Foreign Investment and South African Real Estate Investment Trusts (REITs)

By

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The following co-authors have contributed to the peer-reviewed articles:

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ABSTRACT

Real estate investment trusts (REIT) were introduced in South Africa in 2013 and follow the global REIT standard that originated in the US during the 1960s. The previously existing South African property investment vehicles, property unit trusts (PUTs) and property loan stocks (PLSs) were transformed to REITs. One of the main motivations for the introduction of REITs in South Africa was to make the listed-property sector more attractive to foreign investors. This dissertation investigated three research questions in the context of foreign investments in SA REITs. First, it analysed whether SA REITs are attractive to foreign investors from a portfolio point of view. Using quadratic programming and the perspective of a foreign investor with US REIT investments, this study found that adding SA REITs to a portfolio of US REITs has diversification benefits in terms of a reduced portfolio variance and an increased Sharpe ratio. However, SA REITs with predominantly foreign holdings, particularly in Europe, have superior diversification benefits to foreign investors compared to SA REITs with predominantly South African holdings. Second, this dissertation investigated the macroeconomic, capital and property-market factors that drove foreign investments in SA REITs after May 2013 (REIT period) and in the alternative listed-property vehicles prior to May 2013 (pre-REIT period). The results suggest that the impact of country-specific pull and non-country-specific push factors on foreign REIT investor behaviour changed over time, with push factors driving SA REIT investment in the REIT period and pull factors determining investment in the pre-REIT period. The impact of these factors on foreign REIT investments further differs for REIT market capitalisation (cap), with push factors driving large-cap REIT investments and pull factors affecting small-cap REIT investments. Thus, the attractiveness of SA REITs to foreign investors was not only driven by factors specific to South Africa, but

also by factors specific to other countries, particularly the US and Europe. Third, this dissertation aimed to answer whether the introduction of REITs in South Africa has met the objective of attracting more foreign investors and improved the liquidity in the listed-property market. Results suggest that, following the introduction of REITs, foreign investors have indeed had a significant impact on REIT share liquidity as captured by activity measures (turnover and trading volume). On the other hand, the introduction of REITs has eliminated the negative impact foreign investors had on the friction dimensions of liquidity (bid-ask spread and price impact). The findings of the three chapters in this dissertation contribute to the literature on international REIT investment, and investment in emerging markets such as South Africa in particular. In addition, the study has implications for REIT investors, SA REITs and policymakers concerned with attracting foreign portfolio investment and developing listed-property markets. Other emerging economies that are contemplating the adoption of the REIT structure are likely to benefit from the increasing knowledge regarding foreign REIT investments, particularly with regard to liquidity implications and foreign investment drivers.

AFRIKAANSE OPSOMMING

Eiendomsbeleggingstrusts (REITs) is in 2013 in Suid-Afrika bekend gestel en is gebaseer op die internasionale standaarde wat gedurende die 1960's in die VSA ontstaan het. Die bestaande eiendomstrukture, naamlik eiendomseffektetrusts (PUTs) en eiendomsleningsaandele (PLS's) is hiermee omskep in REITs. Een van die vernaamste redes vir die omskakeling na REITs was om Suid-Afrikaanse genoteerde eiendomsbeleggings meer aantreklik te maak vir internasionale beleggers. Hierdie studie ondersoek drie navorsingsvrae ten opsigte van buitelandse belegging in SA REITs. Eerstens ondersoek die studie of SA REITs aantreklik is vir buitelandse beleggers vanuit 'n portefeulje-oogpunt. Die studie beskou die beleggings vanuit die perspektief van 'n buitelandse belegger wat in VSA REITs belê het, en gebruik dan kwadratiese programmering om te toon dat, deur SA REITs by 'n portefeulje van VSA REITs te voeg, die belegger diversifikasievoordele ten opsigte van 'n laer portefeuljevariansie en 'n verhoogde Sharpe-maatstaf ontvang. Die studie vind egter dat SA REITs wat in internasionale eiendom (veral Europese eiendom) belê, beter diversifikasievoordele bied as REITs wat hoofsaaklik in Suid-Afrikaanse eiendom belê. Tweedens ondersoek die studie mikro-ekonomiese faktore en faktore in die kapitaalmark en eiendomsmark, wat beleggings in SA REITs na 2013 en beleggings in die alternatiewe opsies vir eiendomsbeleggings voor 2013 bepaal. Die resultate toon dat die impak van trek-faktore (met spesifieke lande verbind) en stoot-faktore (nie met spesifieke lande verbind nie) op die gedrag van buitelandse beleggers oor tyd verander het. Stoot-faktore was bepalend vir belegging in SA REITs in die tydperk nadat REITs ingestel is, en trek-faktore vir beleggings in soortgelyke instrumente in die periode voordat REITs ingestel is. Die impak van hierdie faktore op buitelandse belegging in SA REITs verskil ten opsigte van REITs se markkapitalisasie. Stoot-faktore bepaal die

belegging in REITs met 'n groot markkapitalisasie, en trek-faktore is bepalend vir belegging in REITs met 'n klein markkapitalisasie. Gevolglik word die aantreklikheid van SA REITs vir buitelandse beleggers nie net bepaal deur faktore wat spesifiek is aan Suid-Afrika nie, maar ook deur faktore wat spesifiek is aan ander lande, vernaamlik die VSA en Europa. Derdens beantwoord die studie die vraag of die bekendstelling van REITs wel geslaag het om meer buitelandse beleggers te lok en sodoende die likiditeit van die genoteerde-eiendomsmark verbeter het. Die resultate dui daarop dat die bekendstelling van die REITs wel 'n beduidende impak op REIT-likiditeit gehad het, soos blyk uit die aktiwiteitsmaatstawwe (omset en verhandelingsvolume). Die bekendstelling van REITs het ook die negatiewe impak wat buitelandse belegging gehad het op die wrywingsmaatstawwe (die verskil tussen pryse aangebied en pryse gevra, en die impak van verhandeling op pryse) van likiditeit in die tydperk na die instelling van REITs geëlimineer. Die bevindinge van die drie aspekte in die studie maak 'n bydrae tot die kennisbasis oor internasionale REIT-beleggings en kan deur beleidsvormers in Suid-Afrika en ander ontwikkelende lande gebruik word. Die bevindinge van die studie dra by tot die literatuur oor internasionale REIT-belegging en belegging in ontwikkelende lande soos Suid-Afrika. Die studie het implikasies vir REIT-beleggers, SA REITs en beleidvormers met betrekking tot die aansporing van portefeuljebelegging in SA REITs en die ontwikkeling van genoteerde-eiendomsmarkte. Ontwikkelende lande wat die REIT-struktuur oorweeg, kan verder moontlik baat vind by die kennisbasis oor REIT-beleggings deur buitelandse beleggers, veral ten opsigte van likiditeitsimplikasies en die bepalende faktore vir belegging in SA REITs.

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List of abbreviations and acronyms

CGT	Capital gains tax
JSE	Johannesburg Stock Exchange
PLS	Property loan stock
PUT	Property unit trust
REIT	Real estate investment trust
SA REITs	South African real estate investment trusts
SARS	South African Revenue Services
US	United States of America
UK	United Kingdom
SA	South Africa

CHAPTER 1

INTRODUCTION

1.1   Background

Real estate investment trusts (REITs) are either privately held or publicly listed entities that provide investors with the opportunity to indirectly invest in commercial real estate. By investing in a REIT, investors purchase equity interests in the real estate portfolio held by the respective REIT. Originally created in the US, real estate investment trusts (REITs) are becoming progressively relevant in the global listed real estate market investment landscape, with the REIT structure being established in more than 36 countries (Ernst & Young, 2016). In addition to developed countries in Europe and Asia, the REIT structure has been increasingly introduced in emerging countries, which has resulted in 157 publicly listed REITs in 16 emerging countries from Africa, Asia, the Middle East and Europe (NAREIT, 2016).

South Africa represents one of the countries that introduced the REIT structure. SA REITs, which were introduced in May 2013 are subject to the listing requirements of the Johannesburg Stock Exchange (JSE), which specify that a REIT must own property of at least R300 million; maintain a debt to gross asset value ratio of below 60%; have at least 75% of its income originating from property rental or indirect property ownership; distribute at least 75% of taxable earnings, and must have a risk management committee (SA REIT Association, 2016).

Prior to the introduction of REITs, the South African listed-property landscape consisted of two investment vehicles: property loan stocks (PLSs) and property unit trusts (PUTs), which were governed by different regulatory bodies that resulted in different taxation regulation. Despite the attractiveness of passive foreign property investment using listed-property vehicles, unfamiliar vehicles such as PUTs and PLSs,

were not internationally recognised (KPMG, 2013), which subsequently reduced its investment attractiveness, particularly from an international investor perspective. In addition, inconsistent tax treatment between these vehicles further increased foreign investment uncertainty (KPMG, 2013). In order to attract more foreign investors, the South African listed-property sector had to address the tax differences that stemmed from different regulatory bodies guiding the taxation of PUTs and PLSs.

The REIT structure brought about new tax legislation, the Section 25BB REIT tax dispensation act that allows for consistent tax treatment and affected taxation in a number of ways, which increased the attractiveness of SA REITs for foreign investors. With the implementation of the SA REIT structure in 2013, Property Unit Trusts (PUTs) were transformed to trust REITs and Property Loan Stock (PLSs) to company REITs and both were subject to the JSE REIT listing requirements and the Section 25BB REIT tax dispensation act that allows for consistent tax treatment.

Firstly, the tax dispensation provides for investors to be taxed as direct property investors in the REIT property, despite collective ownership thereof (KMPG, 2013). Secondly, qualifying distributions that include dividends are tax deductible for the REIT and taxable in the hands of the investor. Thirdly, REITs are exempt from capital gains tax, while the shareholder will be subject to capital gains tax upon the sale of the shares. Lastly, interest distributions to SA residents are treated as taxable dividends, despite REITs not withholding dividend taxes, implying that normal tax exemption is not applicable. However, tax exemption still applies to foreign investors (KPMG, 2013).

A detailed discussion on the difference between PUTs and PLSs with particular reference to governing regulation and taxation follows in the literature review.

1.2   Research problem and questions

Foreign inflows from international trade and investment are fundamental to improving South Africa's international liquidity and to alleviate the current account deficit, which further emphasises the need for foreign capital to grow the economy (De Beer, 2015). Foreign direct investment (FDI) and portfolio flows constitute the main components of foreign investment inflows, with South Africa being mainly reliant on portfolio flows that contribute approximately 50% to financial inflows (De Beer, 2015). The increasing importance of portfolio inflows is further emphasised by the decreasing contribution of FDIs from 36% in the pre-crisis period to 16% in the post-crisis period (De Beer, 2015).

The South African listed-property sector represents one of the largest JSE sectors based on market capitalisation, with four REITs included in the JSE Top 40 index (Mokopanele, 2017). Additionally, SA REITs are included in FTSE EPRA/NAREIT Emerging Index, representing the second largest market capitalisation with an index weighting of 9.55% (FTSE Russell, 2017). In this way SA REITs play an important role in attracting foreign investment. This aligns with one of the main motivations for implementing REITs, namely to increase the attractiveness of the SA REIT market to foreign investors and thus to attract new capital to the listed-property sector and increase liquidity. In fact, based on JSE data, net foreign investment in SA REITs increased almost 15 times during the second year after the introduction of the REIT structure. Despite decreasing in the third year, the net investment value increased more than seven times relative to the first year, providing evidence of elevated foreign investment levels since May 2013.

Initial evidence therefore suggests that the introduction of SA REITs has led to an increase in foreign REIT investments, supporting one of the main motivations of adopting the REIT structure (Ntuli and Akinsomi, 2017). However, the motivations of foreign investors to invest in SA REITs and the effect of their investments on SA REIT liquidity are not as clear. Understanding the motivations of foreign investors to invest in SA REITs is important to SA REITs, REIT investors and policymakers alike.

If the introduction of the REIT structure has led to an increased involvement of foreign investors in the listed-property sector, an increase in liquidity can be expected for individual SA REITs, which reduces their cost of capital and also increases their attractiveness for domestic investors. In turn, the improvements in funding for SA REITs can be expected to translate into more investment and development activity in commercial real estate markets and economic activity in South Africa. Additionally, considering the importance of portfolio flows for the SA economy, the stock market and REITs, an understanding of what drives foreign investors to invest in or divest from SA REITs is essential in order to understand REIT market movements. These movements, in turn, have liquidity and return implications for SA REIT investors, funding implications for SA REITs as well as development and investment implications for commercial real estate markets in South Africa. It is particularly important to understand the motivations of foreign investors to invest in SA REITs with regard to the characteristics of emerging markets, for example market volatility and market dynamics that differ from those of developed-market counterparts (Akinsomi et al., 2017b).

Consequently, the following research questions arise with regard to foreign investments in SA REITs:

1) From a portfolio perspective, are SA REITs attractive to foreign investors?

2) What factors drive the investments by foreign investors in SA REITs?

3) Did the introduction of SA REITs lead to improvements in market liquidity through foreign investments?

This dissertation serves to answer these three questions in order to assess the attractiveness of SA REITs to foreign investors and the effectiveness of introducing the REIT structure in South Africa with regard to the objectives of attracting foreign investors and increasing the liquidity in the listed-property market. The research questions were investigated in three papers submitted to scholarly peer-reviewed journals.

1.3   Contribution of the study

This dissertation is very timely and highly relevant considering that by 2017 the SA listed-property sector had grown exponentially to twenty times the size it was in 2003. It established itself as one of the largest sectors on the JSE, with a total market capitalisation of R380 billion in May 2017 (Rapp, 2017). In particular, this dissertation contributes to the scholarly literature and has implications for policymakers and REIT investors in the following ways.

Firstly, despite an extensive scholarly REIT literature, a limited number of studies exist that investigate foreign REIT investment. Overall, foreign-investment REIT studies are tilted towards developed-market REIT investigations (Liow et al., 2015; Eichholtz et al., 1998; Eichholtz et al., 2011), with a general lack of studies on foreign investment in emerging REIT markets such as Asia (Ooi et al., 2006) and South Africa. The increasing globalisation of real estate investment and the growing international adoption of the REIT structure, specifically by smaller developing real estate markets such as South Africa, created a gap in the literature with regard to foreign investment into these young REIT markets. A number of foreign investment

aspects are pertinent to REIT investors and policymakers alike, first of which is understanding the impact of implementing a new regulatory standard, the REIT structure, that aligns with the expectations of global REIT investors. However, limited studies provide insight into the implications of the introduction of the REIT structure for an existing listed-property sector, particularly with regard to international investors and the emerging country context. The listed-property sector in South Africa represented an excellent laboratory to investigate the impact of the REIT structure on market liquidity due to the availability of listed-property firms (PUT/PLS), which converted into SA REITs after the introduction of the REIT structure in 2013. While REIT market liquidity has been investigated for US REITs and developed countries (Glascock and Lu-Andrews, 2014; Cannon and Cole, 2011; Marcato and Ward, 2007; Clayton and MacKinnon, 2000), a similar analysis of emerging REIT markets such as South Africa is absent. As such, the findings of this study may be of value to policymakers and inform policy decision-making in other emerging markets – for example in Africa – that are considering the introduction of REITs. Furthermore, the study will contribute to the dearth of research on SA REITs.

Secondly, with foreign real estate representing an increasing component of global real estate portfolios, an understanding of the drivers of foreign investment are increasingly important to attract foreign investment to attract foreign investment and prevent disinvestment[1]. Additionally, previous investigations for push and pull factors considered the determinants of capital flows to developing countries with the intent to inform future policy design, with compensatory policies being appropriate for push factor dominance and direct policy amendments where pull factors drive capital flows (Taylor and Sarno, 1997). For international real estate investment, there are limited

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[1] Foreign investment in this context refers to foreign investors investing in SA REITs.

studies that primarily focus on pull factors as foreign investment drivers in making direct real estate investment decisions (Lieser and Groh, 2014; Mauck and Price, 2017). In addition, no study has investigated the pull and push factors of foreign REIT investments in particular, emphasising a gap in current literature. Apart from seeking diversification benefits by pursuing international investments based on pull factors (Ling and Naranjo, 2002), foreign investors are also chasing higher yields as they compare the opportunity cost of investment alternatives. As such, the findings of this study contribute to the literature on foreign equity (Albuquerque et al., 2009; Bohn and Tesar, 1996). Overall, this investigation complements existing literature and particularly contributes to scarce literature on emerging-market REIT investment. Furthermore, an understanding of the key drivers of foreign investment in developing market REITs will assist policymakers to adapt current policy to stimulate future foreign investment. It also provides foreign and domestic investors with insights that are valuable in developing investment strategies for SA REITs.

Thirdly, this study contributes to the literature on real estate portfolio management, particularly in an international context. The management of international portfolios and possible diversification benefits have been studied extensively for US investors (Conover et al., 2002; Gallo and Zhang, 2010; Hastings and Nordby, 2007). REIT performance in emerging countries such as Asia has been studied to gain a better understanding of the performance dynamics of the specific market as well as to determine the impact of including local securitised property in an international investment portfolio (Ooi, Newell and Sing, 2006). However, only a few studies exist regarding the diversification benefits for foreign investors who pursue emerging-market investments, particularly in the African context (Akinsomi et al., 2015; Barry and Rodriguez, 2004). The behaviour of emerging REIT investments in international

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portfolios, particularly of foreign investors with portfolios containing REITs in developed markets such as the US, is under-researched. More importantly, to my knowledge, this study is the first to evaluate the impact of the foreign asset-base of emerging-market REITs on the diversification benefits for foreign investors. Apart from the contribution to the scholarly literature, this investigation is valuable to the decision-making processes of foreign investors. With portfolio diversification as the main incentive for international real estate investment (Newell and Worzola, 1995), this study provides evidence of the diversification benefits resulting from the portfolio inclusion of SA REITs. As such, it provides foreign real estate investment practitioners with a better understanding of the potential contributions of SA REITs to international listed-property portfolios and assists in constructing optimal international REIT portfolios. This study furthermore provides foreign investors with insights into the SA REIT market, and improves the understanding of foreign investment in SA REITs, thereby reducing the risk adversity of investing in unknown African markets (Akinsomi et al., 2015).

The remainder of the thesis is structured as follows. Chapter 2 presents the literature overview. Chapter 3 investigates the first research question and assess if the inclusion of SA REITs are warranted in an international REIT portfolio. Chapter 4 answers the second research question by determining the drivers of foreign investment for US investors investing in SA REITs. Chapter 5 establishes whether the REIT regime attracted foreign investment and subsequently brought about increased liquidity relative to the pre-REIT period. Chapter 6 concludes the study by reviewing the extent to which the study answered the research questions and provide recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 The listed-property sector in South Africa

2.1.1   The listed-property sector in South Africa prior to 2013

During 2008 the South African National Treasury identified shortcomings in the SA listed-property market regulation. Regulation at the time was too restrictive and regulated only a portion of the market, and the listed-property market was not internationally competitive (Naidoo, 2014; National Treasury, 2007). A more liquid, transparent and tax-efficient listed-property investment structure was required (KPMG, 2013; Naidoo, 2014), especially by international investors.

Prior to the introduction of REITs, the publicly traded property investment vehicles in South Africa, property unit trusts (PUTs) and property loan stocks (PLSs), were not internationally recognised. In addition, these structures were taxed differently based on their legal form and governing regulations, with PUTs constituting trusts and PLSs being treated as companies (Kantilal, 2016; National Treasury, 2012). PUTs were collective property investment schemes and was regulated by the Collective Investment Schemes Control Act and the Financial Services Board (FSB). According to section 47(1) of the Collective Investment Schemes Act (45 of 2002), a collective investment scheme in property (CISP) is a portfolio consisting of real estate, foreign real estate investment, local or foreign property shares or foreign CISPs. Furthermore, the Act defines a property share as 'shares of a fixed property company or holding company with no subsidiaries except than that of fixed property companies that are wholly owned subsidiaries of that holding company' (Kantilal, 2016:12).

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According to Kantilal (2016:12), PLSs were treated as companies, which, according to section 1 of the Collective Investment Schemes Act (45 of 2002), subsection (e) included:

'ii) a portfolio of a collective investment scheme in securities in pursuance of any arrangement in terms of which members of the public (as defined in section 1 of the Collective Investment Schemes Act) are invited or permitted to contribute to and hold participatory interests in that portfolio through shares, units or any other form of participatory interests; or

'iii) portfolio of a collective investment scheme in property that qualifies as a REIT as defined in paragraph 13.1 (x) of the JSE listing requirements.'

Due to the different regulatory guidelines, PUTs were subject to more stringent regulation than PLSs. Apart from adhering to FSB and Collective Investment Scheme Control Act regulations (National Treasury, 2012), the FSB limited property investment to specific property types, including direct investment in real estate, indirect investment by acquiring shares in property companies, and debt-related investments (National Treasury, 2012). PUTs were furthermore also subject to the regulations of their trust deed and decision-making of the appointed management company. Conversely, the investment decision-making of PLSs was managed internally, with regulation guided by the South African Companies Act (71 of 2008) and JSE listing regulations (Kantilal, 2016). Not being regulated by the Collective Investments Schemes Control Act implies that PLS investments were not limited to certain investment types and they could invest in joint ventures and other non-property share companies (Kantilal, 2016).

With regard to taxation, PUTs were treated as vesting trusts that provided beneficiaries with a vested right in the total income and trust assets (SARS, 2014). Following the conduit principle, revenue retained its nature when distributed to investors and was taxed once in the hands of the investor. In addition, PUTs were exempt from capital gains tax, as it only applies to the beneficiaries upon the disposal of units held by beneficiaries. On the other hand, PLSs were subject to income tax at the applicable company tax rate of 28%. Unlike PUTs, the unit investment in a PLS company did not consist of property shares, but represented an equity and debenture component, with dividends distributed on the equity component and interest paid on the debenture component. In the hands of the investor, dividends are exempt from income tax and interest is exempt, subject to the applicable threshold determined by SARS (Kantilal, 2016). The dividend component was subject to dividend withholding tax of 15%. According to Moneyweb (2014), distributions to non-residents are still subject to the dividend withholding tax of 15%, but they enjoy the tax advantage of not having to pay CGT on the sale of their shares.

As such, different regulatory legislation resulted in inconsistent tax treatment between these structures, which was detrimental to foreign investment confidence (KPMG, 2013). Consequently, the REIT structure was introduced in 2013 to provide REITs and investors with the REIT design advantages of transparency, improved regulation and tax certainty.

2.1.2 The SA REIT industry

One of the most pertinent changes brought about by the REIT structure involved taxation. REIT tax legislation created similar tax treatment for the previous PLS and PUT structures and provided investors with greater tax certainty and incentivised REIT investments (KPMG, 2013). Effectively, Section 25BB tax legislation that governs

REIT taxation dictates that the investor is taxed as if the investment in property was direct and as such brings the taxation of listed-property investments in line with international standards (KPMG, 2013).

The new Section 25BB tax legislation has two main implications for SA REITs (Moneyweb, 2014). Firstly, interest distributions were reclassified as taxable dividends. This implies that the company no longer withholds the 15% dividend tax on distributions as with ordinary shares. The distribution is added to the investor's taxable income and taxed at the investor's marginal rate. This provides the REIT with a tax benefit, as all distributions paid to investors are tax deductible and the tax burden is absorbed by the investor. Secondly, SA REITs are exempt from capital gains tax (CGT) when property is sold or shares in another REIT or a controlled property company are disposed of (KPMG, 2013). These changes cause SA REITs to incur a lower tax burden that enables them to grow their commercial real estate portfolios.

The effect of the new taxation resulted in investors being taxed at a higher rate on REIT distributions compared to ordinary shares (Moneyweb, 2014). However, since the REITs enjoy a greater tax benefit from maximising distributions, this motivates maximum payout. The gain from selling the shares is treated in the same manner as ordinary shares. Revenue Services (SARS) determines the intent of the investment, with the return either subject to CGT (normally where shares were held for a period longer than three years) or income tax (normally where shares were held for a period of shorter than three years).

Apart from an effective tax system, foreign investors prioritise investor protection provided by a well-regulated and transparent investment structure. The REIT structure provides investors with a more transparent structure that is on par with global best practice (Lamprecht, 2013). In an effort to improve international standards

and transparency the SA REIT Association, in collaboration with the National Treasury, the South African Revenue Services (SARS) and the JSE, formulated and introduced best practice recommendations (BPR) at the beginning of 2016. The intent of the BPR is to improve financial reporting of SA REITs and they provide investors with greater comparability, consistency and transparency, which are important to increase the attractiveness of the SA listed-property sector among international investors (Smith, 2016). Table 2.1 provides an overview of the similarities and differences between the pre-REIT property investment vehicles and the current REIT structure.

