah *et al*., 2013). Investors have exaggerated expectations regarding growth stocks and are over-pessimistic about value stocks. The pricing errors are, however, corrected when growth is realised. Analysts are also more likely to recommend investors towards growth stocks based on past performance, further adding to exaggerated expectation (Addae-Dapaah *et al*., 2013).

Dividend Yield

Using both net asset value and return as proxy for real estate investment trust performance, Mohamad *et al*. (2014) explored the determinants of Malaysian REIT performance and found that whilst dividend yield has a significant positive relationship with net assets value, it was insignificant in explaining returns. Ooi and Liow (2004) observed that overall the impact of dividends on returns declined over the study period. After 1997, dividends were not significant in explaining real estate returns. Prior to that, a positive correlation between dividend yield and returns was evidenced for South Korea and Malaysian listed property. The dividend yield, however, had no significant impact in returns on the other five Asian countries.

2.4. Evidence from South Africa

Studies into the South African listed property market have not been as focused on identifying the performance determinants of listed stock. Akinsomi *et al*. (2016) investigated the impact of speculative activities on REIT investor behaviour. It was observed that particularly during the financial crisis period from 2008 to 2011, speculative activities which corresponded with market volatility, drove herding behaviour in the REIT market. The author argues that due to the significance of gold in the South African economy, its speculative activities are proxy for future expected prices and consequently drive stock dynamics.

Olaleye (2011) investigated the performance of general stocks, bonds, the 90-day T-bill as well as real estate stock over the 1999 to 2009 period in South Africa. The study found that not only did real estate demonstrate superior performance but it had diversification benefits in addition to enhancing the return generating attribute of a mixed asset portfolio.

Akinsomi *et al*. (2015) investigated the barriers inhibiting listed South African real estate companies from entering other African markets and found legal and title rights as the main barriers. The authors also found that other factors such political stability; corruption and poorly developed infrastructure also inhibited geographical diversification into African markets.

Akinsomi e*t al. (*2016) also found evidence of superior performance of South African listed companies that are Broad-Based Black Economic Empowerment (BBBEE) compliant, indicative of the tendency of the market to reward socially responsive companies.

Table 2 and 3 below summarise the significant findings on the macro and firm-specific determinants of listed property stock returns.

Table 2: Summary of significant macro-economic factors affecting listed property returns

Type of factor	Factor	Country	Observed Relationship	Author
Macroeconomic factor	**Interest Rate**	US, UK, Singapore, Thailand, South Korea, Malaysia, Hong Kong and Indonesia	-ve correlation	McCue and Kling (1994); Ooi and Liow(2004), Bredin *et al*. (2007); Lizieri and Satchell (1997),
		Taiwan	+ve correlation	Ooi and Liow(2004);
	Term structure of interest	US,	+ve correlation	Naranjo and Ling (1997)
		UK	-ve correlation	Leone (2011
	Long term Interest rate	US, Australia	-ve correlation	Allen *et al*. (2000); Ratcliffe and Dimovski (2007); Yong *et al*. (2009)
	Short Term Interest rate	US	-ve correlation	Allen *et al*. (2000)
		Australia	+ve correlation	Yong et al. (2009)
	Overall market conditions	US, Australia	+ve correlation	Allen *et al*. (2000); Yong *et al*. (2009)
	Inflation	US	-ve correlation	Simpson *et al.* (2007),
	Employment	UK, US	+ve correlation	Liang and McIntosh (1998); West and Worthington (2006)

Table 3: Summary of significant firm specific factors affecting listed property returns

Type of factor	Factor	Country	Observed Relationship	Author
Firm Specific	**Size**	Australia, Malaysia, Singapore, South Korea and Taiwan	-ve correlation	Kishore (2002); Ooi and Liow (2004); Yong et al. (2009)
		US, Taiwan, Thailand, Malaysia, Hong Kong, Japan and Singapore, UK	+ve correlation	Ambrose and Linneman (2001); Ooi and Liow (2004); Alias and Soi Tho (2012); Liow (2010); Ro and Ziobrowski; Mohamad *et al*. (2014
	Leverage	US, Hong Kong and Indonesia	-ve correlation	Cheng and Roulac (2007);Ooi and Liow (2004)
		Malaysia, Singapore, Taiwan, Thailand and South Korea		Ooi and Liow (2004)
	Book-to-market	US; Indonesia, Thailand and South Korea	+ve correlation	Lee *et al*. (2008), Goebel (2012)
		US, Australia	-ve correlation	Cheng and Roulac (2007); Yong *et al*. (2009)
	Earnings-to-price	US	+ve correlation	Cheng and Roulac (2007); Addae-Dapaah *et al.* (2013)
		Australia	-ve correlation	Yong *et al*. (2009)
	Dividend Yield	Malaysia and South Korea	+ve correlation	Ooi and Liow (2004)

2.5. Synthesis and Conclusion of the literature review

Extensive research has been done in developed markets, particularly in the US market, to identify the determinants of listed property returns. The identified factors can be decomposed into firm specific, diversification strategies and management strategies. Additionally, several other researchers have explored the impact of macroeconomic factors which includes both property specific factors (such as capitalization and property yield rates) and the general macroeconomic factors (interest rates, inflation, employment, etc.) on listed property returns.

Perhaps since Fama and French (1992)'s study the influence of the firm-specific factors of returns has been a topic of interest among researchers. The more prominent factors that have been consistently evidenced across markets include size, book-to-market ratio, dividend yield earnings-to-price ratio as well leverage. However, more than any other factors, the influence of the macroeconomic factors has been evidenced to be more significant in explaining listed property returns. In particular, McCue and Kling (2004) reported that as much as 60% of the variation in REIT return in the US was due to the influence of macroeconomic factors. The explanatory power of macroeconomic variables such as interest rates (McCue and Kling (1994), Leone (2011), Bredin *et al*. (2007), Allen *et al*. (2000)) and inflation (Naranjo and Ling (1997) and Simpson *et al*. (2007) has been consistently reported in several markets.