Table 2.1: Characteristics of PUTs, PLSs and REITs

	PUTs	PLSs	REITs
Legal form	Trusts	Companies	Trusts and companies
Regulation	Collective Investment Scheme Control Act and Financial Services Board (FSB)	Companies Act (71 of 2008)	Company REITs: JSE Listing Requirements and the Companies Act Trust REITs: JSE Listing Requirements and Collective Investment Schemes Control Act
Management and decision-making	Decisions made by appointed management company in line with the trust deed	Internal decision-making in line with SA Companies Act (71 of 2008)	Company REITs: External or internal management Trust REITs: External management
Unit investment	Property share	Property share and debenture	Property share
Taxation	Income tax: Exempt if income is distributed to investors CGT: Not subject to CGT if profits are distributed	Income tax: Interest on debenture component exempt from income tax if distributed Dividends subject to dividend withholding tax CGT: Subject to CGT	Income tax: Exempt if a minimum of 75% of taxable income is distributed No dividend withholding tax, distribution added to investor's taxable income CGT: Not subject to CGT
Debt limitation	30% of underlying asset value	Debt level within limits set in company's articles of association.	60% of gross asset value
Investment limitation	Not allowed to invest in listed companies	Direct property investments Allowed to invest in listed companies	Income-producing property Allowed to invest in listed companies in the course of business

Source: Akinsomi and Pagiwa (2016); Boshoff and Bredell (2013); Kantilal (2016); KPMG (2013); SA REIT Association (2017c)

2.1.3   The impact of the REIT structure on the listed-property sector

With the introduction of the REIT structure in May 2013, the expectation existed that the listed-property sector could double in size within five years (Lamprecht, 2013). The REIT structure can have a significant impact on the market capitalisation and liquidity of the REIT market, as it enables investors to trade real estate in the form of securities (Lin, 2007). Japan has seen market capitalisation increasing 8.7 times over a five-year period and the number of REITs almost doubling since the introduction of REITs in 2001 (Ooi, Newell and Sing, 2006). Taiwan experienced an exponential increase in liquidity with the introduction of its first Taiwan REITs (T-REITs), achieving a fivefold oversubscription in terms of fund scale (Lin, 2007). In the UK the introduction of REITs led to significant growth, with the UK REIT market achieving fourth place in the world REIT ranking after just six months (Anuar and Soi Tho, 2011).

Similarly, a study by Naidoo (2014) conducted among a sample of property analysts, investors and owners/directors of property companies agrees that the REIT structure is expected to increase liquidity and long-term performance and growth in the SA listed-property sector. The SA REIT market displays exponential growth, evident from examples such as the 43% increase in market capitalisation in one year towards the end of the third quarter in 2015 and the monthly value of REIT trades having increased by 220% relative to five years ago (Rapp, 2015).

2.1.4 South African capital flows and foreign investment

South Africa's dependence on capital inflows is emphasised by its large current account deficit relative to other emerging markets (Miao et al., 2016) and its stagnant economic growth. As such, capital inflows alleviate economic pressure by reducing the cost of capital and motivating local investment and consumption, which improves economic growth (Rangasamy, 2014).

Foreign direct investment (FDI), portfolio flows and other investments constitute capital inflows, with portfolio flows being dominant since 2000, with the exception of 2008, and consistently contributing approximately half of all net financial inflows. Equity flows accounted for the bulk of portfolio flows, with minimal bond market inflows, as bond investments remain mainly domestic (Kahn, 2015). Conversely, FDI decreased over time from 36% (2000–2007) to 16% (2009–2014), reflecting the inability of FDI to consistently contribute to capital flows and leading to an increasing dependence on portfolio inflows (De Beer, 2015; Kahn, 2015). In this regard South Africa differs from its emerging-market counterparts, who largely depend on FDI. While FDI is more resistant to economic downturns, portfolio flows are more sensitive to changes in sentiment, which may result in portfolio outflows with an adverse economic impact (Ahmed et al., 2005). Consequently, an understanding of the factors affecting foreign investment sentiment is essential in attracting portfolio inflows and preventing portfolio reversals.

With capital flows to emerging markets having increased significantly since 2005 (Ahmed et al., 2005), South African markets, and the prominent emerging SA REIT market in particular, will benefit from capturing an increasing proportion of these available emerging-market flows, thereby contributing to SA portfolio flows and the growth of the local economy.

2.1.5   The emerging SA REIT market

As one of only two emerging REIT markets with a market capitalisation that exceeds USD15 billion, South Africa can be regarded as a mature emerging market that has already captured international real estate investment, as is reflected by the number of secondary listings on the JSE (Ernst and Young, 2016), and the increasing investment in SA REITs by offshore investors. Additionally, SA REITs are also included in prominent global indices such as the FTSE EPRA/NAREIT index and the S&P Global index. With regard to the FTSE EPRA/NAREIT index, South Africa represents the second largest market based on market capitalisation and also the only African country (Akinsomi et al., 2015). The SA REIT market also ranks among the top 10 REIT markets included in the S&P Global REIT index in terms of market capitalisation (S&P Dow Jones Indices, 2018). In terms of performance, SA REITs outperformed UK, European and Asian REITs within the first year of adopting the global REIT structure (Ntuli and Akinsomi, 2017). The SA REIT market can therefore be regarded as a noteworthy emerging REIT market and an attractive foreign investment alternative.

Based on shareholder value creation over the past five years, the top 100 companies incorporated nine REITs in 2016 (www.propertywheel.co.za, 2016), with four REITs being included in the JSE Top 40 index. This increasing prominence of SA REITs is captured by its market capitalisation growth and asset class performance. SA REITs display exceptional growth, with a one-year growth rate of 43% in August 2015 (Rapp, 2015) and continued growth of 24% to achieve a market capitalisation of R422 billion in November 2017 (Kilian, 2017). Relative to alternative asset classes, SA REITs provided superior performance over the past 20 years with an average annual

return of 19%, followed by equities (16%), bonds (12%) and cash (9%) (Williams, 2017).

2.1.6 The developed-market asset exposure of SA REITs

One characteristic of the South African listed-property sector is that it has substantial non-emerging-market exposure, with 60 to 65% of the JSE-listed asset value located outside SA across 25 countries (Van Niekerk, 2017). The main geographical locations of these assets are indicated in Table 2.2. In addition, a number of international REITs have secondary listings on the JSE. These 'pure play' firms, which own no SA real estate, are attractive to domestic investors who seek euro- or pound-based returns and provide investors with a hedge against the local currency.

Table 2.2: Geographical asset location of listed JSE real estate firms

Geographical location	Percentage of asset value
South Africa	36%
UK	32%
Rest of Europe	9%
Listed	9%
Australia	5%
Poland	4%
Romania	3%
Germany	1%
Africa	**1%**
Total	**100%**

Adapted from: Van Niekerk; SA REIT Journal (2017)
Source: Company data, Nedbank CIB

2.2 Literature on international real estate portfolios and investment

The first stream of literature relevant to this dissertation focuses on international real estate investment in the context of portfolio management. The main motivations for foreign investment cited in literature are risk-adjusted performance and diversification (Worzala, 1994; Geurts and Jaffe, 1995; Worzala and Sirmans, 2003). This risk-return trade-off is based on Markowitz's (1952, 1959) modern portfolio theory that posits that rational investors prefer portfolios with the lowest risk for a given level of return (Byrne and Lee, 1995). Stated differently, portfolio diversification provides opportunities for risk reduction, such as diversifying real estate portfolios to include offshore investments without compromising return (Geurts and Jaffe, 1995). The findings of multiple real estate diversification studies are based on MPT methodologies (Asabere et al., 1991; Liu and Mei, 1994, 1998; Quan and Titman, 1999). However, Worzala (1994) noted index models such as the capital asset pricing model (CAPM) and return correlations as alternative methods for making foreign real estate investment decisions. Alternative models such as the CAPM argue that excess returns stem from the investment's systemic risk, with the Fama and French (1993) three-factor model testing to what extent excess returns are a function of size, book value and market value (Allen et al., 2000). Additionally, two-factor and multifactor models can be used to investigate the effect of various REIT characteristics on returns (Allen et al., 2000).

Contradicting empirical results were found in the previous literature on the diversification benefits of international property investment. Studies on property in a mixed-asset portfolio proved that property is an effective portfolio diversifier, especially when international and local property investments are included (Stevenson, 2000). Furthermore, Hartzell, Watkins and Laposa (1996) found that listed real estate

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investments provided greater international diversification than international stock investments. Research by Yat-Hung, Joinkey and Bo-Sin (2008) also agrees that REITs provide the investor with portfolio diversification benefits, and an analysis by Stevenson (2000) established that international diversification benefits the investor, but that the result is only statistically significant if the returns are considered in the local currency and no limitations are set for optimising the portfolio.

On the other hand, Cheng, Ziobrowski, Caines and Ziobrowski (1999) state that diversification benefits stem from the low correlation between local and foreign returns. They argue that foreign property is not likely to offer significant diversification benefits and that investors should hold just enough to enjoy the diversification benefit and not allow the risk of foreign investment to exceed the benefits received. An investigation by Ziobrowski and Curcio (1991) demonstrated the diversification benefits for foreign investors in US property and determined that even though US property displays a low correlation with UK and Japanese property, the risk of investment dilutes the benefits received. It is therefore important to consider the emerging-market context that introduces risk concerns for foreign investors.

Return and risk are the two main themes that underpin REIT investment performance. First, investors are driven by higher return potential. According to Newell and Worzala (1995), international portfolio diversification was the main motivator for international property investment, followed by the higher returns. The main diversification benefit sought was due to the fact that property markets behave differently, which in turn affects returns. Asabere, Kleiman and McGowan (1991) stress the potential for international diversification to improve portfolio performance by either providing higher returns for the same level of risk, or lower risk for the same level of returns. However, emerging countries are characterised by higher investment

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growth, but also by higher country-level risk (Conner and Liang, 2006). This introduces the question of whether international securitised property investments, specifically in emerging markets, have the potential to reduce the investment risk of a REIT-only portfolio. A study by Giliberto and Testa (1990) found that international securitised property investments display risk-reduction benefits within a listed-property portfolio. Similarly, Gordon, Canter and Webb (1998) suggested possible risk-reduction benefits from adding international listed property to a US portfolio. Lastly, Pierzak (2001) presented that the risk-adjusted listed-property portfolio performance improves with the addition of internationally listed property.

Investigations into the portfolio benefits of Asian REITs suggest that foreign investment in Asian REITs improves returns, outperforming US REITs (Brounen et al., 2012; Gallo and Zhang, 2010), and provides diversification benefits for real estate funds with investments in Asian real estate firms (Bond et al., 2003; Garvey et al., 2001). However, the diversification opportunities to emerging markets such as Africa (Gibilaro et al., 2016; Akinsomi et al., 2015; Barry and Rodriguez, 2004) are under-investigated. Additionally, previous studies ignore the impact of the geographical focus of emerging-market REITs on the diversification benefits for foreign investors. Previous studies that analysed portfolio performance and diversification benefits by including listed-property investments from emerging countries (Lu and Mei, 1999; Hu and Mei, 1999) did not investigate how these investments perform in relation to developed-market investments (Barry and Rodriguez, 2004), and furthermore failed to consider portfolio optimisation of a REIT-only portfolio. This is an important consideration as SA REITs vary with their exposure to the South African and foreign real estate markets. As such, the study complements existing literature on international real estate diversification and has value for real estate investors in constructing their

international portfolios. Additionally, the study may also be of value to other emerging countries that tilt their investment focus towards developed countries due to home-market conditions like the limited stock of suitable investment-grade real estate, and economic or political volatility.

This study attempted to fill this current gap in the literature and hypothesised that the extension of US REIT portfolios to include SA REITs will reduce portfolio variance and improve diversification benefits and the risk-adjusted portfolio performance.

2.3 Literature on foreign investment drivers

A number of studies argue that a combination of push and pull factors explains international capital flows (Fernández-Arias and Montiel, 1996; De Vita and Kyaw, 2008) and specifically equity flows to developing countries (Taylor and Sarno, 1997). Push factors are exogenous and determined by foreign-market economic and capital market conditions. Examples include an economic slowdown (Taylor and Sarno, 1997) and deteriorating US interest rates that are considered a prominent push force in determining capital flows to developing countries (Fernández-Arias and Montiel, 1996; De Vita and Kyaw, 2008). In contrast, pull factors are endogenous and country-specific factors that increase the attractiveness of the home market, such as improved economic performance (Taylor and Sarno, 1997; De Vita and Kyaw, 2008). With the relative investment attractiveness of developed markets, one can argue that pull factors dominate investment decision-making with respect to developed markets. However, within the emerging-market context the question arises if pull or pull factors dominate foreign investment. De Vita and Kyaw (2008) determined that both push and pull factors are relevant for foreign direct investment and portfolio flows to developing countries Fratzscher (2011) found that country-specific pull factors largely explain

capital flows to emerging markets. On the other hand, in a study investigating portfolio flows to Latin American and Asian countries, the authors found push factors to be the dominant drivers of equity flows (Chuhan et al., 1993).

Compared to general capital flows, the literature on pull and push factors for international real estate investments is relatively under-developed (Mauck and Price, 2017). Previous studies focus predominantly on pull factors as they relate to direct real estate investment. Lieser and Groh (2014) that investigated country-specific factors that attract foreign real estate investors, and by Mauck and Price (2017) that focused on pull factors for investors in unsecuritised real estate, Hamelink and Hoesli (2004) determined that country-specific risk factors outweigh property-type factors in the making of foreign investment decisions. Economic, capital market, socio-cultural and political conditions, as well as investment opportunities and protection along with the legal structure, were found to impact foreign investment decision-making (Lieser and Groh, 2014; Mauck and Price, 2017).

Capital flows into the US equity REITs impact returns (Ling and Naranjo, 2002). Similarly, for emerging markets, capital inflows were found to increase stock prices (Bekaert et al., 2002; Clarke and Berko, 1997; Froot et al., 2001), with a positive relationship between international capital flows and returns (Brennan and Coa, 1997; Tesar and Werner, 1995a, 1995b). Despite earlier investigations into the effect of capital flows on REIT return and value, the drivers of foreign REIT investments in general have been neglected in the real estate literature. Additionally, no previous study investigates the push and pull factors of foreign REIT investments in emerging countries, even though the importance of pull and push factors for capital flows into emerging countries has been established by previous non-real estate studies (Fratzscher, 2011; Chuhan et al., 1993). Foreign capital is vital in growing the market

capitalisation of young emerging REIT markets such as Asia (Ooi et al., 2006) and South Africa. In fact, successful REIT markets are characterised by active foreign investment, making the attraction of foreign capital a prerequisite (Reuters News, 2005). Consequently, SA REITs require a better understanding of what drives REIT investment into South Africa to attract foreign investment and prevent capital outflows. Additionally, international investors benefit from the knowledge of past foreign investor behaviour in making investment decisions.

2.3.1 Foreign investment pull factors

The first pull factor that was considered was government bonds. A recent investor intentions survey (CBRE, 2017) revealed that the main motivation for investing in real estate is its attractive yield in relation to alternative asset classes like government bonds. As such, in line with literature (Glascock et al., 2000), bonds can be viewed as an investment alternative for REIT investors. The suitability of REITs as an investment alternative is supported by studies explaining their bond-like characteristics. Foremost, REITs pay out a high percentage of their income as dividends, providing a high degree of cash-flow certainty for investors. Hence, equity REITs display fixed-income investment characteristics (Giliberto et al., 2017). Additionally, REITs yield higher returns at lower risk than stocks (Brounen et al., 2012), which may be partly explained by the underlying long-term rental agreements of equity REITs (Peterson et al., 1997). However, during the 1990s the US REIT market, which originated in 1960, experienced a weakening in the REIT-bond correlation along with a strengthening of the REIT-equity correlation. This was partly a result of the maturing REIT market that became increasingly integrated with the equity market (Chong et al., 2009). Studies support the changing correlation as the REIT market matures, with Glascock, Lu and So (2000) stating a negative correlation

with equity for the earlier period from 1980 to 1991, and Ling and Naranjo (2002) showing a positive equity correlation for 1979 to 2002. Hence, given the nascent nature of the SA REIT market, a high correlation between SA REITs and bonds is expected. Unsurprisingly, the SA REIT Association Monthly Chartbook for December 2016 reported a high correlation between the total returns for SA REITs and the All Bond Index (0.70) for the period December 2006 to December 2016[2]. Consequently, the study expected foreign REIT investors to invest (divest) in SA REITs as SA government bond prices weaken (improve).

The second pull factor is the South African prime interest rates, which represent the cost of real estate funding. A recent survey measuring investor intentions noted fast increases in interest rates as the main concern among real estate investors (CBRE, 2017). For REIT investors, rising interest rates negatively affect REITs cash flows, profitability and consequently investor performance, making investment less attractive. Several studies investigated the impact of interest rate movements on REITs. High interest rates negatively affect discounted future cash flows and subsequent REIT prices (Hong et al., 2013). As rising interest rates increase the cost of real estate funding, the demand for real estate reduces and return expectations rise (Allen et al., 2000). Lui and Zhang (2008) confirmed the negative relationship between REIT returns and interest rates. Equity REITs in particular have been found to be highly sensitive to interest rate movements during specific shorter periods, with their long-term effect on REITs remaining uncertain (Giliberto et al., 2017; Shulman, 2015). Following the literature, a negative relationship was expected with REIT foreign investors divesting (investing) as the prime interest rate increases (reduce). In addition,

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[2] Correlation is calculated using the historic data (including pre-REIT-period data) of all SA REITs.

investors also follow credit ratings, which determine the cost of sovereign debt (Bekaert, 1995).

The third pull factor, the capitalisation rate, is indicative of the South African commercial real estate market, which represents the underlying assets of REITs. Capital flows to international real estate increase when the availability of attractive US investments decreases, as characterised by high pricing, low cap rates and slowing economic activity (Hastings and Nordby, 2007). Conversely, studies state that investors favour low cap rates indicating low investment risk and favourable commercial market conditions. Following studies that imply a negative correlation between cap rates and foreign investment activity, the study expected foreign investors to invest (divest) when cap rates are low (high) relative to their home market.

The stock-market performance is a fourth pull factor. Evidence exists of the close relationship between securitised real estate and the stock market (Myer et al., 1993). As such, investors use information from benchmark portfolios such as the S&P500 (Aurelio, 2006) as indicators of overall market performance. In line with literature, this study expected foreign investors to follow the movements of the emerging-market overall stock market as an indicator of expected REIT performance. Conversely, Subrahmanyam (2007) found that stock-market flows have a negative impact on REIT order flows, resulting in REITs substituting lower-performing stock investments. Stated differently, REIT liquidity follows stock-market liquidity (Subrahmanyam, 2007). As such, the expectation exists that foreign investment in SA REITs displays similar behaviour, with foreign investment increasing (decreasing) as the JSE ALSI increases (decreases).

The last pull factor captures economic growth, in line with the argument of Lieser and Groh (2014), who argued that economic growth attracts real estate investment. GDP

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growth, inflation and unemployment are all indicative of economic activity and exhibit a significant relationship with composite property returns (Lieser and Groh, 2011). Studies furthermore found a close relation between REIT returns, REIT risk and macroeconomic risk factors (Karolyi et al., 1998) like inflation, industrial production and the interest rate term and risk structure (Chan et al., 1990). As a result, deteriorating economic conditions in the investor's home market may motivate investment in alternative, better-performing markets. Hence, a positive relationship between macroeconomic activity captured by GDP growth and foreign investment is expected, leading to an investment (divestment) as GDP growth indicators improve (deteriorate).

2.3.2 Foreign investment push factors

The first push factor is exchange rates. Newell et al. (1995) found that while portfolio risk increases when currency risk is accounted for, investors still benefit from additional diversification benefits. However, the potentially adverse impact of exchange rates remains a concern for international investors having to account for returns in their local currency (Hastings et al., 2007). Despite foreign investment opportunities offering attractive returns, negative exchange rate movements can potentially eradicate returns and even result in investment losses. Hence, the benefit of the investment must outweigh the costs (Lieser et al., 2014). Hastings and Nordby (2007) add that where a positive correlation between foreign-market returns and the exchange rate exists, return volatility is amplified. In line with the literature, the study expected exchange rates to have a significant impact on REIT foreign investment, with a higher (lower) foreign exchange rate reducing (increasing) investment returns and foreign divestment (investment).

The US REIT industry represents the second push factor. SA REITs provide investors with a potential investment alternative to certain REIT investments like small-cap REITs. Additionally, US REIT investors will consider better-performing investment alternatives during periods of decreasing US commercial real estate performance. Lu, Tse and Williams (2013) confirm that the varying correlations between US and global REITs may be the result of investors looking for better investment opportunities. The NAREIT all equity REIT index is used as a proxy for US REIT performance and a negative relationship was expected, resulting in higher (lower) foreign investment as the NAREIT all equity REIT index returns reduce (improve).

For the third push factor, analogous to SA bonds, US corporate bonds act as potential substitutes for REIT investments, with studies confirming the negative relationship between the NAREIT equity index and the long-term bond index (Boudry et al., 2012; Yang et al., 2012). Following the literature, a negative relationship was expected, with lower (higher) bond index levels leading to an increase (decrease) in foreign REIT investment.

US financial confidence as captured by a financial confidence indicator (FCI) is the fourth push factor. There are a number of reasons for using financial confidence indicators (FCIs) as push factor indicators. First, despite the usefulness of individual economic indicators in explaining foreign investment, information is subject to delays, making confidence indicators that quickly release survey results an attractive alternative (Santero et al., 1997). Financial confidence indicators (FCIs) furthermore provide information on the future state of the economy based on current financial variables (Hatzius et al., 2010). As surveys are based on expectations, this push factor

also introduces an aspect of business and consumer sentiment (Santero et al., 1997) to the investment decision.

Lastly, this push factor allows investors to use a composite index that comprises key economic indicators for analysing and monitoring multiple individual indicators. FCIs include variables documented in literature for their predictive power of US capital flows to developing countries, like the treasury bill rate, government bond yields and industrial production (Taylor et al., 1997). The study therefore included a leading FCI, the Goldman Sachs Financial Conditions Index (GCFCI), that comprises the weighted sum of the S&P500 index, the US T-bond yield, trade-weighted dollar, federal funds rate and investment-grade credit spread (Baum, 2016). An increase (decrease) in the GSFCI indicates tightening (easing) of financial conditions (Hatzius et al., 2010). As such, a lower GSFCI may potentially act as a push factor for US investors and other investors who typically invest in the US market, resulting in higher investment in emerging-market REITs. Thus, a negative correlation was expected with foreign REIT investment (divestment) as the GCFCI decreases (increases).

The final two push factors represent the economic conditions in the US and Europe as proxied by the US OECD business confidence index and the business confidence index for the European OECD countries respectively. Business confidence indicators are useful in projecting real GDP and business investment, while consumer confidence is indicative of private consumption and changes in aggregate output (Santero et al., 1997). Chuhan, Claessens and Mamingi (1998) showed that negative US economic conditions lead to increasing levels of foreign equity investment. When economic downturns adversely affect USA business, investors potentially use foreign investment to hedge against declining local income (Aurelio, 2006). As such,

increasing (decreasing) levels of foreign REIT investment during periods of lower (higher) US and European business confidence were expected.

2.4 Literature on REIT liquidity

The REIT structure introduction represents one of the most prominent changes in the South African listed-property history over the past decade, necessitating an understanding of the extent to which the structure affected SA REIT liquidity, particularly with regard to foreign investment. In order to answer the question of whether the introduction of REITs has resulted in an increased liquidity in the listed-property investment sector in South Africa, this study relied on a stream of literature that investigates REIT share liquidity. In comparing the pre-REIT periods with the REIT period, the study compared the liquidity of the REITs in the REIT period with the liquidity of these firms in the pre-REIT period while still in the pre-REIT format of PUTs and PLSs.

A number of liquidity measures are prominent in real estate literature. Brounen, Eichholtz and Ling (2009) suggested the use of multiple liquidity measures to reflect the different dimensions of liquidity, particularly for international securitised real estate markets. These dimensions include tightness (friction) that is defined as the cost when liquidating a position and depth that reflects the ability of liquidating a large position without a substantial impact on the price (Kyle, 1985). Clayton and Mackinnon (2000) refers to these dimensions as the price and speed aspects when liquidating a position. Additionally, liquidity measures that are not subject to micro-structure data are preferred, particularly for the analysis of international REIT markets where data availability and data cost may be a concern (Cannon et al., 2011). These measures include the Amihud (2002) illiquidity measure, the trading volume, share turnover and percentage of bid-ask spread (Brounen et al., 2012; Cannon et al., 2011).

In line with literature that suggests that no single liquidity measure sufficiently reflects all the components of liquidity (Bertin et al., 2005), this study considers a number of liquidity measures for the purpose of this study. First, liquidity for an individual firm can be proxied by the quarterly share turnover, in line with studies that investigate the growth of REITs in Asia (Ooi et al., 2006), and with a study regarding US REIT liquidity by Cannon and Cole (2011). Share turnover is calculated as share trading volume divided by outstanding shares for a particular period (Glascock et al., 2014). Secondly, trading volume is applied as a liquidity measure and calculated by multiplying the average closing price for a particular period by the share trading volume (Cannon et al., 2010). These first two liquidity measures are used as activity measures, indicative of the extent of trading, with securities that are traded more actively representing investments that are more liquid that can be traded quickly (Brounen et al., 2009).