Given the significance of the macro economic factors, other researchers have explored the influence of the firm-specific factors on the responsiveness of returns to macroeconomic factors. Some of the firm-specific factors such as leverage and size were evidenced to make the impact of the macroeconomic factors on returns more pronounced. Some researchers have further decomposed the more prominent macroeconomic factors further in order to better understand their influence on the returns. The explanatory power of long term interest rates, short term interest rates as well as the term structure of interest rates amongst others are some of the ways in which the influence of interest rates has been explored. Both the impact of unexpected and expected inflation has been explored by some researchers.

Despite the depth as well as the magnitude of research, there exists contradictory evidence across markets on many of the reported influencers of returns. Where some countries have reported factors to be significant, research in other markets has obliterated their significance. Even when factors have been confirmed, the direction of influence varies from country to country. Hoskins *et al*. (2004)'s comparative study confirmed the existence of differences in coefficients in the individual time series for each country which is indicative of the non-uniformity of explanatory determinants across markets. Hamelink and Hoesli (2004) have also observed that substantial differences exist over different periods and across markets which perhaps can be attributable to company and country specific risks. Chui *et al*. (2003) and Yong *et al.* (2009) amongst others also note that as markets mature, there is a structural change in the determinants of listed property performance with some factors losing their explanatory power.

In particular, the South African listed property market has significant economic value, even on a global scale. It is the only African market listed in the top ten global REIT market as well as one of only three African countries included in the emerging market index. Particularly for investors, it has been reported to have outperformed all other investment markets for the past ten years. In spite of this, research in South Africa has mostly concentrated on general stock rather than listed property, although noting some existing similarity on the explanatory factors with that of listed property stock in other markets. Nevertheless, researchers such as Liow (1997, 2010) have reported significant performance differences between general stock and listed property and as such it could be argued that the drivers may not necessarily be the same especially given the existence of distinct literature between the two markets in other markets.

The reported as well as the empirical superior performance of the South African listed property amidst the limited research into the market as well as the lack of consensus in literature regarding the determinants of listed property return provides a compelling motivation for this study from both an empirical and practical perspective.

3. CHAPTER THREE: METHODOLOGY

This chapter provides a description of the research methodology adapted in the report. The data, data collection and analysis method will be detailed as well as the limitation of the research methodology.

3.1. Research Philosophy

A *positivism* approach underpins the research; the existing literature serves as a reference point for analysing the observed relationship between returns of listed property and firm-specific and macro-economic variables.

3.2. Methodological choice

The research is quantitative as numerical data was collected and then analysed in order to draw conclusion about the behaviour of listed property stock in South Africa. The data collected was the historical performance of stock, their individual traits as well as the macro economic factors over time and as such, deemed as panel data (Gujarati, 2011)

3.3. Panel Regression Model

The panel regression model employed by Ooi and Liow (2004) which incorporates both the macroeconomic and firm-specific factors to determine their influence on return of stocks was adapted for this research. This research departs from Ooi and Liow (2004) by using excess return instead of risk adjusted return. The use of excess return also precluded the use of short term interest as an independent variable as the calculation of both short-term interest and excess return is based on the 3-month Treasury bill.

The adapted model is specified below;

$\boldsymbol{S_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta X_{it}} + \boldsymbol{\gamma M_t} + \boldsymbol{\mu_{it}}$ (Equation 1)

Where

$_{it}$ Denotes the cross sectional and time series nature of the data and thus S, the dependent variable is a measure of risk adjusted return,

$\boldsymbol{X_{it}}$ Represents predefined firm-specific characteristics,

$\boldsymbol{M_t}$ Is a set of macroeconomic variables,

$\boldsymbol{\alpha}$ Is the intercept,

$\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are column matrices for the partial regression coefficients allowing for the explanatory variables to be estimated,

$\boldsymbol{\mu_{it}}$ Is the error term that captures all other systematic risk that is captured by neither macroeconomic factors nor the firm-specific factors.

The dependent Variable

The excess return is calculated based on the following calculations:

$$\boldsymbol{S_{it}} = \mathrm{R_{it}} - \mathrm{R_f}$$

Where;

$\boldsymbol{R_{it}}$ Is the return of stock *I* during year t,

$\boldsymbol{R_f}$ Is the return on the risk free rate proxied by the yield on 3 month Treasury bill during year t.

The error term

The error term is specified as$\boldsymbol{U_{it}} = \boldsymbol{\mu_i} + \boldsymbol{V_{it}}$
Where;

$\boldsymbol{\mu_i}$ represents systematic risks not captured in the model,

$\boldsymbol{V_{it}}$ represents systematic risk that vary with the firm and time.

The Independent Variable

Based on literature the following factors are included in the study

Firm-specific factors: Size, book-to-market ratio of equity, earnings-to-price ratio, leverage and cashflow-to-price ratio.

Macroeconomic factors: Long term interest rate, overall market condition and overall foreign market condition as proxied by the US S and P 500 index.

The full model is thus as follows:

$$S_{i,t} = \alpha + \beta_1 lnMV_{i,t} + \beta_2\, BV/MV_{i,t} + \beta_3 E/P_{i,t} + \beta_4 D/E_{i,t} + \beta_5\, CF/P_{i,t} + \beta_6 J_{i,t} - \beta_7 LI_{i,t} + \beta_8 SP_{i,t}$$

Where

lnMv = size

BV/MV = ratio of the book-to-market value of equity

E/P = Earnings-to-price ratio

D/E = Debt-to-equity ratio

CF/P = Cashflow-to-price ratio

J = Overall market condition

S & P500 = Overall foreign market condition

3.4. Data Collection and Proxies

The study focused on a 11-year period from 2004 to 2015. In collecting data, the category of listing was not taken into account (i.e. REIT, PUT, etc.); only that it is listed on the Johannesburg Stock Exchange and its data available on the Inet database.

Ooi and Liow (2004) in their study, collected weekly returns of stock which were then used to calculate the mean average returns. In contrast, yearly returns were used instead of weekly returns primarily because the financial data is only available on the Inet database on a yearly basis. The financial data (which represents 5 of the 8 variables) is drawn from audited

financial year-end statements which are only released yearly. If attempts were made to interpolate the lower frequency financial data, it could possibly introduce misspecification in the model. The three macro-economic variables as well as the dependent variable were thus also collected on a yearly basis. Consequently, the number of observations was reduced.