The Amihud (2002) and the bid-ask spread indicate the depth and tightness dimensions of liquidity respectively (Brounen, Eichholtz and Ling, 2009). The bid-ask spread is calculated by deducting the ask price from the bid price for a particular share for a particular period, divided by the average of the sum of the bid and ask prices for the same share and period (Cannon et al., 2010). As the bid-ask spread indicates the cost to liquidate a position, a narrow bid-ask reflects the investor's ability to quickly trade in line with the market value (Brounen et al., 2009).

Bertin, Kofman, Michayluk and Prather (2005) showed that liquidity increases (decreases) with increasing (decreasing) activity measures and lower (higher) friction measures. Analogous to a study by Bhasin et al. (1997) that showed that REIT liquidity improved during the new REIT period where REITs displayed larger market capitalisations and traded at higher prices, this study expects SA REITs to behave

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similarly in the REIT period. As such, the attractiveness of SA REITs to foreign investors is expected to increase trading activity and reduce friction results.

The chapters that follow are in the format of manuscripts for journal articles. The first article investigated if it makes sense to integrate SA REITs in an international REIT portfolio from a portfolio theory perspective. In addition, the impact of the international exposure of SA REIT assets on the diversification benefits of foreign investors was assessed. Despite diversification benefits, international investors also chase yields, introducing the question as to what factors drive REIT investor behaviour. The second article answered this question by considering the impact of the relevant push and pull factors on SA REIT investment. Lastly, with the attraction of foreign investment as one of the main motivations for the introduction of the SA REIT structure, the study confirmed whether the expectation of increased liquidity and foreign investment was achieved.

CHAPTER 3

IMPACT OF REIT PORTFOLIO COMPOSITION ON DIVERSIFICATION BENEFITS FOR FOREIGN REIT INVESTORS

ABSTRACT

This study investigated the impact of the geographical investment focus of REITs on diversification benefits for foreign REIT investors and focused on South African (SA) REITs as a laboratory as they differ in their geographical investment focus. In particular, some SA REITs predominantly invest in commercial real estate in South Africa, while others predominantly invest in developed markets such as the UK. Using the perspective of a foreign investor holding US REITs, this study found that SA REITs with foreign holdings have superior diversification benefits for foreign investors, in terms of portfolio variance and Sharpe ratio, compared to SA REITs with domestic holdings. Thus, while emerging-market REITs provide diversification benefits to foreign investors, the exposure of these REITs to commercial real estate markets in developed countries further increases these benefits. Explanations include emerging country-specific risks.

Keywords: REITs, Foreign Investment, Portfolio Allocation, Mean-Variance Portfolio Optimisation

3.1 Introduction

International investments in REITs have diversification benefits for the portfolios of investors (e.g. Ling and Naranjo, 2002; Liu and Mei, 1998). However, depending on the size of their domestic market, non-US REITs are likely to invest not only domestically but also internationally (Gibilaro and Mattarocci, 2016; Brounen and De Koning, 2012). In the emerging country of South Africa, for example, real estate firms listed on the Johannesburg Stock Exchange (JSE) have a substantial non-emerging-market exposure, with 60% to 65% of the listed asset value being located outside South Africa. In particular, firms invest in commercial real estate in 25 countries, with a strong geographical focus on Europe, and also the UK (Van Niekerk, 2017). In addition, a number of European REITs, such as Intu and Hammerson, have obtained secondary listings on the JSE and are therefore considered to be SA REITs in which foreign investors can invest, even though these REITs have no South African holdings. Considering that foreign REIT investors purchase emerging-market REITs to achieve diversification, the following research question is formulated: How does the inclusion of developed-market holdings in emerging-market REIT portfolios affect the diversification benefits for foreign REIT investors? This study hypothesises that there exists a difference in the diversification benefits of SA REITs with international holdings relative to SA REITs with a predominantly local asset base.

With increasing international trade and investment, global markets are becoming increasingly integrated, leading to higher correlations, particularly between developed markets like the US and UK (Kaminska, 2010; Temple, 2003). As such, REIT investors from mature REIT developed markets such as the US may find opportunities to improve risk-adjusted returns beyond the US and other developed markets. Emerging-market benefits are confirmed by a higher Sharpe ratio, resulting

from the combination of US and emerging-market country portfolios (0.0736) relative to the US and developed-market country portfolio combinations (0.0680) and the US country portfolio (0.0444) (Bodie et al., 2014). Previous mixed-asset portfolio diversification studies focusing on the US, UK, Australia and Asia generally disregard possible diversification benefits emanating from the African listed-property market (Olaleye, 2011). For REITs in particular, an established body of research exists regarding US focused investments (Gibilaro and Mattarocci, 2016; Zhou and Sah, 2009; Lambson, McQueen and Slade, 2004), while diversification opportunities offered by younger REIT markets such as Europe, Asia and Africa remain under-researched (Gibilaro and Mattarocci, 2016).

Consequently, this paper attempts to fill this gap in literature by investigating the potential diversification benefits offered by an African REIT market with a substantial developed asset base to REIT investors from mature markets such as the US. Focusing on the top 10 global REIT markets based on market capitalisation, South Africa represents the only African country with the ninth largest market capitalisation (S&P Dow Jones Indices, 2018). In addition, the international prominence of South Africa is emphasised by its inclusion in the FTSE/NAREIT index and the S&P Global REIT index, representing the only African country (Akinsomi et al., 2016).

The purpose of this study was to investigate the implications of the geographical investment focus of a REIT for diversification benefits received by foreign REIT investors. In particular, this study assumed the perspective of investors with a US REIT portfolio and firstly investigated if emerging-market REITs in general have diversification benefits for investors who are also investing in mature REIT markets. Then this study assessed whether the exposure of emerging-market REITs to developed commercial real estate markets affects these diversification benefits. In our

analysis, this study compared portfolios of US REITs mixed with 1) SA REITs with predominantly South African holdings and 2) SA REITs with considerable international holdings. For the purpose of this study, group 1 represents home-biased REITs with more than 90% of their asset base invested in South Africa. Home-biased REITs were selected on the basis of data availability and the percentage of underlying local asset value. To the author's knowledge, no fixed guidelines exist in the literature that would help to define home-biased REITs. Consequently, 90% is selected for the purpose of this study, as it displays a strong preference for local real estate. Group 2 displays a foreign bias, with approximately 20% to 100% invested offshore. Appendix A, Table A.1 shows the top 5 SA REITs, based on market capitalisation, for each group included in this study. Data pertaining to the market capitalisation was sourced from the IRESS database.

South Africa represents an excellent laboratory to investigate the implications of a REIT's geographical investment focus for the portfolios of foreign REIT investors. The listed-property market in South Africa was well established before REITs were introduced in May 2013. After the introduction of REITs, all existing listed-property firms converted to REITs and new REITs went public (Carstens and Freybote, 2017b). Thus, compared to REIT markets in other emerging countries, a sufficiently large data set was available. Additionally, SA REITs vary greatly with regard to their exposure to South African and European commercial real estate markets, which was highly beneficial to this investigation.

Using mean-variance portfolio optimisation, this study found that SA REITs in general provide diversification benefits to foreign investors holding US REITs by mitigating portfolio risk and improving risk-adjusted returns. Interestingly, this study found that combining US REITs with SA REITs with foreign exposure into a portfolio

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has superior diversification benefits for foreign investors compared to a portfolio with SA REITs with predominantly South African holdings. Thus, emerging-market REITs with holdings in developed markets have superior diversification benefits for foreign investors with a portfolio of US REITs. Possible explanations for the results include risks specific to emerging countries that affect the performance of domestic REITs and commercial real estate markets.

This investigation is highly relevant to academics and practitioners alike. Previous studies provide evidence that international real estate equities have significant diversification benefits for foreign investors (Worzala and Sirmans, 2003; Ling and Naranjo, 2002; Liu and Mei, 1998; Asabere, Kleinman and McGowan, 1991). However, the geographical investment focus of REITs is likely to have an impact on the diversification benefits of foreign investors, particularly if they invest in emerging-market REITs that, in turn, invest in developed countries, which may already be represented in the investors' portfolios. To my knowledge, no previous study has investigated the geographical investment focus of international REITs and its implications for diversification benefits for foreign REIT investors. This study therefore further stands out, as this study investigated the impact of REIT investment focus on diversification benefits for foreign investors across different continents (Africa and Europe) and economic development stages (developed and emerging). By showing that home-biased REITs have lower diversification benefits for foreign investors than geographically diversified REITs, this study further added to the home-bias literature (Gibilaro and Mattarocci, 2016; Zhou and Sah, 2009).

Additionally, compared to foreign investments in developed REIT markets (Liow, Zhou and Ye, 2015; Eichholtz et al., 2011; Eichholtz et al., 1998), REIT markets in emerging countries in general and foreign investments in emerging REIT

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markets in particular are under-researched. Considering that REITs in other emerging countries, for example in Asia or South America, may also tilt their investment focus towards developed countries, the findings of this study is considered relevant to other emerging REIT markets. Furthermore, this investigation is also relevant for foreign investors in REITs in developed countries such as Australia, which has a relatively small regional investment focus (Gibliaro and Mattarocci, 2016; Brounen and De Koning, 2012).

The remainder of this report is structured as follows: Next, this study review the relevant literature and discuss the data and methodology. This is followed by the presentation of the results and the conclusion.

3.2 Literature review

3.2.1 An overview of the South African listed-property market

Prior to the introduction of the SA REIT structure, the South African listed-property investment landscape consisted of property unit trusts (PUTs) and property loan stocks (PLSs). These property investment vehicles differed in terms of legal form, governing legislation and taxation (Olaleye, 2011), emphasising the need for the SA REIT structure that represents a uniform property investment vehicle with international recognition.

In terms of legal form, PUTs (trusts) transformed to trust REITs, with PLSs (companies) changing to company REITs. The Collective Schemes Control Act and Financial Services Board (FSB) provided governing regulation for PUTs, while PLSs had to adhere to the Companies Act (71 of 2008) (Kantilal, 2016), with all property investment vehicles subject to the Listing Requirements of the JSE. With regard to REITs, company REIT investors are protected by the Companies Act, while trust REIT

investors' interests are protected by the trust deed and the trustees responsible for compliance with the Collective Investment Schemes Control Act.

The tax dispensation provided by section 25BB of the new Taxation Legislation Amendment Bill allows REITs adhering to the taxable earnings payout of 75% to regard distributions as deductible expenses. Additionally, the sale of properties is not subject to capital gains tax (CGT) (SA REIT Association, 2013). In terms of this, REIT earnings are taxed once in the hands of the investor (Ntuli and Akinsomi, 2017). PUTs were exempt from income tax, provided there was a distribution of income to investors (Ntuli and Akinsomi, 2017), while the dividend component of PLSs was subject to dividend withholding tax, with the interest component exempted from income tax once distributed. Additionally, PLSs were subject to CGT, with PUTs exempt from CGT, provided there was profit distribution. Table 2.1 in the literature review chapter summarises the differences between the respective property investment vehicles.

Since its introduction, the SA REIT market managed to establish itself as a mature emerging market with a market capitalisation in excess of USD15 billion. The SA REIT market also captures international investments with multiple secondary listings by offshore firms and investment in SA REITs by foreign investors (Ernst and Young, 2016).

3.2.2 SA REITs in a mixed-asset portfolio

A number of considerations motivate the inclusion of REITs in a mixed-asset portfolio. First, over the past 20 years SA listed property yielded an average annual return of 19%, with equities yielding 16%, bonds 12%, and cash 9% (Williams, 2017). Apart from this historic outperformance of alternative asset classes, listed property also

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outperformed the JSE All Share Index return of 10.53%, providing a return of 14.87% (Giessing, 2017). Ntuli and Akinsomi (2017) confirm that SA REITs represent the best performing asset class, with stocks providing the best risk-adjusted performance. Unsurprisingly, REITs enhance portfolio returns in a portfolio consisting of stock, bonds and REITs (Ntuli and Akinsomi, 2017). Secondly, over the past five years SA REITs displayed a low and/or negative correlation with alternative JSE investments like the FTSE/JSE All Share (0.10 correlation) and the JSE/FTSE Top 40 (-0.01 correlation) (SA REIT Association, 2017a). Ntuli and Akinsomi (2017) found a varying correlation between REITs and stocks, providing high-risk and low-risk investors with good diversification benefits.

Despite the fact that emerging-market investment opportunities may provide superior benefits relative to developed-market investments (Jin et al., 2007), only a few studies have investigated the emerging-market diversification benefits for international investors (Barry and Rodriguez, 2004) specifically with regard to REIT portfolios. Ntuli and Akinsomi (2017) suggest that Africa provides a good example of an emerging market that may offer international diversification potential to global investors. Considering that South Africa represents one of two African countries on the FTSE EPRA/NAREIT Emerging Index (December 2017) with the second largest market capitalisation (USD18 612 million) after China, South Africa can be regarded as a leading emerging real estate market (Ntuli and Akinsomi, 2017) by international REIT investors. Additionally, Olaleye (2011) investigated the diversification benefits of listed-property stock in a mixed-asset portfolio from an African emerging-market perspective. Albeit being market dependent, the inclusion of real estate in international mixed-asset portfolios provides superior benefits (Olaleye, 2011). However, studies

assessing the diversification benefits of REIT portfolios that include investments from African emerging markets are lacking.

3.2.3 Geographical diversification of REIT investments

Earlier studies suggest that property-type and geographical diversification remain popular diversification strategies for property firms, with geographical diversification aiming to reduce portfolio risk by investing in different local and international locations (Ntuli and Akinsomi, 2017; Olaleye, 2008). International real estate portfolio diversification results in increased returns, as different local markets affect real estate, leading to lower correlations between markets (Eichholtz et al., 2001). Additionally, relative to alternative asset classes such as stocks and bonds, real estate markets are characterised by lower international correlation (Eichholtz et al., 2001).

Previous studies provide evidence that international real estate equities have significant diversification benefits for foreign investors (Worzala and Sirmans, 2003; Ling and Naranjo, 2002; Liu and Mei, 1998). For an in-depth review of previous studies on international real estate stock investments, see Worzala and Sirmans, 2003), and for US investors in particular (Asabere, Kleinman and McGowan, 1991). However, one shortcoming of previous studies on international REIT investments is that they ignore the impact of the geographical investment focus of international REITs on diversification benefits for foreign REIT investors.

Investors tend to display home-country bias behaviour by underweighting the portfolio inclusion of foreign investments (Bodie et al., 2014). Despite the persistence of home-bias behaviour, international investments have escalated since 2001, with US investors increasing their offshore holdings from USD2 170 billion to

USD6 481 billion in 2011, representing an increase of approximately 300% over a 10-year period (Bodie et al., 2014).

While US REITs exhibit a strong home bias with regard to the geographical focus of their investments (Gibilaro and Mattarocci, 2016; Zhou and Sah, 2009), REITs from other developed countries differ in their home bias (Gibilaro and Mattarocci, 2016). REITs in smaller developed countries in Europe or Australia have a relatively small regional investment focus (Brounen and De Koning, 2012) and exhibit a large degree of geographical diversification. However, internationally diversified REITs, except Australian REITs, are less likely to invest on different continents (Gibilaro and Mattarocci, 2016). The diversification benefits for foreign investors in REITs from these countries are likely affected by the geographical focus of individual REIT portfolios, particularly with regard to different regions and continents. Eichholtz et al. (1998) showed that real estate returns are driven by continental factors, except in the Asia-Pacific region, which suggests that investments across continents have the largest diversification benefits for international REITs and foreign real estate investors.

A number of emerging countries have introduced REITs over the last decades (Das and Thomas, 2016; Brounen and De Koning, 2012). The prominence of emerging-market real estate emphasises the portfolio diversification benefits that emerging-market real estate (Ntuli and Akinsomi, 2017) and REIT markets may offer foreign investors. However, diversification benefits can vary over time as correlations between, for example, the US NAREIT index and emerging-market property indices change over time (Lu and Mei, 1999). REIT and commercial real estate markets in emerging countries also exhibit more volatility (Lu and Mei, 1999) and are prone to higher levels of economic, political and other country-specific risks, as discussed by Lieser and Groh (2011). As a result of risks specific to emerging countries, some

emerging-market REITs diversify their portfolios to protect against these risks by investing in developed countries. Additional motivations for emerging REITs to diversify into developed countries may be to take advantage of the greater availability of institutional investment-grade properties in developed and larger markets (De Wit, 2010) and cheaper financing.

This study hypothesised an effect of the geographical investment focus of emerging-market REITs on diversification benefits for foreign investors, although the direction was difficult to determine a priori. On the one hand, the inclusion of emerging-market REITs with large holdings in developed countries could negatively affect, i.e. reduce, diversification benefits, as the exposure to developed commercial real estate markets may increase the correlations between these emerging-market REIT investments and developed-market assets in the existing portfolio of a foreign investor. On the other hand, the diversification of emerging country-specific risks within the REIT portfolio may provide foreign REIT investors with additional diversification benefits above the ones received from investing in REITs with predominantly emerging-market holdings.

3.3 Data

SA REITs differ in their geographical investment focus. Table 3.1 presents an overview of the geographical focus of SA REITs. South Africa accounts for 36% of the asset value of SA REITs and is followed by the UK with 32%. Interestingly, only 1% of the asset value of SA REITs is invested in the rest of Africa (Van Niekerk, 2017). This suggests that SA REITs are not a vehicle for foreign investors to get exposure to commercial real estate markets in other African countries. Rather, SA

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REITs appear to be a vehicle to get exposure to commercial real estate markets in the UK, in addition to real estate markets and the stock market in South Africa.

Table 3.1: Geographical asset location of listed JSE real estate firms

Geographical location	Percentage of asset value
South Africa	36%
UK	32%
Rest of Europe	9%
Other	9%
Australia	5%
Poland	4%
Romania	3%
Germany	1%
Africa	1%
Total	**100%**

Adapted from: Van Niekerk; SA REIT Journal (2017)
Source: Company data, Nedbank CIB
'Other' is listed firm investments made by SA REITs

The majority of studies on international diversification and foreign REIT investments employ index data (e.g. Gallo, Lockwood and Zhang, 2013; Gallo and Zhang, 2010; Lu and Mei, 1999). One shortcoming is that results based on index data represent investment in all index assets and not actual physical investments (Seiler and Seiler, 2005), i.e. specific investments selected for portfolio inclusion. The assumption is that when foreign REIT investors diversify their international REIT portfolios, they select specific foreign REITs based on potential diversification benefits and do not invest in all foreign country REITs.

As a result, this study decided against using index data and instead employed return data for selected REITs. In the empirical analysis, this study followed previous

studies (Gallo, Lockwood and Zhang, 2013; Gallo and Zhang, 2010; Conover et al., 2002; Asabere et al., 1991) and assumed the perspective of an investor with US REIT holdings. US investors account for the second largest proportion of portfolio investment in South Africa (State Department Office of Investment Affairs, 2017). In particular, this study used return data for US and SA REITs with the largest market capitalisation in the empirical investigation. The focus on large-cap REITs results from the preference of US institutional investors for larger REITs (Below, Stansell and Coffin, 2000). Considering that larger REITs are more liquid (Marcato and Ward, 2007), they are likely to be more attractive to foreign investors, particularly in emerging countries. In line with this argument, market capitalisation is one of the most important drivers of share liquidity in South Africa (Belgove and Van der Merwe Smit, 2016).

This study obtained monthly (ex post) return data for the twenty largest SA REITs and US REITs over the period of January 2002 to December 2016. The focus on the twenty largest US and SA REITs was a result of methodological requirements and data limitations. The literature supports using a small number of assets for mean-variance portfolio optimisation in the form of quadratic programming (QT) analysis, which was employed in this study. This limitation results from the impracticality of using a large covariance matrix in solving the quadratic programming problem (Byrne and Lee, 1997; Viezer, 2000). Additionally, smaller developing REIT markets have fewer firms. For South Africa, the twenty largest REITs by market cap represented approximately 40% of the SA REIT market at the time of the analysis. The focus on real estate stocks with the largest market capitalisation was furthermore in line with previous studies (e.g. Hamelink and Hoesli, 2004).

The South African sample represented listed-property firms that converted to REITs in May 2013 and REITs that went public after this date. For this analysis, this study derived the 20 largest SA REITs with 1) predominantly South African holdings (*SAREITSA*) and 2) non-SA holdings (*SAREITFOR*). As is shown in Table 3.1, the foreign holdings are predominantly in Europe. *SAREITSA* is defined as SA REITs with more than 90% of their assets located in South Africa. *SAREITFOR* represents SA REITs with varying degrees of foreign-based investments, with approximately 20% to 100% of REIT assets represented by offshore investments.

Considering the US investor perspective and accounting for exchange rate differences, this study converted all South African rand values to US dollars, enabling the model to provide US dollar results. Returns were also left unhedged, as suggested by Hamelink and Hoesli (2004). Table 3.2 provides the summary statistics for the returns of the 5 962 REIT months included in the analysis. Returns were calculated based on monthly firm data using the holding period return (Bodie et al., 2014):

$$HPR_{it} = \frac{P_{it+1} - P_{it} + D_{it+1}}{P_{it}} \tag{1}$$

Where P_{it+1} is the price of a REIT at the end of the month, P_{it} is the price of a share at the beginning of the month, and D_{it+1} represents the cash dividend paid in the specific period. Overall, the average return for US REITs was higher and displayed more extreme minimum and maximum return values than SA REIT returns, which may have been driven by the 2007 to 2009 financial crisis.

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Table 3.2: Summary statistics for REIT returns

	N	Mean	Std dev	Min	Max
Full sample	5 962	0.0138	0.0578	-0.2741	0.3065
US REITs	3 348	0.0153	0.0710	-0.2848	0.4349
All SA REITs	2 614	0.0124	0.0644	-0.2583	0.1909

Note: This table presents the summary statistics for the 20 largest US and SA REITs each month, based on market capitalisation, for the period of January 2002 to December 2016. Returns represent holding period returns using monthly data.

Figure 3.1 visualises the return behaviour of SA REITs and US REITs over the 15-year period of the investigation. With the exception of 2009 to 2011, SA REIT returns appeared to be more volatile, which was in line with expectations of higher volatility in emerging markets (Ghysels et al., 2016; Lu and Mei, 1999). US REIT return volatility over the two-year period from 2007 to 2009 demonstrated the substantial impact of the financial crisis and suggested that the mean US return and standard deviation in Table 3.2 were indeed affected by this period. Overall, relative to US REITs, SA REITs returns appeared to be higher prior to 2009. Interestingly, from 2013, REIT returns comoved in the same direction, which may have been as a result of the increasing internationalisation of REITs and more foreign investments following the introduction of REITs in South Africa (Carstens and Freybote, 2017b).
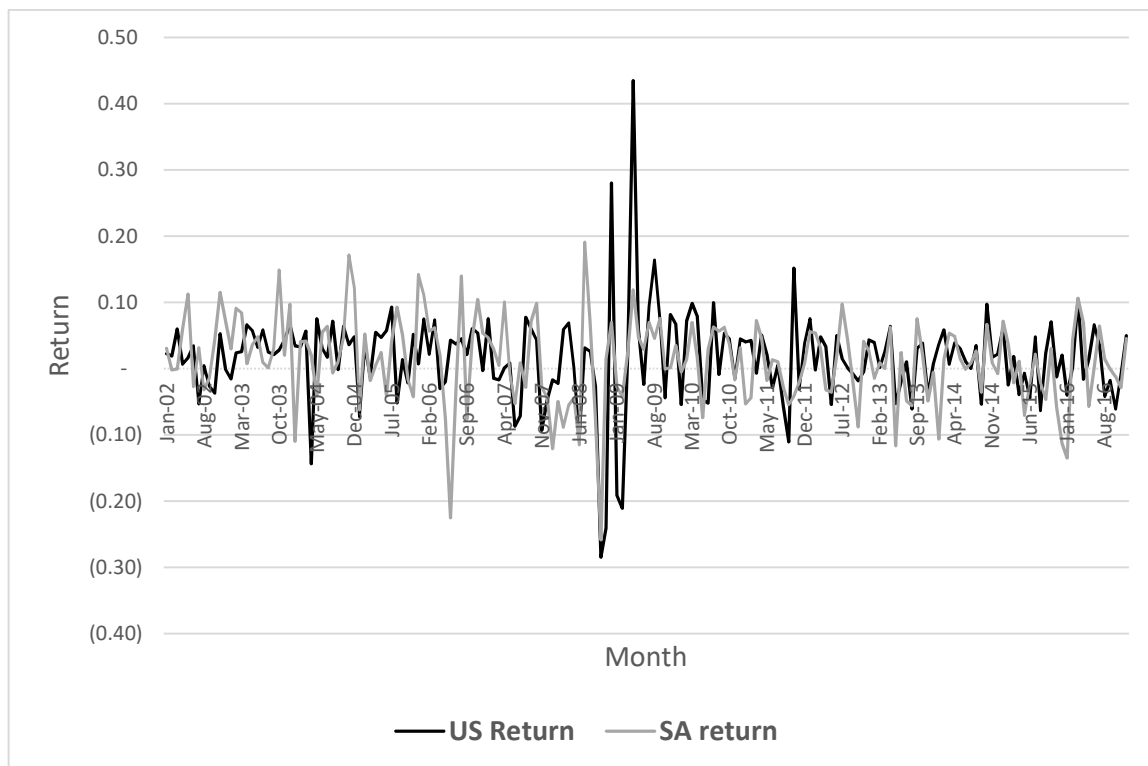
Figure 3.1: US and SA REIT return correlation (2002 to 2016)

3.4 Methodology

The empirical investigation was structured as follows: First, this study investigated whether investing in emerging-market REITs in general has diversification benefits for investors holding US REITs. Then, this study investigated the impact of the geographical focus of a REIT on foreign investor diversification benefits by comparing portfolios with SA REITs predominantly focused on SA commercial real estate to portfolios with SA REITs predominantly focused on commercial real estate in developed countries, particularly the UK.