Although as at 31st March 2016, there were 33 listed property companies on the Inet database, not all of them are included in the research due to the following reasons:

- Unavailability of data during the study period
- Unavailability of data on certain variables
- Listing dates, with some companies having only listed as recently as November 2015

Yong *et al*. (2009), in their study, excluded any stock that did not have data available for a period of more than two years whereas Pham (2010), with a smaller sample size, excluded those that did not have data available for more than 12 executive months. For this study, only stock that had data available for more than two consecutive years was used. The calculation of return in any year is dependent on the closing price of the previous year as such a minimum of two years is required. After filtering, the sample consisted of 25 listed stocks, with a total of 187 yearly observations. Due to the differences in the listing dates, not all of the stocks had data available throughout the entire study period creating an unbalanced data panel. Notably, of the 25 listed stock, as at January 2016, 20 had converted to the REIT structure. Since the study only has about 187 observations, no attempts were made to sort the data into portfolios.

Tables 4 and 5 below highlight the data collected for each variable, its proxy and the source of data as well as the frequency of collection. It is noted that for the long-term interest rates some researchers such as Yong *et al*. (2009) have used the yield on the long-term interest rates whilst others such as Pham (2010) have used the change in the yield. The influence of the two factors has been included in the model to determine which has a more significant impact.

Table 4: Model Specification for the multivariate regression (Firm specific factors)

$$S_{i,t} = \alpha + \beta_1 lnMV_{i,t} + \beta_2\, BV/MV_{i,t} + \beta_3 E/P_{i,t} + \beta_4 D/E_{i,t} + \beta_5\, CF/P_{i,t} + \beta_6 J_{i,t} - \beta_7 LI_{i,t} + \beta_8 SP_{i,t}$$

SYMBOL	VARIABLE	DEFINITIONOF PROXY	CALCULATION	SOURCE OF DATA	FREQUENCY OF DATA
Firm-specific factors					
lnMV	Size	Size of the firm derived by taking the natural log of the market capitalization in Rand Value	Log of market capitalization	Inet BFA Data base	Yearly
BV/MV	Ratio of the Book value of Equity to the Market Value of Equity	The ratio oftotal book value equity over the market value of equity	Extracted from the [8] database,	Inet BFA Data base	Yearly
E/P	Earnings-to-price	Headline earnings per share divided by share price at the end of a financial year-end	Extracted from the database[9]	Inet BFA Data base	Yearly
CF/P	Cashflow-to-Price	Ratio of the cash flow of a firm to its stock price	Extracted from the database	Inet BFA Data base	Yearly
D/E	Ratio of the total debt of a firm over its equity value	Ratio of the total debt of a firm over its equity value	Extracted from the database	Inet BFA Data base	Yearly

[8]On Inet, the ratio that is readily available is the Price to Book value, thus to calculate the book-to-market value the following formula is calculated as adapted from Basiewicz and Auret (2009)Book-to-market value of equity =(Ordinary Shareholders interest/ Share outstanding)/ share price at year end

[9]On Inet, the ratio that is readily available is the Price-to-earnings ratio, thus to calculate the earnings to price, the following formula was used as adapted from Basiewicz and Auret (2009): headline earnings per share divided by share price at the end of a financial year-end

Table 5: Model Specification for the multivariate regression (Macro economic factors)

SYMBOL	VARIABLE	DEFINITIONOF PROXY	CALCULATION	SOURCE OF DATA	FREQUENCY OF DATA
Macro-economic factors					
J	Overall market conditions	The return of overall market condition as proxied by the return on the J203 All share index, given as a percentage	$\frac{J_{it+1} + J_{it}}{J_{it}}$	Inet BFA Data base	Yearly
LI	Long term interest rates	The yield on 10-year government bond		Inet BFA Data base	Yearly
		The change in yield on 10-year government bond from one year to another.[10]	$\frac{LI_{it+1}}{LI_{it}}$	Inet BFA Data base	Yearly
SP	Foreign Market Conditions	The return on the US market proxied by the return on the Sand P 500, given as a percentage	$\frac{SP_{it+1} + SP_{it}}{SP_{it}}$	Federal Reserve Bank of St Louis	Yearly

[10] Whilst the long-term interest rate is normally proxied by the yield on long term government bond, others such a Pham (2010) and Yong *et al*. (2009) use the change in the yield to proxy yield as it is less volatile. Both these proxied will be tested in the regression model, and a superior one will be selected.

3.5. Data analysis

The data was collated on excel and exported to STATA for statistical analysis. Firstly, before running the regression, the correlation between variables, which is a measure of the tendency of two variables moving together when affected by the same factor, is determined. Gujarati (2011) indicates that any high correlation between variables is likely to introduce errors in the regression (these errors are discussed later in the report). Consequently it is suggested that one of the highly correlated must be dropped but only after computing the partial correlation diagnosis. Partial correlations were computed to identify the unique correlation of each variable with return whilst holding all other variables constant. The semi-partial correlations were also calculated to identify whether there is any relationship between each variable and return whilst holding other variables constant (Abdi, 2007).

3.6. Regression analysis

In identifying the determinants of returns, three different regressions were run, the results of which are presented in the following chapter. Gujarati (2011) states that that ordinary least square regression (OLS) pools together all observation to estimate an overall function of return whilst neglecting the dual nature of time series and cross sectional data. Such a pooling thus assumes that coefficients are constant cross sectionally and across time and thus ignores the uniqueness of each variable. Conversely, the fixed effect model pools all observation but each individual variable is allowed to have its own intercept dummy and thus accounts for heterogeneity amongst variables. Markedly, the fixed effect model assumes that individual specific coefficient is time invariant. Torres-Renya (2007) indicates that an important assumption of the fixed effect model is that the time invariant characteristics are unique to the individual and not correlated with other individuals' characteristics (uncorrelated error terms). The random effect regression assumes that each variable represents a random intercept drawn from a large population of variables. It therefore allows for inferences to be made beyond the sample.