The analysis was conducted for two sets of time periods. First, this study divided the sample into the pre-REIT period (January 2002 to April 2013) and the REIT period (May 2013 to December 2016) in South Africa. Carstens and Freybote

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(2017a) found that determinants of foreign REIT investments in South Africa changed from the pre-REIT to the REIT period, while Carstens and Freybote (2017b) found evidence for an increased impact of foreign investor trading on REIT share liquidity in the REIT period.

Second, diversification benefits to US investors may have been impacted by the most recent financial crisis. Liow and Newell (2016) showed that international public real estate markets exhibit increasing stock-market linkages during a financial crisis. Lu, Tse and Williams (2013) showed that the correlation of US REIT returns with international REIT market returns varies over time. Correlations are affected by US REIT market conditions, and diversification benefits were eroded during the most recent financial crisis. Pham (2012) found that returns transmit from developed to emerging markets in Asia. Gibliaro and Mattarocci (2016) found that international home-biased REITs performed worse after the financial crisis compared to internationally diversified REITs. Other studies showed REIT investor behaviour changed from the pre-crisis to the post-crisis period (Das, Freybote and Marcato, 2015; Devos et al., 2013). As a result, this study distinguished between the pre-crisis (2002 to 2006), crisis (2007 to 2009) and post-crisis (2010 to 2016) periods, in line with the arguments of Das, Freybote and Marcato (2015) and Devos et al. (2013).

In the empirical analysis, this study employed mean-variance portfolio optimisation methodologies. The Markowitz modern portfolio theory (MPT) has been used in a number of studies analysing various real estate diversification strategies, including geographical diversification (Byrne and Lee, 1997; Cheng and Liang, 2000). With regard to South African REITs in particular, Ntuli and Akinsomi (2017) investigated the portfolio diversification benefits of including SA REITs in a mixed-asset portfolio.

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MPT posits that the mean-variance analysis establishes a portfolio with the least risk for a given level of return (Byrne and Lee, 1997), suggesting improved portfolio efficiency relative to naïve diversification strategies (Mueller, 1992; Malizia and Simons, 1991). With various possible methodologies for creating diversified portfolios, each with its benefits and disadvantages, MPT is considered effective in maximising returns and minimising risk (Ho, Rengarajan and Xie, 2014).

Markowitz (1959) argued that a risk-averse investor always prefers lower risk and consequently lower returns. Considering the emerging-market context of this study, the study furthermore employed an appropriate minimum-variance model that minimises portfolio risk. Benefits of using the minimum-variance portfolio also include not having to estimate expected returns, as portfolio risk is minimised independently from returns (Clarke, de Silva and Thorley, 2006). Additionally, the minimum-variance model reduces general market risk by about one third without sacrificing returns (Clarke, de Silva and Thorley, 2006).

In addition to portfolio variance, this study applied Sharpe in line with previous studies investigating the performance of South African listed property (Akinsomi et al., 2016) to verify whether the results held when incorporating return considerations. Sharpe is defined as the excess returns that exceed the risk-free rate of return per unit of standard deviation of returns (Giannotti and Mattarocci, 2013).

However, the mean-variance portfolio optimisation method has shortcomings (e.g. Stevenson, 2001). This methodology requires stable correlations over time (e.g. Gallo, Lockwood and Zhang, 2013; Gallo and Zhang, 2010) that may not be a given for real estate markets (Gallo, Lockwood and Zhang, 2013; Pham, 2012). As a result, previous studies employed index data and cointegration as alternative methodology.

To address this shortcoming, this study conducted the analysis for distinct periods of time (e.g. pre-crisis, crisis and post-crisis) for which correlations between US REIT and SA REIT returns were considered stable.

In the analysis this study first employed equally weighted portfolios in line with previous studies (e.g. Moss et al., 2015; Conover et al., 2002). Next, this study conducted mean-variance portfolio optimisation using quadratic programming (QP). This approach has been employed in previous studies investigating portfolio optimisation (Ho, Rengarajan and Xie, 2014; Ragsdale, 2015). Its advantage compared to equally weighted portfolios is that it optimises the investor's fund allocation to individual assets to meet an objective such as minimising portfolio risk or maximising risk-adjusted returns. This study estimated a QP model (Ragsdale, 2015), as shown in Equation 2, to minimise risk subject to a number of constraints:

$$Minimize\ Var(p) = \sum_{i=1}^{n} \sigma_i^2 p_i^2 + 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \sigma_{ij} p_i p_j$$

$$Subject\ to:$$

$$p_i \geq 0, i = 1,2,3\ldots,N$$

$$\sum_{i=1}^{n} p_i = 1$$

$$\sum_{j=1}^{n} p_j \leq 0.3 \tag{2}$$

where *PV (p)* represents the portfolio variance and p_i exhibits the percentage of the portfolio invested in REIT *i*. The investment variance is represented by σ_i^2, with σ_{ij} displaying the covariance between REIT investments *i* and *j*.

The model included three constraints. The first condition limits short selling (Cheng and Liang, 2000), with the second condition requiring all capital to be invested by equating the total portfolio weight to one (Ho, Rengarajan and Xie, 2014). Finally, the model limits the total percentage of SA REITs included in the portfolio. Literature suggests that foreign real estate investment should be limited to 10% for risk-tolerant and 5% for risk-averse investors (Cheng et al., 1999). Yield-seeking investors may be more risk tolerant, potentially increasing the attractiveness of diversification benefits from foreign investment (Cheng et al., 1999). If no constraint were specified to limit the share of SA REITs in the portfolio, the allocation to SA REITs would dominate the portfolio, due to the high returns and low risk offered by certain SA REITs. However, in line with home-bias theory (Gibilaro and Mattarocci, 2016; Zhou and Sah, 2009), foreign investors are more likely to allocate a larger share to US and other developed country REITs and to a lesser extent include developing country REITs for diversification purposes.

Following the findings of Ghysels, Plazzi and Valkanov (2016) motivating an emerging-market portfolio weight of 30%, and of Kyrychenko and Shum (2009), who suggest a foreign to total US stocks proportion of 30% to 50%, this study limited the allocation to SA REITs to 30% of the total REIT portfolio. Considering the improving share liquidity in emerging REIT markets (Carstens and Freybote, 2017b) and an increasing interest in emerging markets (Ghysels, Plazzi and Valkanov, 2016), the argument can be made that higher emerging-market portfolio allocations may be

justified and future studies may investigate the portfolio implications of such allocations.

The Sharpe ratio was calculated in line with Sharpe (1964) and as shown in Equation 3,

$$S = \frac{k_p - k_{RF}}{\sigma_p} \tag{3}$$

where k_p represents the portfolio return, k_{RF} the risk-free rate and σ_p the portfolio return standard deviation. The 30-day treasury bill rate was employed as the risk-free rate for the corresponding period. The return on the portfolio k_p is the weighted average of the returns achieved by the investment in different REITs, or:

$$k_p = \sum_{i=1}^{n} k_i p_i \tag{4}$$

Where k_i represents the return on REIT i and p_i the proportion of the portfolio invested in REIT i,

Substituting into equation 2, and substituting for σ_p from equation 1 yields:

$$S = \frac{\left(\sum_{i=1}^{n} k_i p_i\right) - k_{RF}}{\sqrt{\sum_{i=1}^{n} \sigma_i^2 p_i^2 + 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \sigma_{ij} p_i p_j}}$$

This study therefore estimate a QP model solving for a return maximisation objective as shown in Equation 5 with a number of constraints:

$$Maximize\ S(p) = \frac{\left(\sum_{i=1}^{n} k_i p_i\right) - k_{RF}}{\sqrt{\sum_{i=1}^{n} \sigma_i^2 p_i^2 + 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \sigma_{ij} p_i p_j}} \tag{5}$$

$$Subject\ to:$$

$$p_i \geq 0, i = 1,2,3 \dots, N$$

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$$\sum_{i=1}^{n} p_i = 1$$

Where $S(\text{p})$ represents the portfolio Sharpe, p_i the portion of the portfolio invested in REIT i, σ_i^2 the investment variance, with σ_{ij} displaying the covariance between REIT investments i and j. Analogous to the first model, constraints limiting short selling, ensuring that all capital is invested and limiting SA REIT exposure to 30% are included. Considering the possibility that some REIT investors may display return chasing behavior, the study additionally present a model that maximise Sharpe without the SA allocation constraint. Hereby, this study determined whether investors gain improved risk-adjusted return benefits if home-bias allocation preferences are not considered.

3.5 Results

Real estate diversification benefits are created from the low correlation between different markets (Liow et al., 2009). As is shown in Table 3.3, US and SA REIT returns for the entire period of 2002 to 2016 have a significantly positive correlation of 0.3980. However, this pair-wise correlation varies over time, which is in line with previous studies that found temporarily unstable correlations (Liow and Newell, 2016; Lu, Tse and Williams, 2013; Pham, 2012). In the crisis period (2007 to 2009) SA and US REIT returns exhibited the highest correlation (0.57), which was in line with previous studies that found higher correlations between global REIT markets during volatile periods (Lu, Tse and Williams, 2013).

Compared to the pre-crisis period (2002 to 2006) in which REIT returns had a low and insignificant correlation of 0.09, the correlation was high and significant (0.42) in the post-crisis period. If time periods are separated based on the pre-REIT

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and REIT period in South Africa, pair-wise correlations between US and SA REIT returns are significantly positive, albeit higher in the REIT period. The higher pair-wise correlations in the post-crisis and REIT periods may be the result of the increasing foreign holdings of SA REITs and/or inward listings of foreign REITs, or the increased investments by foreign investors. The results in Table 3.3 are in line with the increasing return comovement shown in Figure 3.1.

Table 3.3: Pair-wise correlations of US and SA REIT returns

Full sample	**0.3980*****
Panel B: US periods	
Pre-crisis	0.0900
Crisis	**0.5702*****
Post-crisis	**0.4225*****
Panel C: SA periods	
Pre-REIT period	**0.3846*****
REIT period	**0.4926*****

Note: This table presents the pair-wise correlations for the returns (in US dollar) of the 20 largest US and SA REITs each month over the period of January 2002 to December 2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Next, this study evaluated to what extent SA REITs in general provide diversification by establishing 1) equally weighted and 2) optimised portfolios for the sample of US and SA REITs. Considering the potential risk concerns of developed-market investors, this study first constructed a minimum risk portfolio to compare the portfolio variance of a US REIT and a combined US-SA REIT portfolio. In this initial analysis, this study did not distinguish between SA REITs with a South African or European investment focus. Secondly, this study derived Sharpe-based portfolio allocations to assess the

inclusion of emerging-market REITs on a risk-adjusted basis. The model performed portfolio allocations to individual REITs on a country level.

Table 3.4 presents the minimum-variance portfolio and Sharpe-ratio results for an equally weighted portfolio. Minimum-variance results in Panel A indicate that the inclusion of SA REITs on an equally weighted basis reduces the overall portfolio risk for all periods except the pre-crisis period. Additionally, including SA REITs in a portfolio with US REITs in the REIT period reduces the variance only slightly. The results in Table 3.4 suggest that combining emerging and developed REITs in a portfolio has diversification benefits for foreign investors.

Panel B in Table 3.4 provides the results for the portfolio Sharpe ratio. In the pre-crisis and pre-REIT periods, the inclusion of SA REITs in a portfolio with US REITs maximised Sharpe ratios. However, in all other periods, diversifying into SA REITs yielded smaller Sharpe ratios than a purely US REIT portfolio. Thus, on a risk-adjusted basis, the diversification into SA REITs does not appear to be beneficial to a foreign investor, based on an equally weighted portfolio.

Table 3.4: Results for equally weighted portfolios (US and US-SA portfolios)

	USREIT	*US-SA REIT*
Panel A: Portfolio variance		
Pre-crisis	0.0016	0.0016
Crisis	0.0174	**0.0087**
Post-crisis	0.0022	**0.0016**
Pre-REIT period	0.0061	**0.0032**
REIT period	0.0018	**0.0017**
Panel B: Portfolio Sharpe ratio		
Pre-crisis	0.0201	**0.0357**
Crisis	**-0.0980**	-0.1139
Post-crisis	**0.2597**	0.1700
Pre-REIT period	**0.0177**	0.0160
REIT period	**0.1699**	0.0325

Note: The figures in bold indicate the portfolio with superior performance (lower risk and/or higher risk-adjusted returns) for the respective period.

The advantage of optimised portfolios over equally weighted portfolios is that the former method estimates portfolio weights based on the objective of the model, such as lowest variance or highest risk-adjusted returns, and thus yields better results. Table 3.5 reports the results of the analysis for optimised portfolios of US and SA REITs based on the objective of minimising portfolio variance.

As shown in Panel A Table 3.5, a portfolio of SA REITs, irrespective of their geographical investment focus, and US REITs allows foreign investors to minimise the portfolio variance in all periods. Interestingly, in the optimised portfolios the maximum allowed proportion (30%) is allocated to emerging country REITs across all periods, indicating that the inclusion of SA REITs provides consistent risk reduction

benefits. The allocation to SA REITs represents the percentage allocation that shifted from US to SA REITs. The 30% allocations to SA REITs are in line with the conclusions of Ghysels, Plazzi and Valkanov (2016) and Kyrychenko and Shum (2009).

The results in Panel B in Table 3.5 suggest that SA REITs with foreign exposure minimise portfolio risk in all periods but the pre-REIT period and overall provide superior risk reduction benefits relative to both the US REIT and US-SA REIT with local asset portfolios.

Table 3.5: Variance results for optimised portfolios

	Panel A: Variance for US and US-SA portfolios		
	USREIT	*US-SA REIT*	*Allocation to SAREITs*
Pre-crisis	0.0008	**0.0004**	30%
Crisis	0.0057	**0.0025**	30%
Post-crisis	0.0014	**0.0001**	30%
Pre-REIT period	0.0019	**0.0011**	30%
REIT period	0.0013	**0.0010**	30%
Panel B: Variance for US and US-SA portfolios separated by geographical investment focus			
	USREIT	*US-SAREITSA*	*US-SAREITFOR*
Pre-crisis	0.0008	0.0007	**0.0006**
Crisis	0.0057	0.0045	**0.0025**
Post-crisis	0.0014	0.0012	**0.0010**
Pre-REIT period	0.0019	**0.0011**	0.0012
REIT period	0.0013	0.0012	**0.0010**

Note: The figures in bold indicate the portfolio with superior performance (lower risk) for the respective period.

Table 3.6 presents the Sharpe results for the optimised portfolios. The results in panel A suggest that SA REITs should be included in a portfolio with US REITs to maximise the Sharpe ratio in all periods. In line with Rubens, Louton and Yabaccio (1998), this study employs the W-test statistic that compares the performance of an expanded portfolio performance relative to a base portfolio using Sharpe. Hereby, a positive W-test statistic value indicates that the expanded REIT portfolio including SA REITs provides superior performance relative to the US only portfolio. However, the W-test statistics in Table 6 are not statistically significant.

As shown in Panel A in Table 3.6, the optimised portfolio allocates 30% to emerging-market REITs periods, except in the pre-crisis period (17%) and REIT period (20%). One explanation for this result is that, when using the Sharpe ratio as a proxy for risk-adjusted returns, high returns in particular periods dominate. In the analysis, this results in high allocations to high yielding SA REITs and a reduction of the share allocated to US REITs included in the model. The higher proportion allocation to fewer high performing REITs is consistent with expectations that high performance real estate displays an increased prominence in the efficient portfolio (Seiler and Seiler, 2005). The expectation also exists that if the SA REIT allocation limitation of 30% was removed, an even higher percentage of the portfolio would be allocated so SA REITs.

Panel B in Table 3.6 shows that *SAREITFOR* provides superior risk-adjusted performance relative to the other portfolio combinations for all periods. Overall, the results in Tables 3.5 and 3.6 suggest that SA REITs with foreign exposure minimise portfolio risk in all periods but the pre-REIT period and maximises Sharpe suggesting that optimised portfolios that include *SAREITFOR* improve diversification benefits for

foreign REIT investors. These findings support Liow et al. (2009) who find that international diversification reduces portfolio risk without diluting returns.

Table 3.6: Sharpe ratio results for optimised REIT portfolios

		Panel A: Sharpe ratio for US and US-SA portfolios			
	USREIT	*US-SA REIT*	*W-test statistic*	*F-stat*	*Allocation to SAREITs*
Pre-crisis	0.3849	**0.4054**	0.0141	0.0285	17%
Crisis	0.0392	**0.5299**	0.2788	0.2214	30%
Post-crisis	0.4059	**0.5264**	0.0965	0.3112	30%
Pre-REIT period	0.0967	**0.2969**	0.0781	0.4595	30%
REIT period	0.3285	**0.3775**	0.0312	0.0360	20%
		Panel B: Sharpe ratios for US and US-SA portfolios separated by geographical investment focus					
	USREIT	*US-SAREITSA*	*W-test statistic*	*F-stat*	*US-SAREITFOR*	*W-test statistic*	*F-stat*
Pre-crisis	0.3849	0.3982	0.0091	0.0460	**0.4016**	0.0112	0.0569
Crisis	0.0392	0.0398	0.0000	0.0001	**0.5299**	0.2788	0.7381
Post-crisis	0.4059	0.4093	0.0024	0.0178	**0.5265**	0.0965	0.7219
Pre-REIT period	0.0967	0.1234	0.0058	0.0744	**0.2970**	0.0781	0.9990
REIT period	0.3285	0.3335	0.0030	0.0100	**0.3774**	0.0312	0.1046

Note: Following Rubens et al. (1998) the W-test and F-statistic is calculated to determine the superior performance of one portfolio relative to another. The figures in bold indicate the portfolio with superior performance (higher risk-adjusted returns) for the respective period.

Finally, Table 3.7 shows the optimised Sharpe portfolio results when the SA asset allocation constraint of 30% is removed. Panel A in Table 3.7 shows that the overall allocation to SA REITs during the post-crisis period (36%), crisis period (93%) and pre-REIT period (71%) exceed 30%. Thus, in absence of an emerging-market allocation limitation, higher proportions of SA REITs are included in the optimised portfolio in these periods. In line with Rubens, Louton and Yobaccio (1998), this study assess if the Shape ratios of different portfolios are statistically different from each other. The study finds a statistically significant difference for the Sharpe Ratio of the US-only and US/SA portfolios in the crisis period.

Panel B reports the results for SA REIT portfolios separated by geographical investment focus. US REIT portfolios with SA REITs with a local asset focus (*US-SAREITSA*) consistently provide diversification gains compared to a US-only portfolios across all periods, albeit Sharpe ratio differences are insignificant. Portfolios that combine US REITs with SA REITs with foreign holdings consistently outperform US-only and *US-SAREITSA* portfolios. Portfolio Sharpe ratios for the *US-SAREITFOR* portfolios are statistically different from the US-only portfolio in the crisis and pre-REIT period, but not in any other period. The finding for the crisis period is particularly interesting considering that previous studies have found the correlations between international REIT markets to increase during times of crisis (Liow and Newell, 2016; Lu, Tse and Williams, 2013), which may reduce diversification benefits. The results for the financial crisis period suggest that including emerging-market REITs in a portfolio with US REITs in that period provided diversification benefits.

Table 3.7: Sharpe ratio results for optimised portfolios without allocation constraints

Panel A: Sharpe ratio for US and US-SA portfolios				
	USREIT	*US-SA REIT*	*W-test statistic*	*F-stat*	*Allocation to SAREITs*
Pre-crisis	0.3849	**0.4054**	0.0141	0.0285	17%
Crisis	0.0392	**6.8040**	46.2219	**36.706 *****	**93%**
Post-crisis	0.4059	**0.5300**	0.0997	0.3218	36%
Pre-REIT period	0.0967	**0.4216**	0.1668	0.9820	71%
REIT period	0.3285	**0.3775**	0.0312	0.0360	20%

Panel B: Sharpe ratio for US and US-SA portfolios separated by geographical investment focus						
	USREIT	*US-SAREITSA*	*W-test statistic*	*F-stat*	*US-SAREITFOR*	*W-test statistic*	*F-stat*
Pre-crisis	0.3849	0.4030	0.0124	0.0630	**0.4016**	0.0114	0.0576
Crisis	0.0392	0.0398	0.0000	0.0001	**6.7412**	**45.373**	**120.10*****
Post-crisis	0.4059	0.4093	0.0024	0.0178	**0.5291**	0.0989	0.7396
Pre-REIT period	0.0967	0.1234	0.0058	0.0744	**0.4216**	**0.1668**	**2.13****
REIT period	0.3285	0.3335	0.0030	0.0100	**0.3774**	0.0312	0.1046

Note: Following Rubens et al. (1998) the W-test and F-statistic is calculated to determine the superior performance of one portfolio relative to another. The figures in bold indicate the portfolio with superior performance (higher risk-adjusted returns) for the respective period.

'*', '**' and '***' denote significance at the 10%, 5% and 1% levels respectively.

3.6 Robustness tests

A number of robustness tests were conducted. First, this study assessed the impact of the global financial crisis by determining the Sharpe ratio for the period excluding 2007 to 2009 relative to the ratio for the full 15-year period. The results, included in Appendix A, Table A.2, indicate that the Sharpe ratio increased across all portfolios (*US* only, *US-SAREIT* and *US-SAREITFOR*) when the impact of the financial crisis was removed, with the allocation to home-biased REITs increasing to 10% and foreign-focused REITs at 30% for both periods.

Secondly, the study analysed the effect on risk-adjusted returns by separating the *US-SAREITFOR* portfolio by degree of foreign holdings in Appendix A, Table A.3. First, *US-SAREITFOR-HIGH* represents SA REITs with approximately 50% or more offshore exposure, while *US-SAREITFOR-LOW* refers to SA REITs with less than 50% foreign assets. The Sharpe ratio for *US-SAREITFOR-HIGH* agrees with the findings indicated in Tables 3.6 and 3.7, with the *US-SAREITFOR-LOW* yielding lower Sharpe ratios, suggesting that increased foreign holdings provide superior diversification benefits.

Lastly, US and SA REIT returns were winsorised[1] by 5% to remove the impact of extreme REIT return behaviour. Appendix A, Table A.4 displays the winsorised results. In line with the previous findings, the Sharpe ratio improved significantly in the crisis period in the absence of allocation constraints to *SAREITFOR*, with no significant improvement from the addition of SAREITs, regardless of allocation constraints. Additionally, risk-adjusted returns improved in the post-crisis period with the portfolio addition of *SAREITFOR*, albeit only at 10% significance.

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[1] The transformation of data to reduce the impact of outliers.

3.7 Conclusion

REITs in emerging countries or smaller-sized developed countries like Australia are likely to invest outside their home country. This study investigated the implications of the geographical focus of an international REIT for foreign investors holding US REITs. In particular, this study focused on emerging-country REITs from South Africa, which differ in their exposure to commercial real estate markets in developed countries, predominantly in Europe.

In the empirical analysis this study used the 20 largest US and SA REITs in each month from January 2002 to December 2016. Using equally weighted and optimised portfolios (quadratic programming), this study found that SA REITs with foreign assets have superior diversification benefits in terms of variance minimisation and Sharpe-ratio maximisation compared to foreign investors holding US REITs. Secondly, SA REITs with predominantly foreign assets have superior diversification benefits compared to SA REITs with predominantly South African assets in terms of variance minimisation and Sharpe ratio maximisation to foreign investors holding US REITs.

The study complements existing literature on foreign REIT investments (e.g. Ling and Naranjo, 2002; Liu and Mei, 1998), specifically within the emerging-market context. In particular, this study was the first to assess the diversification implications of the geographical focus of REITs for foreign investors. Additionally, the study provides further insights into REIT markets in emerging countries and motivations of foreign investors to purchase REIT shares. The findings are of value to portfolio managers constructing international real estate portfolios and investors in emerging

markets, as they suggest that the location of emerging-market REIT holdings have implications for diversification benefits. Thus, foreign investors benefit from an in-depth analysis of the geographical focus of investable emerging-market REITs in order to make investment decisions and develop portfolio strategies.