The results of the three regressions are subsequently presented and run however to enable the selection of the appropriate model to adapt, the following tests were run;

Wald Test

The Wald test is used to choose between the pooled OLS and the fixed effect model. The test follows the chi square statistic and tests the significance of group effects. The null hypothesis assumes pooled least squares are the efficient estimator. A probability greater than 5% confirms the superiority of the null.

Lagranger Multiplier test

Lagranger Multiplier test is used for choosing between the OLS regression and a random effect regression. The null hypothesis is that there is no panel effect and hence no significant difference across units. If the P value of the test is greater than 0.05 then the OLS is assumed to be superior.

Hausman Test

A Hausman test statistic is used to determine which model between the random effect and fixed effect model is superior. It tests whether the unique errors are correlated with the regressors, where the null hypothesis prefers the random effect as it assumes that unique errors are not correlated with the regressors. If the P value of the test is greater than 0.05 then the random effects is assumed to be superior.

3.7. Diagnosis Tests

After determining the superior model to use, diagnostic tests were run as follows.

Multicollinearity

According to Gujarati (2011), multicollinearity exists when there is an exact linear relationship between one or more variables in the regression. Although estimators are still best linear unbiased estimators, the significance of some of the variables may be nullified even with a potentially high R^2. Estimation is affected by the high variance of estimators

when there is multicollinearity. Since multicollinearity affects the validity of statistical inferences, it is advised that one or more variables be dropped.

Heteroscedasticity

Where unequal variances exist, heteroscedasticity is said to exist as the normal ordinary least square regression model assumes that equal variances are observed across all observation. Unequal variances thus mean that estimators are no longer best estimators although still linear and unbiased. Any *t* and *f* tests (hypothesis testing) carried out in the model may not prove reliable due to heteroscedasticity (Gujarati, 2011).

Normality

For interpretation of results of regression to be valid, the data is assumed to be normally distributed. Whilst various methods exist to test for normality, the graphical pp plot was used to determine the normality of the data.

Autocorrelation

Gujarati (2011) indicates that where error terms are correlated estimators in a regression become inefficient which may invalidate any hypothesis testing. Gurajati, however, indicates that auto correlation is a common problem in a time series data. As we are dealing with panel data, no auto correlation test was run.

4. CHAPTER FOUR: FINDINGS AND DISCUSSION

The aim of this chapter is to address the main objective of the study by interpreting the results obtained from the regression analysis performed. The results are reported in comparison to the empirical evidence from the literature review.

4.1. Findings of the results

Summary Statistics

The summary statistics for each of the variables collected for the sample period from 2004 to 2015 are presented in Table 6 below.

Table 6: Summary Statistics

Variables	No of Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
Long term interest rates	187	368.83	94.25	212.70	478.84
Change in long term interest rate	187	1.07	0.11	0.97	1.22
Overall market conditions	187	13.41%	15.00%	-25.72%	42.98%
Foreign Market conditions (Sand P 500)	187	7.52%	15.68%	-38.49%	29.60%
Size	187	R10.4Billion	R15.7 Billion	R94.4 Million	R99.4 Billion
Ratio of Book value of equity to Market value of Equity	187	1.19	6.81	0	93.58
Earnings-to-price Ratio	187	0.59	0.69	-2.21	3.5
Cashflow to Price ratio	187	94	54.12	1	187
Debt to equity ratio	187	33.34	151.8	0.0800	1,459.92

With reference to Table 6 above, it is noted that the overall market conditions (as proxied by the return on the Johannesburg Stock Exchange) and overall foreign market conditions (as proxied by the return on the US S and P 500) all had positive mean returns. Even so, performance on the overall South African market fared considerably better than the US market. The recorded mean return on the JSE All share index is more than double the return on the S and P 500, the highest return value of 42.98% recorded is considerably more than the 29.6% recorded on the US markets. The results are not surprising given that Holland and Kantor(2012)'s analysis of the return of both JSE All Share Index and the S and P 500 over the 2003 to 2012 period (a period just short of 3 years of this study period) showed superior performance of the JSE over the entire period. At the time the authors noted that $ 100 invested in the JSE in 2012 would have given a return of $ 371 in 2012 compared to $ 176 in the US market, which is less than half of the return on the JSE. Both markets, nonetheless, recorded a negative minimum return, with the JSE still performing much better. Not surprisingly, the negative return was recorded in 2008 for both markets, at the time of the start of the financial crash that affected markets globally. The global financial crisis led to negative returns as well as unprecedented volatility in financial markets (Colombo, 2014).

In comparison, lowest change in the yield on long term interest rate value of 0.97 was recorded in 2015. This decline of long term rates in 2015 can be attributed to the decline in the rand, as well as poor economic growth accompanied by the downgrade in government debt at the end of the year which dampened investor confidence (Lange, 2015).

Although the log of the market capitalization is included as proxy for size, the actual market capitalization in Rand value is used in the table above. The high market capitalization values are not surprising given that 80% of the entities are REITS which are required by law to have at a minimum, R300 million worth of property assets. The maximum recorded value of R99.4 billion rand, representing more than 20% of the total market value of the listed property sector, belongs to a London based REIT, Intu Properties which has a secondary listing on the Johannesburg Stock Exchange (Intu Group, n.d). The lowest market capitalization value was recorded in 2009 from Fairvest Holding which saw a significant drop in market value after the financial crisis of 2008. Not surprising is that Fairvest Holding's portfolio consists

primarily of shopping centres, which were likely more affected by the contraction in demand brought on by the crisis. As at January 2016, Fairvest Holdings market share was only at 0.23%. Overall the average listed property stock has a market capitalization of R 10.4 billion which is indicative of the significance of the market has a whole.

The mean book-to-market value of equity of 1.19 recorded may suggest that on average the listed property market is undervalued. A value of over 1 represents an undervalued stock whilst a value under 1 represents an overvalued stock (Pham, 2010). Pham further (2010) highlights that a book-to-market value of above 1 is indicative of a growing demand amongst investors. It is also worth considering Cheng and Roulac (2007) study which found that REITS which are classified as winners often have a book-to-market ratio of equity below 1.41. The minimum value of 0 recorded from Growth point properties is misleading as it suggests that Growth point's share price was 0 at that point which cannot be true. Rather than using these zero values (calculated by the author), the price-to-book value which is derived directly from Inet database of 227.0 (for the year 2006), is used for analysis. This high value is indicative of an overvalued stock. The highest value of 93.58 belongs to Vukile for the year 2015. Interestingly, after issuing their results in 2014, the company announced that they expected the stock to outperform the market in future which could have been positively perceived by investors and hence driven the demand the following year (Mhlanga, 2014).

In contrast to Fama and French (1992)'s assertion that a stock with a high book-to-market value of equity ratio generally also has a high earnings-to-price ratio, the average earnings-to-price ratio of 0.59 is considerably lower than expected. Addae-dappah *et al.* (2012) associate a low earnings price with a growth stock one whose performance is expected to grow in future. This is in line with the recorded average cash flow price ratio of 94 (whilst the maximum recorded value is 187) as Pham (2010) indicates that the higher the value the more attractive the investment is as it is indicative of investors' expectation of higher growth in the future (Pham, 2010).

Given that more than 80% of the listed stocks are currently listed as REITs, one would expect that the debt-to-equity ratio (would be as per the REIT structure requirement however only 2

years of REIT data have been included in the sample period. It is also not surprising that the maximum debt-to-equity recorded is from a stock belonging to a company that is primarily a financial service provider. The high value was also registered before the REIT legislation of 2013. Like common growth stock, listed property stocks on average have a price-to-earnings ratio ranging from 15 to 28. Pham (2010) suggests that values higher than that range are usually indicative of investor's expectation of the stock to exhibit higher performance in future.

Table 7: Pearson Correlation table

Variable	Return	Size	Ratio of Book value of equity to Market value of Equity	Earnings-to-price Ratio	Cashflow-to-price Ratio	Debt to Equity Ratio	Long Term Interest Rates	Change in long term interest rates	Overall Foreign market Conditions	Overall market Conditions
Return	1.000	-0.017	-0.065	-0.058	0.155	0.029	-0.179	0.142	0.285	0.523
Size	-0.017	1.000	0.032	0.038	-0.005	-0.015	0.305	0.494	0.054	0.033
Ratio of Book value of equity to Market value of Equity	-0.065	0.032	1.000	0.054	0.006	-0.037	0.083	-0.082	-0.044	-0.065
Earnings-to-price Ratio	-0.058	0.038	0.054	1.000	0.134	-0.329	-0.002	-0.057	-0.118	-0.120
Cashflow-to-price Ratio	0.155	-0.055	0.006	0.134	1.000	-0.015	-0.100	0.016	0.128	0.173
Debt to Equity Ratio	0.029	-0.015	-0.037	-0.329	-0.015	1.000	0.015	0.018	0.104	0.082
Long Term Interest Rates	-0.179	0.305	0.083	-0.002	-0.100	0.015	1.000	-0.008	0.202	-0.312
Change in long term interest rates	0.142	0.494	-0.082	-0.057	0.016	0.018	-0.008	1.000	-0.185	0.008
Overall Foreign Market Conditions	0.285	0.054	-0.044	-0.118	0.128	0.104	0.202	-0.185	1.000	0.714
Overall market Conditions	0.523	0.033	-0.065	-0.120	0.173	0.082	-0.312	0.008	0.714	1.000

Correlations

Pearson correlation between variables

Table 7 above shows the correlation coefficient between variables calculated using the Pearson's Correlation Coefficient Formula. A ratio of 1 shows a high tendency of variables to move together should they be affected by the same factor. The most significant correlation observed is between the overall market conditions and the foreign market conditions at 0.714 which is consistent with expectations. As previously stated, where a high correlation exists between variables, one has to be dropped for statistical inferences to be valid.

Although the observed signs between book-to-market value of equity and the cashflow to price as well as the cashflow-to-price and earnings conform to previous studies, the strength of the relationships is significantly weaker than expected. This is surprising given the definitions used for the variables; a common denominator (market value) exists amongst the variables. Particularly for the cashflow-to-price ratio and the earnings-to-price ratio, the numerators used in the respective calculation are very similar.

In contrast to Basiewicz and Auret (2009), who found a high correlation of 0.78 between cashflow-to-price ratio and earnings-to-price ratio, the study only found a weak correlation of 0.012. Given that the book-to-market value as well as the earnings-to-price ratio data was not readily available on Inet database; the derived calculations may have distorted the data.

Correlation of variables with independent variable

The simple correlation between return and all the other variables indicates a high positive correlation between return and the overall market condition as well as return and overall foreign market condition. It is thus expected that these variables will be significant in the regression. Particularly, the small firm effect is observed in the South African market, although the correlation is low, it is expected that the smaller the firm the higher the return. It

is further observed that correlation of the long-term interest rate proxied by the change in the yield of long-term government bonds is slightly higher than the yield itself.

Partial correlation and semi partial correlation

Table 8: Partial and Semi partial correlation table

Variable	Partial Correlation	Semi partial correlation	Significance Value
Size	-0.1476	-0.1226	0.0487**
Ratio of Book value of equity to Market value of Equity	-0.0271	-0.0222	0.7191
Earnings-to-price Ratio	0.0076	0.0063	0.9191
Cashflow-to-price Ratio	0.0714	0.0588	0.3421
Debt to Equity Ratio	-0.0134	-0.0110	0.8587
Long Term Interest Rates	0.1255	0.1039	0.0942*
Change in long term interest rates	0.1612	0.1341	0.0312**
Overall Foreign market Conditions	-0.1449	-0.1203	0.0529*
Overall market Conditions	0.4040	0.3628	0.000***
*** p<0.01, ** p<0.05, * p<0.1			

With reference to Table 8 above, the correlation of the overall market condition with return persists even when all the other variables are held constant. It is also noted that when all other factors are held constant, direction of the relationship between return and earnings-to-price ratio (-veto +ve), return and debt to equity ratio (+ve to –ve), return and long term interest rate (as proxied by the yield) (-ve to +ve) and foreign market and return (+ve to –ve) change. The small firm effect persists even when all other factors are held constant; even so the magnitude of the relationship increases. Interestingly the change in the yield of long term government bond is still more correlated to return than the yield itself and significant at the 5% level as opposed to the 10 % for the yield. On the whole, overall market condition, overall foreign market condition, size and long term interest rate are significant in the

relationship with return, even with all other factors held constant. The overall market condition's contribution to the variance is higher than any other factor.