Future studies may investigate the effect of the geographical investment focus of developed-market REITs, for example from Australia, on diversification benefits of US investors. Additionally, future studies may revisit the findings to assess the implications of SA REIT holdings in Europe for US investors holding assets, considering that US investors are likely to be invested in commercial real estate and/or REITs in Europe already. Future studies investigating the diversification benefits of the geographical focus of REITs may also benefit from the use of alternative methodologies like fractional co-integration used by Liow and Yang (2005). Lastly, US investors may consider investing in global indices that include SA REITs as an alternative to direct investment in individual SA REITs. Consequently, the opportunity exists to investigate the portfolio diversification benefits for US REIT investors who prefer this alternative.

REFERENCES

Akinsomi, O., Kola, K., Ndlovu, T. and Motloung, M. (2016) 'The performance of the Broad Based Black Economic Empowerment compliant listed property firms in South Africa', *Journal of Property Investment and Finance*, 34(1), pp. 3-26.

Barry, C.B. and Rodriguez, M. (2004) 'Risk and return characteristics of property indices in emerging markets', *Emerging Markets Review*, 5, pp. 131–159.

Bertin, W., Kofman, P., Michayluk, D. and Prather, L. (2005) 'Intraday REIT Liquidity', *Journal of Real Estate Research*, 27(2), pp. 155–176.

Bodie, Z., Kane, A., & Marcus, A. J. 2014. *Investments* (Tenth Glob). McGraw Hill Education, Berkshire.

Brounen, D. and DeKoning, S. (2012) '50 Years of real estate investment trusts: An international examination of the rise and performance of REITs', *Journal of Real Estate Literature*, 20(2), pp. 197–223.

Brounen, D., Eichholtz, P. and Ling, D. (2009) 'The liquidity of property shares: An international comparison', *Real Estate Economics*, 37(3), pp. 413–445.

Cannon, S. E. and Cole, R. A. (2011) 'Changes in REIT Liquidity 1988-2007: Evidence from Daily Data', *Journal of Real Estate Finance and Economics*, 43(1), pp. 258–280.

Cheng, P., Ziobrowski, A.J., Caines, R.W. and Ziobrowski, B.J. (1999) 'Uncertainty and Foreign Real Estate Investment', *Journal of Real Estate Research*, 18(3), pp. 463–479.

Cheng, P. and Liang, Y. (2000) 'Optimal Diversification: Is It Really Worthwhile?', *Journal of Real Estate Portfolio Management*, 6(1), pp. 7–16.

Chong, J., Miffre, J. and Stevenson, S. (2009) 'Conditional correlations and real estate investment trusts', *Journal of Real Estate Portfolio Management*, 15(2), pp. 173–184.

Clarke, R. G., de Silva, H. and Thorley, S. (2006) 'Minimum-Variance Portfolios in the U.S. Equity Market', *The Journal of Portfolio Management*, 33(1), pp. 10–24.

Conover, C. M., Friday, H. S. and Sirmans, G. S. (2002) 'Diversification Benefits from Foreign Real Estate Investments', *Journal of Real Estate Portfolio Management*, 8(1), pp. 17–25.

Eichholtz, P., Koedijk, K. and Schweitzer, M. (2001) 'Global Property Investment and the Costs of International Diversification', *Journal of International Money and Finance*, 20(3), pp. 349-366.

Ernst and Young. 2016. Global perspectives: 2016 REIT report.

Fernández-Arias, E. and Montiel, P. J. (1996) 'The Surge in Capital Inflows to Developing Countries: An Analytical Overview', *The World Bank Economic Review*, 10(1), pp. 51–77.

Fratzscher, M. (2011) 'Push factors versus pull factors as drivers of global capital flows', *VOX CEPR's Policy Portal*, (January). Available at: http://voxeu.org/article/drivers-global-capital-flows-pushes-or-pulls.

Gibilaro, L. and Mattarocci, G. 2016. Are Home-biased REITs Worthwile? *Journal of Real Estate Portfolio Management*, 22:1, 19–30.

Giessing, R. (2017) '*Why your portfolio needs listed property*.' [Online]. Available at:https://www.fin24.com/Finweek/Investment/why-your-portfolio-needs-listed-property-20170329 (last accessed on 28 January 2018).

Geurts, T. G. and Jaffe, A. J. (1995) 'Risk and Real Estate Investment : An International Perspective', *Journal of Real Estate Research*, 11(2), pp. 117–130.

Ghysels, E., Plazzi, A. and Valkanov, R. (2016) 'Why Invest in Emerging Markets? The Role of Conditional Return Asymmetry', *Journal of Finance*, 71(5), pp. 2145–2192.

Giannotti, C. and Mattarocci, G. (2013) 'Risk Measurement Choice in Selecting REITs : Evidence from the U . S . Market', *Journal of Real Estate Portfolio Management*, 19(2), pp. 137–153.

Giliberto, M. and Shulman, D. (2017) 'On the interest rate sensitivity of REITs:Evidence from twenty years of daily data', *Journal of Real Estate Portfolio Management*, 23(1), pp. 7–20.

Glascock, J. L. and Kelly, L. J. (2007) 'The relative effect of property type and country factors in reduction of risk of internationally diversified real estate portfolios', *Journal of Real Estate Finance and Economics*, 34(3), pp. 369–384.

Glascock, J. and Lu-Andrews, R. (2014) 'An Examination of Macroeconomic Effects on the Liquidity of REITs', *Journal of Real Estate Finance and Economics*, 49(1), pp. 23–46.

Glascock, J., Lu, C. and So, R. (2000) 'Further evidence on the integration of REIT, bond, and stock returns', *The Journal of Real Estate Finance and Economics*, 20(2), pp. 177–194.

Hamelink, F. and Hoesli, M. (2004) 'What factors determine international real estate security returns ?', *Real Estate Economics*, 32(3), pp. 437–462.

Hastings, A. and Nordby, H. (2007) 'Benefits of Global Diversification on a Real Estate Portfolio', *The Journal of Portfolio Management*, 33(5), pp. 53–62.

Hatzius, J., Hooper, P., Mishkin, F.S., Schoenholtz, K.L., Watson, M.W. (2010) *Financial Condition Indexes: A Fresh Look After The Financial Crisis*.

Ho, D. H. K., Rengarajan, S. and Xie, E. J. Y. (2014) 'A Comparative Risk Analysis between the Markowitz Quadratic Programming Model and the Multivariate Copula Model for a Singapore REIT portfolio', *Journal of Real Estate Portfolio Management*, 20(2), pp. 125–145.

Hong, G. and Lee, B. S. (2013) 'Does Inflation Illusion Explain the Relation between REITs and Inflation?', *Journal of Real Estate Finance and Economics*, 47(1), pp. 123–151.

Jin, G.C., Grissom, T.V., and Ziobrowski, A.J. 2007. The Mixed-Asset Portfolio for Asia-Pacific Markets. *Journal of Real Estate Portfolio Management*, 13(3), 249-256.

Kaminska, I. (2010) '*Asset classes: Correlation remains at highs reached in the crisis.'* The Financial Times, 27 October 2010.

Kantilal, H. (2016) 'An analysis of the Real Estate Investment Trust tax regime on the South African property sector.' Mini-dissertation submitted in partial fulfillment of the requirements for the degree *Magister Commercii* in South African and International Taxation at the Potchefstroom Campus of the North-West University.

Karolyi, G. A. and Sanders, A. B. (1998) 'The Variation of Economic Risk Premiums in Real Estate Returns.', *Journal of Real Estate Finance & Economics*, 17(3), pp. 245–262.

Lambson, V.E., McQueen, G.R. and Slade, B.A. (2004) 'Do Out-of-State Buyers Pay More for Real Estate? An Examination of Anchoring-Induced Bias and Search Costs.' *Real Estate Economics*, 32(1), pp. 85-126.

Lieser, K. and Groh, A. P. (2014) 'The Determinants of International Commercial Real Estate Investment', *Journal of Real Estate Finance and Economics*, 48(4), pp. 611–659.

Lieser, K. and Groh, A.P. (2011) 'The Attractiveness of 66 Countries for Institutional Real Estate Investments.', *Journal of Real Estate Portfolio Management*, 17(3), pp. 191–211.

Liow, K.H., Ho, K.H.D., Ibrahim, M.F. and Chen, Z. (2009) 'Correlation and volatility dynamics in international real estate securities markets', *Journal of Real Estate Finance and Economics*, 39(2), pp. 202–223.

Liow, K.H. and Yang, H. (2005) 'Long-Term Co-Memories and Short-Run Adjustment Securitized Real Estate and Stock Markets', *Journal of Real Estate Finance and Economics*, 31(3), pp. 283-300.

Lu, K. W. and Mei, J. P. (1999) 'The return distributions of property shares in emerging markets', *Journal of Real Estate Portfolio Management*, 5(2), pp. 145–160.

Mauck, N. and Price, S. M. K. (2017) 'Determinants of Foreign Versus Domestic Real Estate Investment: Property Level Evidence from Listed Real Estate Investment

Firms', *Journal of Real Estate Finance and Economics*, 54(1), pp. 17–57.

Myer, N. F. C. and Webb, J. R. (1993) 'Return Properties of Equity REITs, Common Stocks, and Commercial Real Estate: A Comparison.', *Journal of Real Estate Research*, 8(1), pp. 87–106.

Ntuli, M. and Akinsomi, O. (2017) 'An Overview of the Initial Performance of the South African REIT Market', *Journal of Real Estate Literature*, 25(2), pp. 365-388.

Olaleye, A. (2011) 'The effects of adding real estate into mixed-asset portfolios in South Africa', *Journal of Financial Management of Property and Construction*, 16(3), pp. 272-282.

Ooi, J. T. L., Newell, G. and Sing, T. (2006) 'The Growth of REIT Markets in Asia', *Journal of Real Estate Literature*, 14(2), pp. 203–222.

Peterson, J. D. and Hsieh, C.H. (1997) 'Do Common Risk Factors in the Returns on Stocks and Bonds Explain Returns on REITs?', *Real Estate Economics*, 25(2), pp. 321–345.

Rapp, L. (2015) *Market capitalisation of SA REITs increased around 43% over past year*. Available at: http://propertywheel.co.za/2015/08/market-capitalisation-of-sa-reits-increased-around-43-over-past-year/ (last accessed on 10 August 2017).

S&P Dow Jones Indices. (2018) '*Equity S&P Global REIT Index Fact Sheet',* [Online]. Available: https://us.spindices.com/indices/equity/sp-global-reit-us-dollar (last accessed on 21 January 2018).

SA REIT Association. (2017) *'Monthly Chart Book. January 2017',* [Online]. Available: http://www.sareit.com/stats.php (last accessed on 28 January 2018).

SA Reit Association. (2016) *'What is SA REIT'*, Available at: http://www.sareit.com/101_WhatIsReits.php (Accessed: 2 November 2016).

SA REIT Association. (2013) '*SA REIT Presentation',* [Online]. Available: http://www.sareit.com/docs/SAREIT_Presentation-23_May_2013.pdf (last accessed on 21 January 2018).

Seiler, M. J. and Seiler, V. L. (2005) 'Realistic portfolio allocation decision-making for the small U.S. retail investor', *Journal of Real Estate Finance and Economics*, 31(3), pp. 319–330.

State Department Office of Investment Affairs. (2017) '*South Africa - Investment Statistics*', State Department Office of Investment Affairs' Investment Climate Statement.

Subrahmanyam, A. (2007) 'Liquidity, return and order-flow linkages between REITs and the stock market', *Real Estate Economics*, 35(3), pp. 383–408.

Taylor, M. P. and Sarno, L. (1997) 'Capital Flows to Developing Countries : Long- and Short-Term Determinants', *The World Bank Economic Review*, 11(3), pp. 451–470.

Temple, P. (2003) ''*Correlation' a key to smart investing',* The Financial Times, 29 May 2003.

De Vita, G. and Kyaw, S. (2008) 'Determinants of capital flows to developing countries: a structural VAR analysis', *Journal of Economic Studies*, 35(4), pp. 304–322.

Williams, G. (2017) '*The investment case for listed property*', [Online]. Available: https://www.fin24.com/Finweek/Investment/the-investment-case-for-listed-property-20170518 (last accessed on 8 February 2017).

Worzala, E. (1994) 'Overseas Property Investments: How Are They Perceived by the Institutional Investor ?', *Journal of Property Valuation and Investment*, 12(3), pp. 31–47.

Worzala, E. and Sirmans, C. F. (2003) 'Investing in International Real Estate Stocks: A Review of the Literature', *Urban Studies*, 40(5–6), pp. 1115–1149.

Zhou, X. and Sah, V. 2009. Does Home Expertise Exist in Equity REITs? *Journal of Real Estate Portfolio Management*, 15(3), 281–288.

CHAPTER 4

PULL AND PUSH FACTORS AS DETERMINANTS OF FOREIGN REIT INVESTMENTS

ABSTRACT

This study investigated pull and push factors as drivers of foreign investments in REITs. Pull factors are country-specific fundamentals that draw foreign investors to a REIT market, while push factors are fundamentals of other countries such as the US, based on which foreign investors push into or withdraw from a REIT market. This study used South Africa as a laboratory and primarily focused on US-specific push factors. With regard to contemporaneous relationships, this study found that pull factors (commercial real estate market conditions and stock-market performance) and push factors (US and EU business confidence) drive the net buying or selling behaviour of foreign investors in South African (SA) REITs. For large-cap REITs, push factors are more important than pull factors in explaining foreign investments, while for small-cap REITs, commercial real estate market conditions are most important. Over time, pull and push factors have explanatory power for foreign REIT investments. The findings suggest that foreign REIT investors use SA REITs to diversify their portfolios as well as chase returns relative to the performance of alternative markets.

4.1 Introduction

In line with the increasing globalisation of commercial real estate investments over the last decades (Eichholtz, Gugler and Kok, 2011; Worzala and Sirmans, 2003b), 36 countries have introduced REITs (Ernst & Young, 2016) to attract foreign REIT investors (Ooi, Newell and Sing, 2006). Lieser and Groh (2014) identify country-specific factors that affect the attractiveness of a particular country to international real estate investors. These are pull factors that are endogenous or internal to a country (De Vita and Kyaw, 2008). Besides pull factors, push factors have been found to be determinants of foreign equity and bond investments (e.g. De Vita and Kyaw, 2008; Edison and Warnock, 2008; Chuhan, Claessens and Mamingi, 1998; Fernández-Arias, 1996). Push factors are exogenous or external to a country (De Vita and Kyaw, 2008) and represent economic and capital market conditions in developed countries. In this context, deteriorating (improving) investment opportunities in developed countries push (draw) foreign investments into (from) other countries. Particularly for emerging countries, push factors have been identified as important determinants of international equity flows into the respective countries (Baek, 2006; Chuhan, Claessens and Mamingi, 1998; Fernandez-Arias, 1996).

The purpose of this study is to investigate the impact of pull and push factors on foreign REIT investments, as measured by a foreign investor buy-sell index. Previous studies suggest that investments in international commercial real estate and REITs offer investors diversification benefits (e.g. Hoesli, Lekander and Witkiewicz, 2004; Worzala and Sirmans, 2003a,b; Conover, Friday and Sirmans, 2002; Ling and Naranjo, 2002; Liu and Mei, 1998). If foreign REIT investors pick REITs in a particular country to diversify their portfolios, this study expect pull factors such as economic or property-market conditions to be more important for foreign investments

than push factors. Additionally, the performance of REITs is driven by local property markets and economic conditions, which should make pull factors more important for foreign REIT investment decisions than push factors.

In the empirical analysis, this study used the REIT market in South Africa as a laboratory. The advantage of focusing on South Africa was that detailed data for the purchases and sales of South African (SA) REIT stocks by foreign investors was available. Private market data was also available, which allowed this study to control for commercial real estate market conditions, a factor not accounted for in previous studies investigating foreign real estate investments (Mauck and Price, 2017; Lieser and Groh, 2014). In this investigation, the study focused particularly on US-specific push factors, as US stocks, REITs and bonds as important asset classes for investors from the US and other developed countries and their performance are likely to affect investments in SA REITs. US investors represent one of the most prominent international investor groups in SA equities and bonds (State Department Office of Investment Affairs, 2017). Similarly, European and Asian investors invest in South Africa, but also invest heavily in the US. Thus, US push factors affect US investors directly, and non-US investors who prefer to invest in the US indirectly. Additionally, US push-factor data is easier to obtain relative to European and Asian country-specific data.

Using Prais-Winsten regression, this study found that not only pull factors, but also push factors have explanatory power for whether foreign investors behave as net buyers or sellers in SA REITs. Push factors appear to be more important for investors in large-cap REITs, while foreign investments in small-cap REITs are predominantly driven by commercial real estate market conditions, which are a pull factor. For small-cap REITs, The results differed from previous studies for foreign equity investments

in emerging markets that found push factors to be more important than pull factors (Baek, 2006; Fernandez-Arias, 1996). Using Panel VAR, this study found that the majority of pull and push factors have predictive power for foreign investments in SA REITs over time.

The findings suggest that, while foreign REIT investors based their investment decisions on pull factors to generate the diversification benefits identified in previous studies (e.g. Ling and Naranjo, 2002), they also appeared to exhibit a return-chasing behaviour driven by returns on alternative assets in their investment universe. This behaviour is in line with findings in previous studies on investors in international real estate mutual funds (Shen, Lu and Lin, 2012) and foreign equity (Albuquerque, Bauer and Schneider, 2009; Bohn and Tesar, 1996).

The study complements previous studies such as those by Mauck and Price (2017) and Lieser and Groh (2014) that focus on pull factors as determinants of foreign real estate investments. With the exception of these two earlier studies, investigations into the drivers of foreign investments in commercial real estate or REITs have been relatively scarce and this study aimed at reducing this gap in the literature. Additionally, compared to developed markets (Liow, Zhou and Ye, 2015; Eichholtz et al., 2011; Eichholtz et al., 1998), emerging REIT markets such as South Africa have received limited attention in real estate literature.

This investigation was highly relevant to foreign real estate investors and new REIT markets. Foreign investments driven by endogenous pull factors such as solid economic and property-market fundamentals provide relatively higher stability for REITs in a particular country. Exogenous push factors, on the other hand, may lead to more volatility (Fernandez-Arias, 1996) and are driven by factors other than local

fundamentals. Considering that this study found push factors to be an important driver of foreign REIT investments, particularly in large-cap REITs, foreign investors may introduce higher volatility into REIT market liquidity and, potentially, funding constraints for local REITs. Understanding the drivers of foreign investments in REITs in emerging countries furthermore assists domestic and foreign investors to develop appropriate trading and portfolio strategies as well as price their risk. Additionally, the findings of this study may inform the decision-making of REIT policymakers.

The remainder of this paper is structured as follows: First, the study discusses international capital flows and the emerging SA REIT market. Next, pull- and push-factor literature is reviewed in developing the variables and hypotheses based on previous studies. This is followed by the discussion of the methodology, as well as the presentation of the results and the conclusion.

4.2 International capital flows

In an emerging-market context, capital inflows such as foreign direct investment (FDI), equity and bond inflows provide foreign capital that is important for economic development and growth. For South Africa in particular, the current account deficit emphasises the need for international capital to mitigate this shortfall in domestic capital and support economic development (De Beer, 2015). With international capital flows driven by yield-seeking investors, emerging countries have experienced a significant increase in capital flows over the past decade (De Beer, 2015). Capital flows consist of two components. Firstly, FDI represents long-term investments where the investor acquires an ownership interest of at least 10% in a foreign firm. Secondly, portfolio investment flows represent equity and bond investments in a foreign country.

Relative to comparable emerging countries, South Africa attracted three times more portfolio investments, with more than 70% represented by equity investments over the period 1994 to 2002. Hereby, South Africa differs from other emerging markets in that its composition of capital inflows is tilted towards portfolio investment (Ahmed et al., 2005). Despite the contribution of FDI to net financial inflows decreasing from 36% to 16% from the pre-crisis (2000–2007) to the post-crisis period (2009–2014), portfolio investment maintained its contribution of approximately 50% (De Beer, 2015). This is in line with the finding by Ahmed et al. (2005) that the South African portfolio-inflows coefficient of variation is 50% lower than that of its counterparts, confirming the stability of South African portfolio inflows.

Continuing the significant increase in cross-border flows seen over recent years, global real estate investment capital is expected to grow from USD700 billion to USD1 trillion by 2020. Approximately 50% of this capital is invested by international investors, mainly represented by North America, Asia and the Middle East, which collectively represent 70% of international investment flows (Wiegelmann and Szumilo, 2017).

The US remains the dominant market in the international real estate investment landscape for a number for reasons. First, the US attracts approximately half of global property investments, with real estate acquisitions exceeding dispositions by 95% during the first half of 2017 (Nelson, 2017). In terms of global REIT capitalisation, the US accounts for approximately 66% (Ernst and Young, 2016). As such, international real estate investors either invest in the US market or make investments based on US investment performance indicators. Hence, yield-chasing investors may consider alternative investment options during periods of poor

US market performance, as investors base their portfolio decisions on global information, considering the opportunity cost of alternative investments.

Secondly, for REITs in particular, global REIT regimes are modelled after the US REIT structure, with the US REIT market representing the most mature and largest global market preferred by international and US REIT investors. Lastly, within the South African context, the US and UK collectively represent 52.5% of South African portfolio inflows (State Department Office of Investment Affairs, 2017). As a result, this study also includes European market indicators. However, UK investors also represent one of the largest investment groups in the US, emphasising the relevance of US indicators for international real estate investors.

4.3 SA REITs as an emerging market

Previous studies provide evidence of economic variables influencing the returns of direct real estate (Kohlert, 2010; Park and Bang, 2012), which represents the underlying asset base of REITs. Relative to developed markets such as the US, emerging markets in general and South Africa in particular displayed higher levels and greater volatility with regard to macroeconomic variables such as inflation (four times higher than that of the US) and interest rates (2.63 times higher than the US) over the 2007 to 2016 period (Akinsomi et al., 2017b).

Despite the high market volatility, emerging-market REITs are likely to offer greater opportunities for growth and higher yields relative to mature developed markets, resulting in increasing investment flows to emerging REIT markets such as South Africa. Using JSE data, Appendix B, Figure B.1 confirms an increase in the foreign REIT purchase and foreign REIT net investment value over the 2010 to 2015 period for the sample included in this study.

While FDI determinants are well researched, studies investigating portfolio inflows in an emerging-market context are lacking (Ahmed et al., 2005), particularly with regard to REITs. This represents an existing gap in literature and the need for such research to improve the understanding of the drivers of portfolio flows to SA REITs, as it affects access to foreign capital and local economic growth (De Beer, 2015).

4.4 Literature review of pull and push factors and hypotheses

In the empirical investigation this study focused on a set of pull and push factors. The selection of factors was driven by the findings of previous studies and the availability of data for South Africa. The first pull factor was the commercial real estate market in South Africa. The performance of SA REITs and their fit in an international portfolio are tied to the commercial real estate market in South Africa. Cap rates capture real estate investment risks in the commercial real estate market and reflect conditions in the unsecuritised real estate market. In fact, cap rates in the sample were significantly correlated with other commercial real estate market indicators such as the discount rate (0.95), rent growth (-0.58), expenses growth (0.35) and number of properties sold (0.25). Additionally, cap rates affect real estate valuations, which are important for real estate returns (Akinsomi et al., 2017b) and to attract prospective international investors. This study therefore considered the cap rate an appropriate proxy for commercial real estate market conditions in South Africa.

This study expected a negative relationship between cap rates and foreign REIT investments. In particular, the higher (lower) the real estate investment risk premium was in the commercial real estate market, the more foreign REIT investors behave as net sellers (net buyers). This study included the property-type specific market cap rates provided by IPD and the South African Property Owners Association

(SAPOA) in the data set. These cap rates are based on transactions in the previous six months for industrial, office, retail and other property types. In South Africa, property-market fundamentals such as cap rates, rental growth or expenditure growth are only reported with a semi-annual frequency by IPD/SAPOA and this study included the cap rates for each REIT based on property type. In contrast to retail and industrial, for which cap rates are reported by property-type sub-category, cap rates for office buildings are reported according to building class (CBD, non-CBD prime and non-CBD secondary). This study derived office cap rates based on the average cap rate for CBD buildings in the four major cities (Johannesburg, Pretoria, Cape Town and Durban), and non-CBD prime to reflect the institutional investment-grade properties targeted by REITs. For diversified REITs, cap rates represent the average cap rate for all property types, while for REITs specialising in office and industrial, cap rates represent the average for both property types.