Regression Model

Table 9: Results of the OLS regression run with the change in the long term yield vs. the results of the OLS with the yield in long term interest rate

Variable	OLS with yield	OLS with change in the yield
Size	-0.7077	-1.1328
	(0.6886)	(0.7481)
Ratio of Book value of equity to Market value of Equity	-0.1253	-0.0457
	(0.2042)	(0.2039)
Earnings-to-price Ratio	-0.2764	0.1224
	(2.1503)	(2.1506)
Cashflow-to-price Ratio	0.0295	0.0229
	(0.2634)	(0.0262)
Debt to Equity Ratio	-0.0013	-0.0017
	(0.0097)	0.0097
Long Term Interest Rates	**0.0381**	**34.8252****
	(0.0219)	(15.7000)
Overall Foreign market Conditions	-0.4486*	-0.1510
	(0.1687)	(0.1341)
Overall market Conditions	1.0900***	0.82***
	(0.1723)	(0.1272)
*** p<0.01, ** p<0.05, * p<0.1		

The results of the normal ordinary least square regression run using the two different proxies are recorded in the Table 9 above. It is noted that only the change in the yield for long term government bond is significant in explaining returns. For this reason, as well as the reported semi and partial correlation results the change in the yield will be the preferred proxy for long term interest rate. However, it is noted that its inclusion invalidates the significance of the overall market condition.

OLS *Regression vs. Fixed Effect vs. Random Effect*

Table 10: OLS vs. Fixed effect vs. Random Effect

Variable	OLS Regression	Fixed Effects	Random Effects
Size	-1.1330	-0.5190	-1.0310
	0.7480	1.4160	0.9220
Ratio of Book value of equity to Market value of Equity	0.0457	-0.0693**	-0.0568*
	0.2040	0.0303	0.0296
Earnings-to-price Ratio	0.1220	0.0953	0.1200
	2.1510	3.0310	2.9740
Cashflow-to-price Ratio	0.0229	0.0093	0.0191
	0.0263	0.0299	0.0299
Debt to Equity Ratio	-0.0017	-0.0009	-0.0011
	0.0097	0.0061	0.0053
Long Term Interest Rates	34.83**	Omitted due to collinearity	32.11**
	15.7100		15.1500
Overall Foreign market Conditions	-0.1510	1.7860	-0.1570
	0.1340	2.6890	0.1880
Overall market Conditions	0.820***	Omitted due to collinearity	0.833***
	0.1270		0.1210
Constant	-20.0300	1.4280	-19.4300
	16.2900	14.2100	17.2900
Observations	187	187	187
R-squared	0.3140	0.0080	0.3064
TESTS			
Wald Test	Wald chi2(1)		108.74
	Prob> chi2		0.0000
LM Test	chibar2(01)		13.35
	Prob> chibar2		0.0001
Hausman Test	chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)		-18.34
	Prob> chi2		0.0000
*** p<0.01, ** p<0.05, * p<0.1			

Table 10 above presents the results of the regression for the OLS, fixed effect and random effects regression. The fixed effect model has the least R squared of all three models, only 8% of the variance in adjusted returns is explained by the dependent variables. However, it noted that due to collinearity, two variables long term interest and the overall market condition are omitted automatically by Stata when the regression was run. Whilst this collinearity was observed earlier, it is noted that Stata actually omits variables which were found to have a high correlation with return. Only the book market is found to be significant in explaining return, although the sign is contrary to observation made in prior literature such as Yong *et al*. (2009), and Pham (2010) who found a positive correlation between book-to-market value of equity and adjusted return.

The OLS regression has the highest *r squared* at 31.4%, 31.4% of the variance in return is explained by the variables. Only two of the variables, long term interest and the overall market condition are found to be significant in explaining return. A positive relationship is observed between both variables and return. The positive relationship is contrary to observation made by both Ratcliffe and Dimovski (2007) and Allen *et al*. (2000), who found a negative relationship between return and long term interest rates.

The return on the JSE is assumed to be representative of the underlying economic environment and thus it is not surprising that return is positively correlated to the JSE. It is expected that when overall market conditions are favourable, and return on listed property return will be positive.

Perhaps the least surprising is the positive correlation between adjusted return and the return on the Johannesburg Stock exchange. Since it is proxy for overall market condition, it is expected that when market conditions are favourable stocks tend to also do well. Yong *et al*. (1999) also purport to this high integration of the listed property market with the general stock market. The overall market condition was observed on the semi partial correlation to be most correlated with return amongst all other factors.

On the contrary, the observed relationship between long term interest rates and return suggest that as interest rates raise rise, return also increases. Allen *et al*. (2000) propose that the long-term interest represents expectation about future interest rates. Interest rates can thus affect listed property stock in a number of ways; higher cost of borrowing may reduce the demand

for the underlying physical assets or increase the cost of finance for investors. On the other hand, increases in interest rates are generally reflective of stronger economic growth and a higher expected inflation rate which is likely to drive up real estate prices, the effect of this could likely offset the expected prior negative relationship between interest rates and return (Allen *et al*., 2010).

The above factors as well as the book-to-market ratio of equity are found to be significant in explaining returns in the random effect regression. 30.6% of the variance in this regression is explained by the explanatory variables. The book-to-market value of equity is, however, less significant at 10% compared to 5% significance observed in the fixed effect regression.

It is worth noting that although the sign reported for the size variable affirms the small size effect as reported by general stock studies in South African markets such as Van Rensburg and Robertson (2003), the variable itself is found to be insignificant in contrast to the findings of a vast number of researchers who have argued that amongst other firm-specific variables, size has one of the most significant influence on the return of stock (Ambrose and Linneman (2001) Mohamad *et al*. (2014), Alias and SoiTho (2012), Liow (2010), Ro and Ziobrowski (2011)). Van Rensburg and Robertson (2003) argue that the reason for the absence of the size effect may be attributable to two factors, the use of a small sample size and the exclusion of small firms in the sample. This is not surprising given that the study uses data from 25 listed companies with an average market capitalization of R 10.4 billion. Ali (2006)'s study is one of the few studies in literature that have provided a guideline for defining the size of a firm, small firms are defined as firms with a market capitalization of less than R 1.0 billion[11]. This threshold is far less than average size of the firm recorded in this study and remarkably only 15% of the 187 observations of market value fall below that threshold.

Model choice

The results of the Wald test as shown in Table 10 show a probability value which is less than 5% and thus the null is rejected. Pooled OLS regression is thus not an efficient estimator and is rejected over the fixed effect model. These results are further confirmed by the LM test which also rejects the OLS over the random effect, as the p value is also less than 5%. Since

[11] Since the study is based on the Malaysian market, the value is based on the conversion of the given value from the study from Malaysian Ringgit to South African Rand using exchange rate of the year (2006) the study was published.

the P value of the Hausman test is less than 5% we reject the null and accept that the fixed effect model is the more appropriate model to use to model return.

Diagnostic tests

The results of the diagnostic test run on the fixed effect model are presented below.

Multicollinearity

Table 11: Multicollinearity results

Variable	VIF	1/VIF
Overall Foreign market Conditions	2.34	0.42734
Overall market Conditions	2.19	0.455693
Long Term Interest Rates	1.54	0.647974
Size	1.43	0.701176
Earnings-to-price Ratio	1.18	0.847554
Debt to Equity Ratio	1.13	0.886521
Cashflow-to-price Ratio	1.07	0.934644
Ratio of Book value of equity to Market value of Equity	1.02	0.979072
Mean VIF	1.49	

VIF and tolerance factors as derived from Stata in Table 11 above show that on average the multicollinearity is not high as it is below 2. However, the overall foreign market conditions as well as the overall South African market conditions have VIF factors above 2, which is indicative of high collinearity. The results are not surprising given that when the fixed effect regression was run the overall market condition was omitted due to collinearity. The previous exclusion of the long-term interest is not surprising as it has the third highest VIF factor although below 2.

Normality

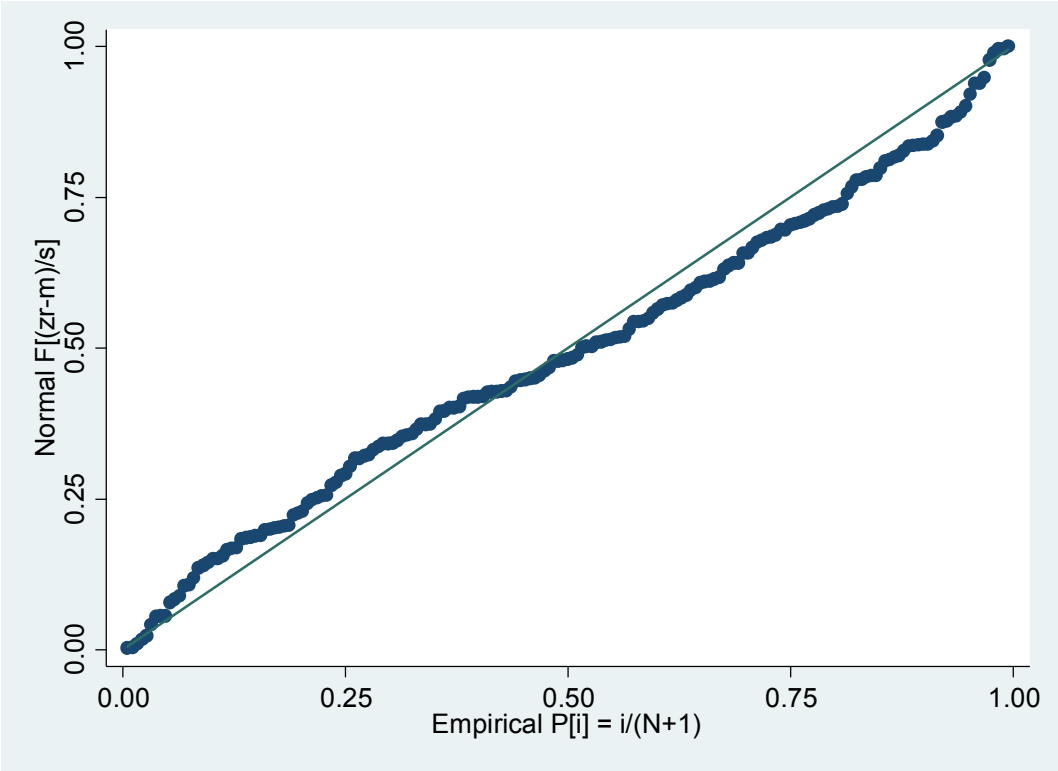

Figure 3: PP Plot for normality

The PP plot in Figure 3 above is derived from Stata and it shows that data is not seriously deviated from the straight line which confirms that it is normally distributed.

Heteroscedasticity

Table 12: Heteroscedasticity

Heteroscedasticity
H0: sigma(i)^2 = sigma^2 for all i
chi2 (12) = 288.32
Prob>chi2 = 0.0000

The results of the heteroscedasticity test are presented in Table 12 above. The null of the test assumes that there is a constant variance – homoscedasticity. The P value above shows that the null is significant and thus we conclude that heteroscedasticity is present in the model.