The second pull factor was performance of the stock market, which included the performance of the REIT market, as measured by the Johannesburg Stock Exchange (JSE) All Share Index. Previous studies provide evidence of the strong relationship between the stock market and securitised real estate (Myer et al., 1993), with REIT liquidity following stock-market liquidity (Subrahmanyam, 2007). Unsurprisingly, Aurelio (2006) found that investors benchmark overall market performance using benchmark portfolios such as the S&P500. This study expected a positive relationship between the JSE index and foreign investor behaviour. The better (worse) the performance of the South African stock market, the more foreign REIT investors behave as net buyers (net sellers). The JSE also reports the South African Listed Property Index (SAPY), which is based on the 20 largest property firms in terms of market capitalisation. This study decided against using the SAPY in the

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analysis as it is based on the performance of diverse listed-property firms such as REITs and non-REIT development firms. Thus, the SAPY is of limited explanatory power for REITs, which have been acknowledged by the JSE. At the time this manuscript was written, the SAPY was being phased out and the JSE was working on the creation of an SA REIT index to better reflect this asset class. Additionally, the SAPY has a correlation of 0.92 with the JSE index, which is significant at the 1% level, and this study considered the performance of the REIT sector to be sufficiently captured by the JSE index.

The third pull factor was economic activity in South Africa. In line with Akinsomi et al. (2017b), who find that macroeconomic indicators determine total direct real estate returns, economic conditions are considered an important pull factor for international real estate investments. Lieser and Groh (2011) confirm that a significant relationship exists between property returns and economic activity represented by GDP growth, inflation and unemployment. For REITs specifically, studies provide evidence of the impact of macroeconomic risk factors, including inflation and the interest rate term structure on REIT returns (Chan et al., 1990; Karolyi and Sanders., 1998) Additionally, Lieser and Groh (2014) found that indicators of economic activity such as economic size, GDP or unemployment rate have a significantly positive impact on foreign investments in commercial real estate. Mauck and Price (2017), on the other hand, found a significantly negative relationship between economic activity and foreign real estate investments by publicly listed investment companies. Akinsomi et al. (2017b) identify GDP as an important economic growth variable that is inversely related to total direct real estate return, which was particularly noticeable in the high vacancy rates during the 1997 to 2003 period of low GDP growth. This study proxied for economic activity by including the

growth of the South African GDP for the previous quarters from the St. Louis Federal Reserve. This study expected a positive relationship of macroeconomic fundamentals and foreign investments in SA REITs. In particular, the higher (lower) the growth in GDP is, the more foreign REIT investors behave as net buyers (net sellers).

The next pull factor was the interest rate in South Africa. Interest rates are important for direct real estate investment and real estate supply (Akinsomi et al., 2017). Representing the cost of capital, interest rate increases are a major concern for REITs and real estate investors (Hogan Lovells, 2017), as they affect profitability, economic activity and REIT funding constraints. When interest rates and the demand for space exceed the rate by which REITs expand their real estate portfolios, property prices and REIT share value are potentially adversely affected (Hogan Lovells, 2017). Additionally, REIT returns are highly sensitive to interest rate movements (Giliberto and Shulman, 2017; Chou and Chen, 2014; Allen, Madura and Springer, 2000). Conversely, total direct real estate returns are found to increase during high interest rate periods, with interest rates as a significant determinant for overall rental growth – with specific reference to South African corporate real estate (Akinsomi et al., 2017b). As a result, this study included the monthly prime interest rate to reflect conditions with regard to the cost of debt capital to consumers and companies. This study expected a negative relationship between interest rates and foreign REIT investments. Thus, the higher (lower) the prime interest rate, the more foreign REIT investors behave as net sellers (net buyers). The prime interest rate was obtained from the South African Reserve Bank.

The last pull factor captured the performance of SA government bonds. Ling and Naranjo (2003) found a positive correlation of US government bond yield and net equity flows into REITs for the period of 1979 to 2002. Similar to high REIT dividend

payouts, bonds provide a fixed income to investors, representing an investment alternative to REITs (Giliberto and Shulman2017). Despite the higher yields offered by REITs relative to stocks (Brounen and De Koning, 2012) and the relatively high correlation between the All Bond Index and SA REITs (SA REIT Association, 2016a), investors may prefer bonds as a low-risk investment alternative. Considering that bond prices and yields are negatively correlated, this study expected a negative relationship between SA government bond prices and foreign REIT investments. The higher (lower) SA government bond prices are, the more foreign REIT investors behave as net sellers (buyers). This study included the monthly price of the 10-year South African government bond from the SA Reserve Bank. Additionally, Fernandez-Arias (1996) showed that a country's creditworthiness has an impact on foreign capital flows into developing countries. This study consequently also included the monthly S&P credit rating for SA government bonds, which is coded -1 for BBB-, 0 for BBB and 1 for BBB+.

The first push factor was the rand/dollar exchange rate. Currency risk is an important consideration for foreign real estate investors, as it affects returns and return volatility (Hastings and Nordby, 2007), increasing overall portfolio risk (Newell and Worzala, 1995). Lieser and Groh (2011) emphasise that the net benefit of offshore investments needs to be regarded, with returns outweighing the potential negative impact of exchange rate movements. In particular, sub-Saharan Africa, including South Africa, is subject to currency devaluations, which introduce return uncertainty (JLL, 2016). This study expected the rand/dollar exchange rate to have a negative impact on foreign REIT investments. This rate reflects the number of South African rands that can be purchased for USD1. If the rand devalues, i.e. the exchange rate increases, cash flows received from investments in SA REITs are reduced. Thus, the

higher (lower) the rand/dollar exchange rate, the more foreign REIT investors behave as net sellers (net buyers). This study included the monthly average of the rand/dollar exchange rate as reported by the US Federal Reserve Bank.

The second push factor was financial conditions in the US. Interest rates in the US represent an important push factor driving capital flows into developing countries (De Vita and Kyaw 2008; Edison and Warnock, 2008; Chuhan, Claessens and Mamingi, 1998; Taylor and Sarno 1997; Fernández-Arias and Montiel 1996). In particular, US interest rates have a negative impact on foreign equity investments (Edison and Warnock, 2008; Chuhan, Claessens and Mamingi, 1998). This study expected financial conditions in the US, such as interest rates, to have a significant impact on foreign investments in SA REITs. This study measured monthly US financial conditions with the Goldman Sachs Financial Conditions Index (*GSFCI*) in line with Van Niekerk and Loonat (2017). This index reflects US capital market conditions and is the weighted sum of the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread (Baum, 2016). An increase in the *GSFCI* reflects a tightening of financial conditions, while a decrease reflects an easing (Hatzius et al., 2010). This study expected the *GSFCI* to have a significantly negative relationship with foreign REIT investments in SA. The higher (lower) the *GSFCI*, the more foreign REIT investors behave like net sellers (net buyers).

The next two push factors were the economic conditions in the US and Europe, as captured by the monthly respective business confidence indices from the OECD. Despite the strong correlation that exists between the US and UK property markets and their macroeconomic variables (Bouchouicha and Ftiti, 2012), this study employs the economic conditions from both markets. US economic conditions have been found to negatively affect foreign investments in equities (Chuhan, Claessens and Mamingi,

1998). The business confidence index for the US is based on the monthly assessment by US firms of productions, order, stocks and current positions as well as expectations about the future. Business confidence indicators are useful in projecting real GDP and business investment. Their advantage is that, compared to economic fundamentals, which are reported with a delay, survey-based confidence indicators capture the current economic conditions more immediately (Santero and Westerlund, 1997).

This study expected a negative relationship of US business confidence and foreign REIT investments. If the US economy is undergoing economic difficulties, domestic and foreign investors who would otherwise invest in the US are more likely to look for investment opportunities in other geographies in order to generate the desired return. Thus, the higher (lower) the US business confidence index, the more foreign REIT investors behave as net sellers (net buyers). This is in line with the findings by Aurelio (2006), who found that investors potentially use foreign investments to hedge against declining domestic income.

To account for European economic conditions, which may affect investment decisions by European investors or investors from other regions that commonly invest in Europe, this study also included the business confidence index for European OECD countries and expected the same relationship with foreign REIT investments as for the US business confidence.

Foreign investors may consider SA REITs as alternative investments, on a risk-adjusted basis, to certain categories of US REITs, such as small-cap or recently listed REITs. Additionally, deteriorating or poor conditions of US commercial real estate markets and US REIT may motivate investors to search for alternative real estate investments internationally. Lu, Tse and Williams (2013) show that correlations

between the US and international REIT markets vary over time and suggest that these varying correlations may stem from the behaviour of portfolio managers, who seek international REIT investment opportunities based on the performance of US REITs. To reflect the performance of the US REIT industry as a push factor, this study included the return on the NAREIT all equity REITs index. This study expected a negative relationship between the NAREIT index return and foreign investments in SA REITs. The higher (lower) NAREIT equity returns are, the more foreign REIT investors behave like net sellers (net buyers).

In addition to US equity markets and economic conditions, the performance of the US corporate bond market may have an impact on foreign REIT investments. Boudry et al. (2012) showed a significantly negative relationship between Barclay's BAA long-term bond index and the NAREIT equity index, which is in line with the findings by Yang, Zhou and Leung (2012). Analogously, this study hypothesised a negative relationship of the performance of US corporate bonds and foreign investments in SA REITs. Thus, the higher (lower) the US bond price index, the more foreign REIT investors behave as net sellers (net buyers). This study included the monthly Bloomberg USD High Yield Corporate Bond Index (BUHY), in line with Van Niekerk and Loonat (2017), to reflect the performance of the corporate bond market in the US. Table 4.1 presents an overview of the push and pull factors, their hypothesised direction with foreign REIT investments, and related literature reviewed for the respective factors.

Table 4.1: Hypothesised relationships of pull and push factors with foreign REIT investments

	Variable	Definition	Impact	Literature reviewed	Country focus of study
Pull factors	Commercial real estate market conditions	*Cap rate*	-	Akinsomi et al. (2017)	South Africa
				Hastings et al. (2007)	Not country specific
	REIT and stock-market performance	*JSE All Share Index*	+	Aurelio (2006)	USA
				Myer et al. (1993)	USA
				Subrahmanyam (2007)	USA
	Economic activity	*GDP growth*	+	Akinsomi et al. (2017)	South Africa
				Lieser et al. (2011)	Not country specific
				Lieser et al. (2014)	Not country specific
				Mauck et al. (2017)	Not country specific
	Interest rates	*Prime interest rate*	-	Akinsomi et al. (2017)	South Africa
				Allen et al. (2000)	USA
				Chou et al. (2014)	USA
				CBRE (2017)	Not country specific
				Giliberto et al. (2017)	Not country specific
				Hong and Lee. (2013)	USA
				Lui et al. (2008)	USA
				Shulman (2015)	USA
	Debt capital market	*Price on 10-year government bond*	-	CBRE (2017)	Not country specific
				Glascock et al. (2000)	USA
				Chong et al. (2009)	Not country specific
				Ling and Naranjo (2002)	USA
				SA REIT Association (2016)	South Africa

Push factors	Exchange rate	*Rand/US dollar exchange rate*	-	Hastings and Nordby (2007)	Not country specific
				Newell and Worzala (1995)	Not country specific
	US financial conditions	*Financial conditions index*	-	Aurelio (2006)	USA
				Baum (2016)	USA
				Chuhan et al. (1998)	USA
				De Vita and Kyaw (2008)	Developing countries
	US economic conditions	*OECD business confidence index for US*	-	Edison and Warnock (2008)	USA
				Fernández-Arias and Montiel (1996)	Developing countries
					Not country specific
				Hatzius et al. (2010)	Not country specific
				Santero and Westerlund. (1997)	Not country specific
	EU economic conditions	*OECD business confidence for all EU OECD countries*	-	Taylor and Sarno (1997)	
	US REIT market	*Return on NAREIT equity REITs index*	-	Lu et al. (2013)	Not country specific
				Yang et al. (2012)	USA
	US corporate bonds	*Bloomberg USD High Yield Corporate Bond Index*	-	Boudry et al. (2012)	USA
				Yang et al. (2012)	USA

To measure foreign investments in SA REITs this study obtained foreign investment information for SA REITs directly from the JSE. The JSE started to collect this information in 2010. This study obtained an unbalanced panel data set of all publicly listed-property firms at the JSE for the period of January 2010 to December 2016. The sample included only firms that were 1) listed prior to the introduction of REITs in May 2013 and then converted to a REIT, or 2) REITs that went public after May 2013. The final sample included 2,269 REIT months. To avoid a survivorship bias, the sample also included delisted REITs.

For each firm in the sample, this study obtained monthly data about purchases and sales of firm shares by foreign investors. This study followed Kumar and Lee (2006) and derived a monthly buy-sell index (BSI) for foreign investors in each REIT. The BSI can also be interpreted as a measure of investor sentiment (Freybote and Seagraves, 2017; Kumar and Lee, 2006). Hereby, the foreign investor BSI (*FBSI*) is calculated as the difference between foreign investments and divestments divided by the sum of foreign trading volume in a particular REIT shown in Equation 1. A positive BSI indicates a net buying behaviour of foreign investors (optimism), whereas a negative BSI indicates a net selling behaviour (pessimism):

$$BSI_{jt} = \frac{(B_{jt} - S_{jt})}{(B_{jt} + S_{jt})} \tag{1}$$

where B_{jt} (S_{jt}) are the rand-denominated purchases (sales) of shares for a particular REIT j by foreign investors in month t. Figure B.1 in Appendix B illustrates the total annual purchase value and net value invested in the sample of SA REITs.

To control for the impact of REIT-level characteristics on foreign investments, this study included the leverage, defined as total liabilities divided by total assets (Brounen and De Koning, 2012; Harris and Mongiello, 2006). This study winsorised

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the leverage variable to reduce the effect of outliers. This study also controlled for the size of a REIT by including the log of market capitalisation. Market capitalisation is calculated as the monthly average of daily closing cost multiplied by outstanding shares. To reflect the property-type focus of REITs in the sample, this study included binary property-type variables. Diversified REITs are the reference group, while *OFFIND* reflects office and industrial REITs, *RET* reflects retail REITs and *OTH* reflects other specialised REITs such as multi-family and hospitality REITs.

Over the last couple of years, a number of foreign REITs, particularly from Europe, underwent a secondary listing on the JSE. These SA REITs generally have no exposure to commercial real estate markets in South Africa. While listed on the JSE, these REITs invest predominantly in commercial real estate in Europe. To control for the foreign exposure of SA REITs, this study included a binary variable coded 0 for REITs without any holdings in South Africa and 1 for REITs that hold one or more properties in South Africa. Some SA REITs also have more than one stock class, which this study controlled for with the binary variable *DUAL*. In December 2015, the South African finance minister was surprisingly replaced, which led to a ZAR290bn (about USD22.26bn) market value decline of the 17 largest financial and property firms included in the JSE All Share Index within two days (Hogg, 2016). This study controlled for this event with a binary variable (*IMPF*). Table 4.2 presents the descriptive statistics for the sample and shows that foreign investors were, on average, net buyers (optimistic) as indicated by the mean *FBSI*.

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Table 4.2: Descriptive statistics for REITs

	Mean	Median	Standard deviation	Minimum	Maximum
FBSI	0.12	0.22	0.67	-1.00	1.00
Cap rate	9.16	9.35	0.89	7	11.63
Interest rate	9.35	9.25	0.68	8.50	10.5
JSE index	10.66	10.76	0.22	10.18	10.90
GDP growth	0.43	0.44	0.49	-0.47	1.28
SA bond	8.06	8.16	0.79	6.01	9.77
exchange rate	10.62	10.54	2.66	6.72	16.33
GSFCI	99.61	99.49	0.51	98.67	100.90
NAREIT	1.03	1.07	4.39	-10.97	14.28
US corporate bond	141.82	146.69	16.84	101.28	169.78
US bus. conf.	100.07	99.96	0.56	98.97	101.37
EU bus. conf.	100.17	100.31	0.50	99.06	101.29
Leverage	0.49	0.41	0.23	0.20	0.86
Size	22.23	22.29	1.29	16.69	25.32

Note: This table presents the descriptive statistics for the sample of SA REITs from January 2010 to December 2016 (N=2269). FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price on a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence are based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT.

4.5 Methodology

This study investigated the explanatory power of push and pull factors for foreign REIT investments in two ways. First, this study focused on the contemporaneous relationships between *FBSI* and 1) pull factors and 2) push factors using cross-sectional time-series data. Considering that autocorrelation and contemporaneous (cross-sectional) correlation of residuals are common for longitudinal data sets (Dufour and Khalaf, 2000; Beck and Kats, 1995), this study employed the Wooldridge test for autocorrelation and Breusch-Pagan LM test to assess heteroskedasticity and contemporaneous correlation in the data set. All test statistics were significant at the

1% level, which suggests that the unbalanced panel data set suffered from heteroscedasticity, serial and contemporaneous correlation. Consequently, this study used a Prais-Winsten regression with correlated panel-corrected standard errors (PCSE) to estimate the model shown in Equation 2. Autocorrelation, contemporaneous correlation and heteroscedasticity were assumed to be panel-specific. Autocorrelation was calculated based on the autocorrelation of residuals. The augmented Dickey-Fuller test suggested that all the continuous variables in the data set were stationary at the 1% level:

$$FBSI_{jt} = \alpha + \beta_1 X + \beta_2 Y + \varepsilon \qquad \textbf{(2)}$$

where $FBSI_{jt}$ is the foreign investor buy-sell index for REIT j in month t, X is a set of either pull factors or push factors, Y is a set of firm-level control variables.

Second, this study investigated the ability of push and pull factors to forecast foreign REIT investments by means of a bivariate panel vector-autoregression (panel VAR), as shown in Equation 3. The advantage of this approach is that it allowed us to test for Granger causality between individual pull (push) factors and foreign REIT investments. The Panel VAR lag order selection was based on the minimisation of the J, MBIC, MAIC and MQIC values. This study did not include exogenous variables in the VAR model as all of the variables, except leverage, were endogenous:

$$\begin{bmatrix} y_{1,t} \\ y_{2,t} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} A_{1,p} \\ A_{2,p} \end{bmatrix} \begin{bmatrix} y_{1,t-p} \\ y_{2,t-p} \end{bmatrix} + \begin{bmatrix} e_{1,t} \\ e_{2,t} \end{bmatrix} \qquad \textbf{(3)}$$

where y_1 and y_2 represent the FBSI and the relevant pull (push) variable, which are expressed as a linear function of its own and the other endogenous variable's lags, y_{t-p}

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represents the lags, c is a k×1 vector of constants, A is a k×k matrix and e is a k×1 vector of error terms.

4.6 Results

4.6.1 Contemporaneous relationships

The results for the contemporaneous relationships of pull and push factors with foreign REIT investments (*FBSI*) are presented in Table 4.3 (full sample). With regard to pull factors, the cap rate has a significantly positive effect on *FBSI*. Thus, the higher (lower) the real estate investment risk in the commercial real estate market, the more (less) foreign investors in REITs behave as net buyers (net sellers). Or put differently, the better (worse) the property-market conditions, the more pessimistic (optimistic) foreign investors are about REITs. The direction of this relationship is surprising as this study hypothesised a negative relationship (Table 4.1). However, the positive relationship between cap rate and *FBSI* may reflect a flight to liquidity by foreign investors from the direct real estate to the REIT market in times of deteriorating commercial real estate market conditions. Such behaviour has been found for investors in the US who switch capital between the securitised and unsecuritised real estate market (Das, Freybote and Marcato, 2015; Lee, Lee and Chiang, 2008).

In addition to the property-market conditions, the size of a REIT has a significantly positive impact on foreign REIT investments, considering that the larger a REIT is, the more foreign investors behave as net buyers. The positive relationship of foreign investment behaviour and a firm's size are in line with expectations, as larger REITs are more liquid (Marcato and Ward, 2007) and therefore more attractive to foreign investors. In fact, Belgove and Van der Merwe Smit (2016) concluded that

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the market capitalisation of South African stocks is one of the most important drivers of liquidity.

Foreign investors prefer REITs with at least some exposure to commercial property markets in South Africa, as suggested by the significantly positive coefficient on *Foreign exposure*. Compared to REITs without property holdings in South Africa, foreign investors behave as net buyers for REITs with at least some exposure to the commercial real estate market in South Africa. This finding suggests that diversification considerations in line with previous studies (Ling and Naranjo, 2002; Liu and Mei, 1998) are important to foreign REIT investors, who want exposure to the South African commercial real estate market.

For the full sample, none of the push factors had an impact on *FBSI*. The size and geographical focus of holdings of a REIT had an impact on foreign investments in line with the pull factor results. Additionally, compared to diversified REITs, foreign investors were pessimistic about retail REITs, as suggested by the significantly negative coefficient on *RET*. Overall the results for the full sample suggest that property-market conditions as a pull factor are most important to explain the behaviour of foreign REIT investors.

One explanation for the insignificant coefficients for most of the pull and push factors is that the sample contained a rather heterogeneous group of REITs that requires further analysis at a disaggregated sample level, which this study conduct below. Another explanation is that pull and push factors are not as important for foreign REIT investments as investor characteristics or portfolio characteristics. One shortcoming of the investigation was that this study did not control for these characteristics, as this study did not have the data. Future studies with data sets

containing this information may provide further insights into the impact of pull and push factors on foreign REIT investment decisions, considering investor characteristics and portfolios.

Table 4.3: Prais-Winsten regression results (full sample)

Pull factors			Push factors		
	Coefficient	*P-value*		*Coefficient*	*P-value*
Cap rate	**0.11****	**0.026**	Exchange rate	-0.02	0.439
Interest rate	-0.03	0.550	GS fin conditions	-0.08	0.332
SA bond	-0.01	0.702	NAREIT	-0.003	0.372
SA bond rating	0.07	0.345	US corp. bond	-0.002	0.669
JSE index	0.22	0.429	US business conf.	-0.00	0.971
GDP growth	-0.01	0.901	EU bus. conf.	0.004	0.430
IMPF	-0.01	0.949	Leverage	-0.08	0.379
Leverage	-0.07	0.451	Size	**0.03***	**0.081**
Size	**0.03***	**0.083**	DUAL	0.05	0.323
DUAL	0.04	0.436	INDOFF	-0.004	0.941
INDOFF	-0.04	0.541	RET	**-0.09*****	**0.009**
RET	0.04	0.519	OTH	-0.07	0.363
OTH	-0.13	0.116	Foreign exp.	**0.34*****	**0.000**
Foreign exp.	**0.36*****	**0.000**	Constant	7.69	0.371
Constant	-3.82	0.228			
N	*2268*		*N*	*2266*	
No. of groups	*47*		*No. of groups*	*47*	
Avg. obs	*48.26*		*Avg. obs*	*48.21*	
Wald Chi²	*57.36****		*Wald Chi²*	*62.00****	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from January 2010 to December 2016, separated by the South African exposure of firms. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price on a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence are based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise. DUAL is coded 1 for REITs with more than one share class. INDOFF, RET and OTH are binary variables for REITs specialising in office and/or industrial, retail or other property types. Diversified REITs are the reference group.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

The full sample period included the pre-REIT period (January 2010 to April 2013), in which South Africa had an established listed-property sector, but no REITs, and the REIT period (May 2013 to December 2016), in which REITs were introduced in

South Africa and firms in the sample converted to being REITs in line with the SA REIT requirements[4]. To assess whether the introduction of the REIT structure in May 2013 had an impact on the importance of push and pull factors for *FBSI*, this study estimated the model in Equation 2 for the pre-REIT and REIT period separately and report the results in Table 4.4.

In the pre-REIT period, none of the South African pull factors had a significant impact on the foreign REIT investors. However, a firm's leverage and size have a significant impact on the investment behaviour of foreign investments. In particular, the higher (lower) the leverage of a firm, the lower (higher) the *FBSI*. Compared to firms with a specialisation in industrial, industrial and office, and other property types, foreign investors in the pre-REIT period had a clear preference for diversified firms. Additionally, South African holdings in the portfolio of a REIT (*Foreign exposure*) had an impact on *FBSI* in line with Table 4.3. The only push factor in the pre-REIT period that had an impact on *FBSI* was US business confidence. Overall, the results for the pre-REIT period suggest that pull and push factors had hardly any impact on foreign REIT investments. Instead, firm-level variables such as property-type specialisation, South African holdings, leverage and size, were more important in explaining whether foreign investors behaved as net sellers or net buyers.

In the REIT period, the pull factors cap rate and the JSE index had a significantly positive impact on foreign REIT investments. The higher (lower) the JSE index, the more optimistic (pessimistic) foreign investors were about REITs. This was in line with the expectation for stock and REIT market performance (Table 4.1). The business confidence in the US and Europe as push factors had a significant impact on *FBSI*. The negative relationship of US business confidence and *FBSI* were in line with

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[4] For more information on SA REIT requirements, please visit: http://www.sareit.com/101_WhatIsReits.php

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the expectations (Table 4.1). The higher (lower) the confidence is about economic conditions in the US, the more pessimistic (optimistic) foreign investors are about SA REITs.