4.2. Discussion of the results

Although the fixed effect regression is found to be superior in explaining the determinants of real estate stock returns, it is worth noting that the presence of heteroscedasticity in the data set, as argued by Gujarati (2011) means that the estimators are no longer best estimators although still linear and unbiased. Furthermore, when the fixed effect regression is run, Stata automatically precludes two important factors (long term interest rate and overall market condition) due to the presence of multi collinearity. This is surprising since the significance of the overall market condition as well as the long term interest is persistent across the OLS and random effects model. The long-term interest rate was found to be the most correlated with return when all other factors were held constant. What is more surprising is that when S & P 500 is manually excluded from the regression (Refer to Appendix A), the return on the Johannesburg Stock Exchange is still precluded from the regression with Stata still citing the presence of multi collinearity. This omission also obliterates the significance of the long-term interest rates, a factor that has been consistently found in literature to have a significant influence on return.

It is worth noting that researchers such as Clarke and Linzer (2014) suggest that the mere rejection of the random effect based on the Hausman may not be sufficient as in most application the true correlation between the covariates and the unit effect is not exactly zero. The rejection of the null could thus be that the Hausman test failed to distinguish between zero correlation and a small correlation. Consequently, other factors such as sample size, effect size of the independent variable, correlation between the independent variable and unit effects should play a role on deciding between the two models.

Nevertheless, the results of the book-to-market value of equity ratio, although contrary to accepted literature, suggest an inverse relationship between book-to-market value ratio and adjusted return of a stock. The higher the book-to-market ratio (undervalued stock) the lower

its adjusted return. A high book-to-market ratio represents a low price of a stock relative to its book value, indicative of the market's poor expectation (Fama and French, 1992). The inverse relationship suggests that the lower book market ratio which is associated with lower risk tends to exhibit superior returns which is contrary to efficient pricing theory. Auret and Sinclaire (2006) argue that investors tend to be more attracted to risky assets as they are compensated by higher returns. This is also supported by Chen and Zhang (1998), who suggest that the superior return associated with high book-to-market value ratio compensates the investors as it bellies the tendency of the stocks to be in distress, highly leveraged and with uncertain future prospects. Cheng and Zhang (1998)'s study, though, found that this superior return of stock with a high book to market ratio is not persistent across all markets and is thus more pronounced in established markets, less common in growth markets and almost non-existent in high growth markets. The authors suggest that investors in high growth markets are not so naïve as to project poor performance of stock into the future. Remarkably, despite the contrary behaviour of listed property stock, the results of this study support Fama and French (1992)'s findings that the book-to-market is more powerful than size as an explanatory variable of return. The influence of size in this study has been diminished by the book-to-market value of equity ratio.

5. CHAPTER FIVE: CONCLUSION

The objective of this study was to identify the macroeconomic and firm-specific determinants of listed property stock in South Africa. The sample data consisted of 25 property stock currently listed on the Johannesburg Stock Exchange, of which 80% are currently listed as Real Estate Investment Trusts. The data was collected from 2004 to 2015 on the annual return data of the stock, 5 firm-specific characteristics (size, book-to-market ratio, earnings-to-price ratio, cashflow-to-price ratio and debt-to-equity ratio) and 4 macro-economic variables (short term interest rates, long term interest rates, the return on the Johannesburg Stock Exchange and the return on the S and P 500).

The results of the regression model on the 9 collected variables reveal some influence on the excess return of listed property. 8% percent of the variance in excess return is explained by only the book to market ratio of equity. A premium is attached to listed property stock that exhibit low book-to-market ratio, Investors are thus more rewarded by including in their portfolio, stock with a low book to market ratio. Contrary to evidence from a majority of the findings in literature, the size effect is not observed in this study hence supporting the notion that the book-to-market value of equity ratio provides a more superior determinant of return also absorbing the effects of leverage and cashflow-to-price ratio as expected. Also, confirming to literature was the absence of the influence of the earnings-to-price ratio in the presence of the ratio of book-to-market value of equity.

However, the presence of multicollinearity in the dataset resulted in some of the factors which were not only found to significant in prior literature, but were evidenced to have high partial correlation with return. The influence of the Johannesburg Stock Exchange as proxy for overall market condition as well as the change in the yield of long term interest rate as proxy of long term interest rate were found not to be significant in explaining listed property returns. Even though the S and P 500 is said to be integrated with the South African market, it was found not to have any influence on return. Although the departure from literature may be explained by the idiosyncrasy of the South African market; in that the factors may be the same but the significance and the direction of influence is determined by the country specific risks, as suggested by some researchers. It worth noting that perhaps there are certain

limitations in the data set itself. The more pertinent being the use of annual data owing to the majority of the firm-specific characteristics being only available on an annual basis on Inet database. This is due to the fact that the firm-specific characteristics are calculated from financial statements which are only publicly released annually. The result of this is a small sample which further restricts the use of portfolio which could perhaps improve results. The study could have been improved by the correction of heteroscedasticity, adapting more sophisticated methodologies, as well as including more variables especially the property related variables such as capitalization rates and property yields. Since risk is a crucial factor in return, perhaps using a proxy that captures the risk element could also improve the results. This research also raises several questions: Does the introduction of the REIT legislature affect the determinants? Do the structural differences between the listed property entities affect the determinants? Additionally, it would be worth considering which factors firm-specific or macroeconomic play a stronger influence or do the firm-specific characteristics influence how the stocks respond to the macro economic factors.

Nevertheless the results of the study appeal to a wide range of audience: investors can make informed decisions regarding which stocks to include in their portfolio; and fund managers can use this information to constantly appraise and manage the stocks in the portfolio. From an academic perspective, this study provides useful insight into the performance of listed property in developing markets and in particular the South African environment.

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7. APPENDICES

Appendix: Fixed Regression with S & P 500 omitted

Variable	Fixed Effects with S & P 500 OMITTED
Size	-0.5180
	1.4160
Ratio of Book value of equity to Market value of Equity	-0.0693**
	0.0303
Earnings to Price Ratio	0.0953
	3.0310
Cash flow to Price Ratio	0.0093
	0.0299
Debt to Equity Ratio	-0.0009
	0.0061
Long Term Interest Rates	0.0425
Overall Foreign market Conditions	1.7860
	2.6890
Overall market Conditions	Omitted due to collinearity
Constant	1.4280
	14.2100
Observations	187
R-squared	0.0020