The finding was in line with those of Chuhan, Claessens and Mamingi (1998), who found that US economic conditions have a negative effect on foreign equity investments. The positive relationship of European business confidence and *FBSI* was in the opposite direction from what was expected (Table 4.1). The higher (lower) the confidence about economic conditions in Europe, the more foreign investors behaved as net buyers (net sellers). One explanation for this finding is that in times of strong business confidence in Europe, European investors may have more funds available to place. However, compared to the US, European commercial real estate markets are relatively small and may not offer sufficient diversification benefits. In these times, European investors may increase their investments in developed and developing countries on other continents to diversify, as found by Eichholtz et al. (1998).

To investigate whether foreign investments in SA REITs increase if European business confidence is high and US business confidence is low, which would render the US REIT and commercial real estate market less attractive to European investors, this study estimated the model including an interaction term for US and EU business confidence. The coefficient (*not reported*) was insignificant, suggesting that there was no interaction between the business confidence indices in these developed regions.

Overall, the results suggest that after REITs were introduced in South Africa, the effect of pull and push factors on foreign investments increased. On the other hand, firm-level characteristics such as leverage, size or property-type focus have less explanatory power for foreign REIT investments in the REIT period, compared to the

pre-REIT period. One explanation for the findings is that REITs have introduced more transparency into the SA listed-property market and made SA REITs more homogeneous compared to listed-property firms in the pre-REIT period. Another explanation for the increased importance of push factors is the increasing involvement of foreign investors who are either US-based or invest in the US. Carstens and Freybote (2017) found that after REITs were introduced in South Africa, foreign investor trading had a significant impact on REIT share liquidity, as measured by turnover and trading volume.

Table 4.4: Prais-Winsten regression results separated by period

	Pre-REIT period		REIT period	
	Coefficient	*P-value*	*Coefficient*	*P-value*
Pull factors				
Cap rate	0.12	0.446	**0.10***	**0.053**
Interest rate	0.07	0.563	-0.11	0.119
SA bond	0.09	0.155	-0.07	0.170
SA bond rating	0.05	0.652	0.02	0.798
JSE index	1.22	0.139	**1.23**	**0.019**
GDP growth	0.05	0.616	-0.04	0.342
IMPF			0.06	0.534
Leverage	**-0.25**	**0.016**	0.13	0.342
Size	**0.07**	**0.014**	0.01	0.541
DUAL	0.13	0.192	-0.02	0.726
INDOFF	**-0.24**	**0.043**	0.05	0.471
RET	0.08	0.624	-0.00	0.999
OTH	**-0.25***	**0.059**	-0.03	0.814
Foreign exposure	**1.26***	**0.000**	**0.34***	**0.000**
Constant	**-17.70***	**0.081**	**-13.15**	**0.016**
N	844		1424	
No. of groups	33		47	
Avg. obs	25.58		30.30	
Wald Chi²	1061.42***		62.28***	
Push factors				
Exchange rate	-0.02	0.879	-0.04	0.222
GS fin conditions	-0.06	0.753	-0.11	0.275
NAREIT	-0.001	0.891	-0.01	0.275
US corp. bond	0.00	0.00	-0.00	0.959
US business conf.	**0.02***	**0.089**	**-0.02**	**0.022**
EU bus. conf.	-0.004	0.645	**0.04**	**0.004**
Leverage	**-0.24**	**0.024**	0.12	0.378
Size	**0.07**	**0.011**	0.01	0.542
DUAL	0.14	0.160	-0.02	0.801
INDOFF	**-0.19***	**0.069**	0.08	0.239
RET	-0.04	0.448	**-0.13***	**0.004**
OTH	**-0.20***	**0.065**	0.05	0.608
Foreign exposure	**1.29***	**0.000**	**0.33***	**0.000**
Constant	-3.44	0.853	10.68	0.284
N	842		1424	
No. of groups	33		47	
Avg. obs	25.52		30.30	
Wald Chi²	1099.54***		70.78***	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from January 2010 to December 2016, separated for the REIT (May 2013 to December 2016) and pre-REIT period (January 2010 to April 2013). FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price of a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield,

S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence are based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise. DUAL is coded 1 for REITs with more than one share class. Foreign exposure is coded 1 for REITs with holdings in South Africa and 0 for REITs without any South African holdings. INDOFF, RET and OTH are binary variables for REITs specialising in office and/or industrial, retail or other property types. Diversified REITs are the reference group.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

The introduction of REITs in South Africa may also have led to increased investments by foreign institutions such as pension funds. In the US, institutional investors have been found to prefer older and larger REITs (Below, Stansell and Coffin, 2000). Consequently, this study separated the full sample into small- and large-cap REITs and estimated the model in Equation 2. Hereby, large-cap REITs are defined as REITs with a market capitalisation of ZAR10bn or more (about USD768m). The results are presented in Table 4.5.

For small-cap REITs, commercial property-market conditions had a significantly positive effect on *FBSI* in line with Table 4.3 and the REIT period in Table 4.4. However, no other pull or push factor explained foreign investments in small-cap REITs. At the firm level, size had a significantly positive impact on *FBSI*. The results for small-cap REITs in Table 4.5 suggest that the overall results in Table 4.4 may be driven by small-cap REITs. The share of South African holdings (foreign exposure) had no impact on *FBSI* for small-cap REITs.

For large-cap REITs, the SA bond prices had a significantly negative relationship with *FBSI*, which this study expected (Table 4.1). Thus, the higher (lower) the price is on SA government bonds, the more pessimistic (optimistic) foreign investors are about SA REITs.

As is shown in Table 4.5, financial conditions in the US (*GS fin conditions*) and US corporate bond prices (*US corp. bond*) had a significantly negative impact on foreign REIT investments for large-cap REITs. An increase in the Goldman Sachs Financial Conditions Index indicates a tightening of financial conditions. Thus, the tightening (easing) financial conditions in the US led to foreign investors behaving as net sellers (net buyers) of large-cap SA REITs. This result was in line with the expectation (Table 4.1). In times of tightening US financial conditions, foreign investors may be faced with increasing funding constraints, exhibit a higher risk aversion and home bias, or find more attractive investment alternatives in the US. The negative relationship of the US bond price index and *FBSI* was in line with the expectation (Table 4.1) and previous studies for the US (Boudry et al., 2012; Yang, Zhou and Leung, 2012). Lastly, the significant coefficient on foreign exposure for large-cap REITs, compared to small-cap REITs, suggested that REITs without any South African holdings were predominantly large-cap stocks.

Overall, the results in Table 4.5 suggest that large-cap REITs are different from small-cap REITs. Besides property-market conditions and firm size, none of the variables explained foreign investor behaviour with regard to small-cap REITs. Property-market conditions are important for foreign investments in small-cap REITs, but not for large-cap REITs. Clayton and MacKinnon (2003) found that small-cap US REITs in the early period (1993 to 1998) were more like real estate than large-cap REITs, which have a higher institutional ownership. The results for small-cap REITs appear to be in line with these earlier findings.

On the other hand, push and pull factors were more important for large-cap REITs. In particular, push factors had more explanatory power for large-cap REITs than pull factors. This finding was unexpected, considering that this study expected

pull factors to be more important to investors seeking portfolio diversification. It suggests that foreign investors in large-cap REITs chase returns to some extent in line with the findings of previous studies on equities and real estate mutual funds (Shen, Lu and Lin, 2012; Albuquerque, Bauer and Schneider, 2009; Bohn and Tesar, 1996). One explanation may be the higher institutional ownership in large-cap REITs (Clayton and MacKinnon, 2003; Chan, Leung and Wang, 1998) and foreign institutional investors, which may be required to meet portfolio return objectives and thus chase returns internationally.

Additionally, the results suggest that foreign investors may consider large-cap REITs as alternative investments to US corporate bonds and SA government bonds. This finding was surprising, considering that SA REITs represent equity investments and US REITs behave more like stock and real estate than bonds (Boudry et al., 2012; Clayton and MacKinnon, 2003; Glascock, Lu and So, 2000). One explanation for the findings may be that SA REITs, compared to US REITs, behave more like bonds than stocks or real estate and are comparable to bonds on a risk-adjusted basis. While an in-depth investigation into the relationship of large-cap SA REITs and domestic and foreign bonds was beyond the scope of the investigation, future studies may further investigate the risk-adjusted behaviour of SA REITs in a mixed-asset portfolio in line with Ntuli and Akinsomi (2017), and with regard to bonds.

Table 4.5: Prais-Winsten regression results separated by market capitalisation

	Small cap		Large cap	
	Coefficient	*P-value*	*Coefficient*	*P-value*
Pull factors				
Cap rate	**0.13****	**0.034**	-0.01	0.874
Interest rate	-0.05	0.343	0.08	0.105
SA bond	0.01	0.878	**-0.10*****	**0.007**
SA bond rating	0.04	0.645	0.13	0.122
JSE index	0.13	0.675	0.34	0.303
GDP growth	-0.02	0.672	0.01	0.767
IMPF	-0.11	0.439	**0.21****	**0.025**
Leverage	-0.002	0.983	0.03	0.883
Size	**0.07****	**0.011**	-0.06	0.237
DUAL	0.08	0.152	-0.08	0.462
INDOFF	-0.08	0.256	0.03	0.714
RET	0.09	0.249	-0.11	0.228
OTH	-0.14	0.121		
Foreign exposure	0.08	0.566	**0.50*****	**0.000**
Constant	-3.64	0.333	-2.32	0.532
N	*1715*		*553*	
No. of groups	*43*		*17*	
Avg. obs	*39.88*		*32.53*	
Wald Chi²	*29.60****		*66.86****	
Push factors				
Exchange rate	-0.05	0.184	0.03	0.238
GS fin conditions	-0.02	0.875	**-0.17****	**0.041**
NAREIT	-0.01	0.222	0.003	0.448
US corp. bond	0.002	0.694	**-0.01****	**0.040**
US business conf.	-0.00	0.904	-0.004	0.956
EU bus. conf.	0.01	0.228	-0.01	0.372
Leverage	0.004	0.967	-0.09	0.628
Size	**0.07****	**0.011**	-0.06	0.270
DUAL	0.09	0.119	-0.06	0.572
INDOFF	-0.04	0.565	-0.02	0.839
RET	-0.06	0.129	**-0.10***	**0.066**
OTH	-0.07	0.395		
Foreign exposure	0.05	0.724	**0.48*****	**0.000**
Constant	0.42	0.970	**18.98****	**0.029**
N	*1713*		*553*	
No. of groups	*43*		*17*	
Avg. obs	*39.84*		*32.53*	
Wald Chi²	*31.06****		*63.42****	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from January 2010 to December 2016, separated by market capitalisation. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. SA bond is the price of a 10-year SA government bond. GDP growth is the GDP growth in the previous quarter. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index,

federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence are based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise. DUAL is coded 1 for REITs with more than one share class. Foreign exposure is coded 1 for REITs with holdings in South Africa and 0 for REITs without any South African holdings. INDOFF, RET and OTH are binary variables for REITs specialising in office and/or industrial, retail or other property types. Diversified REITs are the reference group.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

The results in Table 4.3, 4.4 and 4.5 suggest that the extent to which REITs invest in South African real estate or not has an impact on foreign investments. REITs listed on the JSE without South African investments appear to be a different species of REITs to foreign investors. This is reflected in the mean *FBSI* for REITs without South African assets and the mean *FBSI* for REITs with South African assets. The former is -0.22 and suggests a net selling behaviour by foreign investors, while the latter is 0.11, which reflects a net buying behaviour. The mean *FBSIs* for both types of REITs are statistically different at the 1% level. SA REITs without South African holdings may be targeting domestic investors in South Africa interested in international diversification, but affected by foreign exchange restrictions. For foreign investors, these types of REITs appear to be less attractive.

To assess whether REITs without South African holdings affected the results, this study estimated the model in Equation 2 for REITs with South African holdings only as a robustness check. As the IPO of REITs without South African properties is a relatively recent phenomenon, this study focused on the REIT period (May 2013 to December 2016). The sample of REITs without South African properties in their portfolio was too small for an in-depth analysis (N=150). However, future studies with a larger sample may investigate these types of REITs in more detail. The results are presented in Table 4.6 and are in line with the results in Table 4.4 (REIT period).

Commercial property market conditions (*cap rate*) and stock-market performance (*JSE index*) were the most important pull factors for foreign REIT investors, while business confidence in the US and the EU overall were the most important push factors.

Table 4.6: Prais-Winsten regression results for REITs with South African exposure

Pull factors			Push factors		
	Coefficient	*P-value*		*Coefficient*	*P-value*
Cap rate	**0.09***	**0.089**	Exchange rate	-0.03	0.441
Interest rate	-0.12	0.130	GS fin conditions	-0.13	0.258
SA bond	-0.07	0.168	NAREIT	-0.01	0.227
SA bond rating	-0.002	0.981	US corp. bond	-0.00	0.941
JSE index	**1.27****	**0.023**	US business conf.	**-0.024****	**0.023**
GDP growth	-0.04	0.455	EU bus. conf.	**0.04****	**0.017**
IMPF	0.05	0.675	Leverage	**0.26****	**0.052**
Leverage	**0.26***	**0.064**	Size	**0.04***	**0.100**
Size	0.04	0.102	DUAL	-0.001	0.984
DUAL	-0.004	0.952	INDOFF	0.04	0.591
INDOFF	0.01	0.918	RET	**-0.09***	0.060
RET	0.04	0.672	OTH	0.06	0.544
OTH	-0.01	0.956	Constant	12.23	0.286
Constant	**-13.73****	**0.017**			
N	*1274*		*N*	*1274*	
No. of groups	*41*		*No. of groups*	*41*	
Avg. obs	*31.07*		*Avg. obs*	*31.07*	
Wald Chi^2	*27.54****		*Wald Chi^2*	*64.10****	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from June 2013 to December 2016, separated by the South African exposure of firms. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price of a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence are based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise. DUAL is coded 1 for REITs with more than one share class. INDOFF, RET and OTH are binary variables for REITs specialising in office and/or industrial, retail or other property types. Diversified REITs are the reference group.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

4.6.2 Relationships over time

In the second part of the empirical investigation, this study focused on the forecasting ability of different pull and push factors for foreign REIT investments over the full period (2010 to 2016). In the remainder of this paper, this study only present and discuss factors that have predictive power for foreign REIT investments. US corporate bond prices, the business confidence in the US and EU fail to allow forecasting foreign investments in SA REITs for the full period. Subsequently, this study do not report the Panel VAR results for these push factors.

First, this study focused on South African debt capital market conditions as pull factor and report the results of the bivariate VAR for the SA bond prices and prime interest rate in Table 4.7. The first lag of SA government bond prices has a significantly negative relationship with *FBSI,* while *FBSI* has no predictive power for SA bond prices over time. The Granger causality test suggests that SA government bond price movements Granger-cause foreign investments in SA REITs. Thus, past values of SA bond prices have predictive value above previous values of *FBSI*. The first lag of the prime interest rate also has a significantly negative effect on *FBSI* and the prime interest rate Granger-causes foreign investments in SA REITs. Overall, the results suggest that debt capital market conditions in South Africa contain valuable information to predict foreign REIT investments, albeit only in the previous month.

Table 4.7: Panel VAR results for pull factors

		SA bond			*SA interest rate*
		Coefficient			*Coefficient*
FBSI	$FBSI_{t-1}$	**0.15 (0.000)***	**FBSI**	$FBSI_{t-1}$	**0.16 (0.000)***
	$FBSI_{t-2}$	**0.08 (0.016) **		$FBSI_{t-2}$	**0.08 (0.012)**
	$FBSI_{t-3}$	0.03 0.301)		$FBSI_{t-3}$	0.03 (0.316)
	$FBSI_{t-4}$	0.02 (0.447)		$FBSI_{t-4}$	0.03 (0.431)
	$FBSI_{t-5}$	-0.01 (0.705)		$FBSI_{t-5}$	-0.01 (0.731)
	$SABOND_{t-1}$	**-0.15 (0.002)***		$INTR_{t-1}$	**-0.21 (0.004)***
	$SABOND_{t-2}$	-0.03 (0.445)		$INTR_{t-2}$	0.12 (0.181)
	$SABOND_{t-3}$	-0.01 (0.841)		$INTR_{t-3}$	-0.13 (0.175)
	$SABOND_{t-4}$	0.01 (0.880)		$INTR_{t-4}$	0.15 (0.122)
	$SABOND_{t-5}$	-0.02 (0.560)		$INTR_{t-5}$	-0.11 (0.105)
SABOND	$FBSI_{t-1}$	0.03 (0.151)	**INTR**	$FBSI_{t-1}$	0.01 (0.265)
	$FBSI_{t-2}$	0.02 (0.213)		$FBSI_{t-2}$	-0.003 (0.771)
	$FBSI_{t-3}$	-0.005 (0.807)		$FBSI_{t-3}$	-0.01 (0.654)
	$FBSI_{t-4}$	-0.01 (0.554)		$FBSI_{t-4}$	-0.01 (0.394)
	$FBSI_{t-5}$	-0.02 (0.413)		$FBSI_{t-5}$	-0.002 (0.849)
	$SABOND_{t-1}$	**0.81 (0.000) ***		$INTR_{t-1}$	**1.10 (0.000)***
	$SABOND_{t-2}$	**0.36 (0.000) ***		$INTR_{t-2}$	**0.05 (0.000)***
	$SABOND_{t-3}$	**0.06 (0.029) **		$INTR_{t-3}$	0.01 (0.614)
	$SABOND_{t-4}$	**-0.37 (0.000) ***		$INTR_{t-4}$	**-0.12 (0.000)***
	$SABOND_{t-5}$	**0.26 (0.000) ***		$INTR_{t-5}$	**0.06 (0.000)***

		Granger causality test			
Equation		Chi-square	Equation		Chi-square
FBSI	SABOND	**15.67***	**FBSI**	INTR	**18.18***
SABOND	FBSI	5.76	**INTR**	FBSI	2.95
No. of obs		*1631*	*No. of obs*		*1631*
No. of panels		*43*	*No. of panels*		*43*
Avg. no. of T		*37.93*	*Avg. no. of T*		*37.93*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. SA bond is the price on a 10-year SA government bond. SA interest rate is the prime interest rate.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table 4.8 presents the Panel VAR results for commercial property and stock-market conditions as pull factors. The prior month's cap rate has predictive power for the current foreign REIT investments. The relationship is positive and provides additional evidence for the flight to liquidity hypothesis for foreign investments. On the other hand, the JSE index has a significantly negative impact on FBSI in its third lag. Thus, the higher (lower) the JSE All Share Index three months prior, the more pessimistic (optimistic) foreign investors are about SA REITs. The negative relationship is different from the positive relationship identified in the contemporaneous analysis

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(Table 4.4 and 4.6). One explanation for this finding may be that foreign investors expect the stock-market performance to revert to lower (higher) levels following on periods of a high (low) index. This, in turn, is likely to affect SA REITs and their attractiveness to foreign investors. Both cap rate and JSE index return Granger-cause foreign REIT investments.

Table 4.8: Panel VAR results for pull factors

		Cap rate			JSE index
		Coefficient			*Coefficient*
FBSI	$FBSI_{t-1}$	**0.12 (0.001)*****	**FBSI**	$FBSI_{t-1}$	**0.15 (0.000)*****
	$FBSI_{t-2}$	**0.09 (0.01)*****		$FBSI_{t-2}$	**0.07 (0.023)****
	$FBSI_{t-3}$	0.02 (0.557)		$FBSI_{t-3}$	0.02 (0.442)
	$FBSI_{t-4}$	0.002 (0.953)		$FBSI_{t-4}$	0.01 (0.651)
	$FBSI_{t-5}$	-0.01 (0.683)		$FBSI_{t-5}$	-0.02 (0.570)
	$FBSI_{t-6}$	-0.04 (0.256)			
	$CAPRATE_{t-1}$	**0.20 (0.049)****		JSE_{t-1}	-0.34 (0.518)
	$CAPRATE_{t-2}$	-0.01 (0.946)		JSE_{t-2}	0.57 (0.285)
	$CAPRATE_{t-3}$	0.09 (0.343)		JSE_{t-3}	**-1.09 (0.046) ****
	$CAPRATE_{t-4}$	0.09 (0.269)		JSE_{t-4}	0.45 (0.389)
	$CAPRATE_{t-5}$	-0.14 (0.115)		JSE_{t-5}	-0.04 (0.921)
	$CAPRATE_{t-6}$	0.03 (0.645)			
CAP RATE	$FBSI_{t-1}$	-0.02 (0.162)	**JSE index**	$FBSI_{t-1}$	-0.002 (0.203)
	$FBSI_{t-2}$	-0.004 (0.770)		$FBSI_{t-2}$	-0.002 (0.120)
	$FBSI_{t-3}$	-0.01 (0.269)		$FBSI_{t-3}$	-0.00 (0.878)
	$FBSI_{t-4}$	-0.02 (0.103)		$FBSI_{t-4}$	**-0.003 (0.058) ***
	$FBSI_{t-5}$	-0.01 (0.620)		$FBSI_{t-5}$	-0.001 (0.740)
	$FBSI_{t-6}$	-0.00 (0.966)			
	$CAPRATE_{t-1}$	**1.15 (0.000)*****		JSE_{t-1}	**0.68 (0.000) *****
	$CAPRATE_{t-2}$	-0.002 (0.911)		JSE_{t-2}	**0.30 (0.000) *****
	$CAPRATE_{t-3}$	-0.01 (0.661)		JSE_{t-3}	**-0.07 (0.033) ****
	$CAPRATE_{t-4}$	0.02 (0.487)		JSE_{t-4}	**-0.14 (0.000) *****
	$CAPRATE_{t-5}$	0.05 (0.226)		JSE_{t-5}	**0.18 (0.000) *****
	$CAPRATE_{t-6}$	**-0.13 (0.000)*****			
		Granger causality test			
Equation		*Chi-square*	*Equation*		*Chi-square*
FBSI	CAPRATE	**21.83***	**FBSI**	JSE	**19.62***
CAPRATE	FBSI	5.14	**JSE**	FBSI	6.43
No. of obs		*1549*	*No. of obs*		*1631*
No. of panels		*42*	*No. of panels*		*43*
Avg. no. of T		*36.88*	*Avg. no. of T*		*37.93*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. JSE index is the JSE All Share Index. P-values in brackets.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

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Table 4.9 presents the results for GDP growth as the last pull factor. GDP growth in the sixth lag has a significantly positive coefficient, which suggests that economic activity explains foreign REIT investments. Foreign REIT investments and GDP growth exhibit a reversed Granger causality. As shown in Table 4.9, the rand/dollar exchange rate has a significant impact on foreign REIT investments in the fifth and sixth lag. However, the coefficients on both lags differ in direction. While the exchange rate six months ago has a negative relationship with current foreign investments, the exchange rate five months ago has a positive one. The exchange rate Granger-causes foreign investments in REIT.

Table 4.9: Panel VAR results for pull and push factors

		GDP growth			Exchange rate
		Coefficient			*Coefficient*
FBSI	$FBSI_{t-1}$	**0.16 (0.000) *****	**FBSI**	$FBSI_{t-1}$	**0.13 (0.000) *****
	$FBSI_{t-2}$	**0.10 (0.002) *****		$FBSI_{t-2}$	**0.08 (0.012) ****
	$FBSI_{t-3}$	0.04 (0.178)		$FBSI_{t-3}$	0.03 (0.377)
	$FBSI_{t-4}$	0.03 (0.392)		$FBSI_{t-4}$	0.01 (0.761)
	$FBSI_{t-5}$	-0.001 (0.978)		$FBSI_{t-5}$	-0.02 (0.608)
	$FBSI_{t-6}$	-0.02 (0.452)		$FBSI_{t-6}$	-0.05 (0.144)
	GDP_{t-1}	0.05 (0.273)		$EXRATE_{t-1}$	-0.05 (0.333)
	GDP_{t-2}	0.03 (0.596)		$EXRATE_{t-2}$	-0.07 (0.272)
	GDP_{t-3}	0.02 (0.677)		$EXRATE_{t-3}$	0.05 (0.411)
	GDP_{t-4}	0.07 (0.242)		$EXRATE_{t-4}$	-0.002 (0.975)
	GDP_{t-5}	-0.05 (0.455)		$EXRATE_{t-5}$	**0.11 (0.085) ***
	GDP_{t-6}	**0.08 (0.070) ***		$EXRATE_{t-6}$	**-0.07 (0.067) ***
GDP	$FBSI_{t-1}$	**0.05 (0.001) *****	**EXRATE**	$FBSI_{t-1}$	-0.004 (0.856)
	$FBSI_{t-2}$	0.004 (0.797)		$FBSI_{t-2}$	0.01 (0.514)
	$FBSI_{t-3}$	0.01 (0.609)		$FBSI_{t-3}$	0.003 (0.862)
	$FBSI_{t-4}$	0.02 (0.128)		$FBSI_{t-4}$	-0.002 (0.917)
	$FBSI_{t-5}$	**0.03 (0.087) ***		$FBSI_{t-5}$	-0.02 (0.363)
	$FBSI_{t-6}$	**0.03 (0.067) ***		$FBSI_{t-6}$	-0.01 (0.743)
	GDP_{t-1}	**0.95 (0.000) *****		$EXRATE_{t-1}$	**1.26 (0.000) *****
	GDP_{t-2}	0.001 (0.945)		$EXRATE_{t-2}$	**-0.22 (0.000) *****
	GDP_{t-3}	**-0.53 (0.000)*****		$EXRATE_{t-3}$	**-0.15 (0.011) ****
	GDP_{t-4}	**0.47 (0.000)*****		$EXRATE_{t-4}$	**0.45 (0.000) *****
	GDP_{t-5}	**-0.001 (0.891)**		$EXRATE_{t-5}$	**-0.29 (0.000) *****
	GDP_{t-6}	**-0.09 (0.000) *****		$EXRATE_{t-6}$	**-0.06 (0.034) ****
		Granger causality test			
Equation	*Equation*	*Chi-square*	*Equation*	*Equation*	*Chi-square*
FBSI	**GDP**	**17.26*****	**FBSI**	**EXRATE**	**22.35*****
GDP	**FBSI**	**17.64*****	**EXRATE**	**FBSI**	1.87
No. of obs	*No. of obs*	*1563*	*No. of obs*	*No. of obs*	*1549*
No. of panels	*No. of panels*	*42*	*No. of panels*	*No. of panels*	*42*
Avg. no. of T	*Avg. no. of T*	*37.21*	*Avg. no. of T*	*Avg. no. of T*	*36.88*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. GDP is the GDP growth in the previous quarter. Exchange rate is the rand/dollar exchange rate. P-values in brackets.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Finally, Table 4.10 reports the results of the bivariate Panel VAR for US financial conditions (*GSFCI*) and the NAREIT return as push factors. Financial conditions in the US have predictive power for foreign investments in SA REITs in the first and second lag. The tighter (looser) financial conditions are in the US in the previous two months, the lower (higher) is the current *FBSI*. Additionally, the third and fourth lag

of NAREIT returns have a significantly positive relationship with *FBSI*. The higher (lower) NAREIT returns were three and four months ago, the higher (lower) is the current level of foreign REIT investments.

The significant Granger causality test statistics for *GSFCI* and NAREIT returns suggest that both variables have predictive power for foreign investments in SA REITs. While the relationship of *GSFCI* and *FBSI* is in line with expectations (Table 4.1), the direction of the relationship of NAREIT returns and *FBSI* is the opposite of the hypothesis. One explanation may be that the performance of US REITs may increase the interest of investors, such as US mutual funds, in securitised real estate in general and foreign REIT markets in particular. While the findings show a link between the US and SA REIT markets in line with previous studies that find a comovement of international REIT markets (Liow, Zhou and Ye, 2015; Lu, Tse and Williams, 2013), more research is needed to understand how the performance of the US REIT market affects REIT investments in emerging or other developed countries, particularly with regard to investor behaviour.

Table 4.10: Panel VAR results for push factors

		GS financial conditions			*NAREIT return*
		Coefficient			*Coefficient*
FBSI	FBSI$_{t-1}$	**0.15 (0.000) *****	**FBSI**	FBSI$_{t-1}$	**0.19 (0.000) *****
	FBSI$_{t-2}$	**0.07 (0.060) ***		FBSI$_{t-2}$	**0.10 (0.002) *****
	FBSI$_{t-3}$	0.03 (0.450)		FBSI$_{t-3}$	0.05 (0.118)
	FBSI$_{t-4}$	0.02 (0.623)		FBSI$_{t-4}$	0.04 (0.206)
	FBSI$_{t-5}$	-0.01 (0.855)		FBSI$_{t-5}$	0.01 (0.747)
	GSFCI$_{t-1}$	**-0.38 (0.004)*****		NAREIT$_{t-1}$	0.01 (0.151)
	GSFCI$_{t-2}$	**-0.19 (0.018) ****		NAREIT$_{t-2}$	0.004 (0.235)
	GSFCI$_{t-3}$	-0.03 (0.743)		NAREIT$_{t-3}$	**0.01 (0.018) ****
	GSFCI$_{t-4}$	0.01 (0.0895)		NAREIT$_{t-4}$	**0.01 (0.027) ****
	GSFCI$_{t-5}$	-0.05 (0.410)		NAREIT$_{t-5}$	0.004 (0.236)
GSFCI	FBSI$_{t-1}$	-0.002 (0.921)	**NAREIT**	FBSI$_{t-1}$	**0.37 (0.072)***
	FBSI$_{t-2}$	0.02 (0.338)		FBSI$_{t-2}$	-0.26 (0.212)
	FBSI$_{t-3}$	0.01 (0.543)		FBSI$_{t-3}$	0.17 (0.391)
	FBSI$_{t-4}$	0.01 (0.586)		FBSI$_{t-4}$	-0.02 (0.907)
	FBSI$_{t-5}$	-0.01 (0.331)		FBSI$_{t-4}$	0.20 (0.280)
	GSFCI$_{t-1}$	**1.09 (0.000) *****		NAREIT$_{t-1}$	**-0.14 (0.000)*****
	GSFCI$_{t-2}$	0.01 (0.743)		NAREIT$_{t-2}$	0.04 (0.134)
	GSFCI$_{t-3}$	**0.24 (0.000) *****		NAREIT$_{t-3}$	**0.18 (0.000) *****
	GSFCI$_{t-4}$	**-0.21 (0.000) *****		NAREIT$_{t-4}$	**-0.16 (0.000) *****
	GSFCI$_{t-5}$	**0.15 (0.000) *****		NAREIT$_{t-5}$	**-0.08 (0.002) *****

		Granger causality test			
Equation		*Chi-square*	*Equation*		*Chi-square*
FBSI	GSFCI	**15.75*****	**FBSI**	NAREIT	**9.27***
GSFCI	FBSI	2.69	**NAREIT**	FBSI	6.32
No. of obs		*1631*	*No. of obs*		*1631*
No. of panels		*43*	*No. of panels*		*43*
Avg. no. of T		*37.93*	*Avg. no. of T*		*37.93*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. P-values in brackets.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Overall, the results suggest that pull and push factors allow forecasting of foreign investment in SA REITs. The results for the relationship of pull and push factors with the behaviour of foreign REIT investors suggest that a larger number of pull factors have explanatory power for foreign REIT investments (cap rate, JSE index return, SA bond price, interest rate, GDP growth) than push factors (rand/dollar exchange rate, GS financial conditions index, NAREIT index return). This suggests that foreign investors are considering diversification benefits based on South African

fundamentals to some extent in their decision-making. However, push factors have more explanatory power in terms of number of significant lags than pull factors.

Considering the results for the pre-REIT and REIT period in Table 4.4, this study estimated the Panel VAR for the REIT period (May 2013 to December 2016) only as a robustness check and reports the findings in Appendix B, Tables B.1 to B.5. The results for pull factors such as SA bond and GDP growth, as well as push factors such as the rand/dollar exchange rate, GS financial conditions, NAREIT return and the US corporate bond price index, are in line with Tables 4.7 to 4.10. For the REIT period, the JSE index has no predictive power for *FBSI*, while the interest rate has an increased explanatory power, as suggested by significant coefficients on its first, third and fourth lag. Additionally, the business confidence in the US and EU has significant coefficients on the first, second and third lag, which suggests explanatory power for foreign REIT investments in South Africa in the REIT period. The findings for the business confidence indices are also in line with the contemporaneous findings in Table 4.4 and 4.6.

4.7 Robustness tests

In order to verify the main findings of this chapter, a random effects regression was executed for the full period and for the pre- and REIT periods. The results that are displayed in Appendix B, Table B.6 and Table B.7 indicate that, for the full period, the cap-rate results are similar, with size becoming insignificant from low significance levels in the original results. When separated by period, regression results display similar pull-factor results, with leverage significant in the pre-REIT period, and the cap rate and JSE index significant in the REIT period. Results for the push factors are similar, with US and EU business confidence indices retaining significance in the pre-

and REIT periods. However, these results cannot be relied upon due to the fact that contemporaneous correlation is not controlled for in the robustness regression.

4.8 Conclusion

This study investigated pull and push factors as drivers of foreign investments in REITs. In the investigation, this study focused particularly on US-specific push factors. Using the emerging REIT market of South Africa as a laboratory this study found that, at a contemporaneous level, not only pull factors, but also push factors have explanatory power for whether foreign investors behave as net buyers or sellers in SA REITs. This study also found that, over time, the majority of pull and push factors have predictive power for foreign investments in SA REITs.

Push factors appear to be more important for investors in large-cap REITs, while foreign investments in small-cap REITs are predominantly driven by commercial real estate market conditions. For this latter category of REITs, the results differed from previous studies for foreign equity investments in emerging markets (Baek, 2006; Fernandez-Arias, 1996). For small-cap REITs, pull factors are more important to foreign investor behaviour than push factors. Considering that this study found push factors to be an important driver of foreign REIT investments, particularly in large-cap REITs, foreign investors may introduce higher volatility into REIT market liquidity and potential funding constraints for local REITs.

Future studies may investigate the impact of push factors on REIT market liquidity and capital availability for REITs in foreign markets. The greater importance of pull factors for foreign investments in small-cap SA REITs may suggest that, compared to foreign equity investments in emerging countries, which are driven by push factors to a larger degree (Baek, 2006; Fernandez-Arias, 1996), foreign investments may not introduce as much volatility in emerging REIT markets. This

study encourage future studies on these and other research questions as they relate to emerging REIT markets.

The investigation was a starting point for understanding the impact of push factors on the behaviour of foreign REIT investors and REIT markets. The fact that this study found commercial real estate market conditions as pull factor to be particularly important for foreign REIT investments and a preference of foreign REIT investors for REITs with South African holdings suggests that foreign REIT investors do invest in foreign securitised real estate to take advantage of diversification benefits. However, particularly for large-cap REITs, investors also appear to show a return-chasing behaviour driven by push factors, i.e. conditions in alternative asset markets and the US economy. This was previously identified for foreign equity investors (Albuquerque, Bauer and Schneider, 2009; Bohn and Tesar, 1996) and international real estate mutual fund investors (Shen, Lu and Lin, 2012). More research is needed to understand what drives foreign investments in commercial real estate and REITs. Future studies may, among other things, investigate push and pull factors in the context of investor characteristics and their portfolios. These studies may also identify additional pull or push factors, for which this study do not have data.

REFERENCES

Ahmed, F., Arezki, R. and Funke, N. 2005. The Composition of Capital Flows: Is South Africa Different? *IMF Working Paper*, WP/05/40.

Akinsomi, O., Mkhabela, N. and Taderera, M. 2017. The Role of Macro-economic Indicators in explaining direct commercial real estate returns: evidence from South Africa. *Journal of Property Research*, 35:1, 28-52.

Albuquerque, R., Bauer, G.H. and Schneider, M. 2009. Global private information in international equity markets. *Journal of Financial Economics*, 94: 18–46.

Allen, M.T., Madura, J. and Springer, T.M. 2000. REIT Characteristics and the Sensitivity of REIT Returns. *Journal of Real Estate Finance and Economics*, 21(2): 141–152.

Aurelio, M.M. 2006. Going Global: The Changing Pattern of U.S. Investment Abroad. *Economic Review – Federal Reserve Bank of Kansas City*, 91(3): 5–32.

Baek, I.-M. 2006. Portfolio investment flows to Asia and Latin America: Pull, push or market sentiment? *Journal of Asian Economics*, 17: 363–373.

Baum, C. 2016. Why do we need a Goldman Sachs Financial Conditions Index? http://www.marketwatch.com/story/why-do-we-need-a-goldman-sachs-financial-conditions-index-2016-11-29 (Accessed: 08 February 2017).

Beck, N., and Katz, J.N. 1995. What to do (and not to do) with Time-Series Cross-Section Data. *The American Political Science Review*, 89(3): 634–647.

Belgrove, J.B. and Van der Merwe Smit, E. 2016. The Controllable Determinants of Liquidity in the Context of Securitised Real Estate Companies in South Africa. *Management Dynamics*, 25(1): 2–15.

Below, S.D., Stansell, S.R. and Coffin, M. 2000. The Determinants of REIT Institutional Ownership: Tests of the CAPM. *Journal of Real Estate Finance and Economics,* 21(3): 263–278.

Bohn, H. and Tesar, L.L. 1996. U.S. equity investment in foreign markets: Portfolio rebalancing or return chasing? *American Economic Review*, 86(2): 77–81.

Bouchouicha, R. and Ftiti, Z. 2012. Real Estate Markets and the Macro-economy: A Dynamic coherence framework. *Economic Modelling*, 29, 1820-1829.

Boudry, W.I., Coulson, N.E., Kallberg, J.G. and Liu, C.H. 2012. On the Hybrid Nature of REITs. *Journal of Real Estate Finance and Economics*, 44: 230–249.

Bertin, W., Kofman, P., Michayluk, D. and Prather, L. 2005. Intraday REIT Liquidity. *Journal of Real Estate Research*, 27(2): 155–176.

Brounen, D. and DeKoning, S. 2012. 50 Years of real estate investment trusts: An international examination of the rise and performance of REITs. *Journal of Real Estate Literature*, 20(2): 197–223.

Brounen, D., Eichholtz, P. and Ling, D. 2009. The liquidity of property shares: An international comparison. *Real Estate Economics*, 37(3): 413–445.

Cannon, S. E. and Cole, R. A. 2011. Changes in REIT Liquidity 1988-2007: Evidence from Daily Data. *Journal of Real Estate Finance and Economics*, 43(1): 258–280.

Chan, K.C., Hendershott, P. and Sanders, A.B. 1990. Risk and Return on Real Estate: Evidence from Equity REITs. *AREUEA Journal*, 18, 431-452.

Cheng, P., Ziobrowski, A.J., Caines, R.W. and Ziobrowski, B.J. 1999. Uncertainty and Foreign Real Estate Investment. *Journal of Real Estate Reseach*, 18(3): 463–479.

Cheng, P. and Liang, Y. 2000. Optimal Diversification: Is It Really Worthwhile? *Journal of Real Estate Portfolio Management*, 6(1): 7–16.

Chong, J., Miffre, J. and Stevenson, S. 2009. Conditional correlations and real estate investment trusts. *Journal of Real Estate Portfolio Management*, 15(2): 173–184.

Clarke, R. G., de Silva, H. and Thorley, S. 2006. Minimum-Variance Portfolios in the U.S. Equity Market. *The Journal of Portfolio Management*, 33(1): 10–24.

Conover, C. M., Friday, H. S. and Sirmans, G. S. 2002. Diversification Benefits from Foreign Real Estate Investments, *Journal of Real Estate Portfolio Management*, 8(1): 17–25.

De Beer, B. 2015. *South Africa's experience with capital flows since the financial crisis: From measurement to analysis.* Paper presented at the IFC satelite meeting during the 60th ISI conference, 24 July 2015.

De Vita, G. and Kyaw, S. 2008. Determinants of capital flows to developing countries: a structural VAR analysis. *Journal of Economic Studies*, 35(4): 304–322.

Ernst and Young. 2016. Global perspectives: 2016 REIT report.

Fernández-Arias, E. and Montiel, P. J. 1996. The Surge in Capital Inflows to Developing Countries: An Analytical Overview. *The World Bank Economic Review*, 10(1): 51–77.

Fratzscher, M. 2011. Push factors versus pull factors as drivers of global capital flows, *VOX CEPR's Policy Portal*, (January). Available at: http://voxeu.org/article/drivers-global-capital-flows-pushes-or-pulls.

Geurts, T. G. and Jaffe, A. J. 1995. Risk and Real Estate Investment : An International Perspective. *Journal of Real Estate Research*, 11(2): 117–130.

Ghysels, E., Plazzi, A. and Valkanov, R. 2016. Why Invest in Emerging Markets? The Role of Conditional Return Asymmetry', *Journal of Finance*, 71(5): 2145–2192.

Giannotti, C. and Mattarocci, G. 2013. Risk Measurement Choice in Selecting REITs : Evidence from the U . S . Market. *Journal of Real Estate Portfolio Management*, 19(2): 137–153.

Giliberto, M. and Shulman, D. 2017. On the interest rate sensitivity of REITs: Evidence from twenty years of daily data. *Journal of Real Estate Portfolio Management*, 23(1): 7–20.

Glascock, J. L. and Kelly, L. J. 2007. The relative effect of property type and country factors in reduction of risk of internationally diversified real estate portfolios. *Journal of Real Estate Finance and Economics*, 34(3): 369–384.

Glascock, J. and Lu-Andrews, R. 2014. An Examination of Macroeconomic Effects on the Liquidity of REITs. *Journal of Real Estate Finance and Economics*, 49(1): 23–46.

Glascock, J., Lu, C. and So, R. 2000. Further evidence on the integration of REIT, bond, and stock returns. *The Journal of Real Estate Finance and Economics*, 20(2): 177–194.

Hamelink, F. and Hoesli, M. 2004. What factors determine international real estate security returns ? *Real Estate Economics*, 32(3): 437–462.

Harris, P. and Mongiello, M. 2006. *Accounting and Financial Management* (First Edition). Routledge, New York, USA.

Hastings, A. and Nordby, H. 2007. Benefits of Global Diversification on a Real Estate Portfolio. *The Journal of Portfolio Management*, 33(5): 53–62.

Hatzius, J., Hooper, P., Mishkin, F.S., Schoenholtz, K.L., Watson, M.W. 2010. *Financial Condition Indexes: A Fresh Look After The Financial Crisis*.

Ho, D. H. K., Rengarajan, S. and Xie, E. J. Y. 2014. A Comparative Risk Analysis between the Markowitz Quadratic Programming Model and the Multivariate Copula Model for a Singapore REIT portfolio. *Journal of Real Estate Portfolio Management*, 20(2): 125–145.

Hogan Lovells. 2017. *Trends in cross-border Real Estate investment and the changing tax landscape*. June, 2017.

Hong, G. and Lee, B. S. 2013. Does Inflation Illusion Explain the Relation between REITs and Inflation? *Journal of Real Estate Finance and Economics*, 47(1): 123–151.

JLL. 2016. The great African capital migration exploring trends impacting real estate capital flows in Sub-Saharan Africa. *Capital Markets Research*, October, 2016.

Karolyi, G. A. and Sanders, A. B. 1998. The Variation of Economic Risk Premiums in Real Estate Returns. *Journal of Real Estate Finance & Economics*, 17(3): 245–262.

Kohlert, D. 2010. The determinants of regional real estate returns in the United Kingdom: A vector error correction approach. *Journal of Property Research*, 27:1, 87-117.

Lieser, K. and Groh, A. P. 2014. The Determinants of International Commercial Real Estate Investment. *Journal of Real Estate Finance and Economics*, 48(4): 611–659.

Lieser, K. and Groh, A.P. 2011. The Attractiveness of 66 Countries for Institutional Real Estate Investments. *Journal of Real Estate Portfolio Management*, 17(3): 191–211.

Liow, K.H., Ho, K.H.D., Ibrahim, M.F. and Chen, Z. 2009. Correlation and volatility dynamics in international real estate securities markets. *Journal of Real Estate Finance and Economics*, 39(2): 202–223.

Lu, K. W. and Mei, J. P. 1999. The return distributions of property shares in emerging markets. *Journal of Real Estate Portfolio Management*, 5(2): 145–160.

Mauck, N. and Price, S. M. K. 2017. Determinants of Foreign Versus Domestic Real Estate Investment: Property Level Evidence from Listed Real Estate Investment Firms. *Journal of Real Estate Finance and Economics*, 54(1): 17–57.

Myer, N. F. C. and Webb, J. R. 1993. Return Properties of Equity REITs, Common Stocks, and Commercial Real Estate: A Comparison. *Journal of Real Estate Research*, 8(1): 87–106.

Nelson, A.J. 2017. U.S. Property Markets Shake Off Slowdown and Power On. U.S. *Colliers International Research Report*, 2017 Midyear Report.

Newell, G. and Worzala, E. 1995. The role of International property investment portfolios. *Journal of Property Finance,* 6:1, 55–63.

Ntuli, M. and Akinsomi, O. 2017. An Overview of the Initial Performance of the South African REIT Market. *Journal of Real Estate Literature*, 25:2, 365-388.

Ooi, J. T. L., Newell, G. and Sing, T. 2006. The Growth of REIT Markets in Asia. *Journal of Real Estate Literature*, 14(2): 203–222.

Park, Y.W. and Bang, D.W. 2012. Direct Commercial Real Estate as an Inflation Hedge: Korean evidence. *Journal of Real Estate Portfolio Management*, 18:2, 187-203.

Peterson, J. D. and Hsieh, C.H. 1997. Do Common Risk Factors in the Returns on Stocks and Bonds Explain Returns on REITs? *Real Estate Economics*, 25(2): 321–345.

Rapp, L. 2015. *Market capitalisation of SA REITs increased around 43% over past year*. Available at: http://propertywheel.co.za/2015/08/market-capitalisation-of-sa-reits-increased-around-43-over-past-year/.

SA REIT Association. 2016a. *Monthly Chart Book. December 2016.* [Online]. Available: http://www.sareit.com/stats.php (last accessed on 28 January 2018).

SA REIT Association. 2016b. *What is SA REIT.* Available at: http://www.sareit.com/101_WhatIsReits.php (Accessed: 2 November 2016).

Seiler, M. J. and Seiler, V. L. 2005. Realistic portfolio allocation decision-making for the small U.S. retail investor. *Journal of Real Estate Finance and Economics*, 31(3), pp. 319–330.

State Department Office of Investment Affairs. 2017. *South Africa - Investment Statistics*. State Department Office of Investment Affairs' Investment Climate Statement.

Subrahmanyam, A. 2007. Liquidity, return and order-flow linkages between REITs and the stock market. *Real Estate Economics*, 35(3): 383–408.

Taylor, M. P. and Sarno, L. 1997. Capital Flows to Developing Countries : Long- and Short-Term Determinants', *The World Bank Economic Review*, 11(3): 451–470.

Van Niekerk, L and Loonat, R. 2017. Property Sector Overview. *Nedbank CIB Sector Report,* 6 April 2017.

Wiegelmann, T. and Szumilo, N. 2017. Capital Flows: Investors leave the tap running. *IPE Real Assets*, January/February 2017.

Worzala, E. 1994. Overseas Property Investments: How Are They Perceived by the Institutional Investor ? *Journal of Property Valuation and Investment*, 12(3): 31–47.

Worzala, E. and Sirmans, C. F. 2003. Investing in International Real Estate Stocks: A Review of the Literature. *Urban Studies*, 40(5–6): 1115–1149.

CHAPTER 5

THE IMPACT OF INTRODUCING REITS ON FOREIGN INVESTMENTS

AND LIQUIDITY

Abstract

Over the last decades, more than 30 countries have introduced REITs. One main objective is to attract foreign investors and improve the liquidity of the respective listed-property sectors. This study investigated whether the introduction of REITs meets this objective by using the South African listed-property sector as a laboratory. In particular, the study employed panel data to investigate whether converting to REITs improved the liquidity of listed South African property firms through foreign investments. The findings indicate that foreign investor trading after the introduction of REITs had a significantly positive impact on activity measures such as turnover and trading volume. On the other hand, the significantly negative impact of foreign investor trading on friction measures such as bid-ask spread and the Amihud (2002) illiquidity measure, which was prevalent in the pre-REIT period, disappeared once REITs were introduced. Therefore the introduction of REITs eliminated the impact of foreign investments on the depth and tightness of the listed-property market in South Africa.

Keywords: REITs, Liquidity, Foreign Investors, Panel Data, Emerging Market

5.1 Introduction

REITs were first introduced in the US in 1960 and over the last decades more than 30 countries, including Germany, the UK and Japan, have introduced REITs[5]. The appeal of REITs for countries worldwide is that they enable the respective listed-property markets to improve their international competitiveness and increasingly attract foreign investors (Schacht and Wimschulte, 2008; Ooi, Newell and Sing, 2006). The advantages of attracting more foreign investments into the domestic REIT sector are improvements to market liquidity and financing opportunities for REITs (Ooi, Newell and Sing, 2006), which in turn stimulate not only the public real estate market but also commercial real estate markets.

Previous studies suggest that the introduction of REITs leads to increases in the liquidity and market capitalisation of the respective REIT markets. In the US, the introduction of the new type of REITs in 1993 resulted in subsequent liquidity increases in the REIT market (Marcato and Ward, 2007; Clayton and MacKinnon, 2000). In this way market capitalisation was identified as a key driver of liquidity in securitised real estate markets, not only in the US, but also in the UK, continental Europe and Australia (Brounen, Eichholtz and Ling, 2009). The market capitalisation of Japanese REITs increased 8.7 times over a five-year period and the number of REITs almost doubled since the introduction of REITs in 2001 (Ooi, Newell and Sing, 2006). The introduction of UK REITs at the beginning of 2007 resulted in a significant growth, which led to an aggregated market capitalisation of USD58bn within six months and the fourth position in the international REIT market ranking (Anuar and Soi Tho, 2011).

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[5] For an in-depth discussion of the development of REIT markets around the world, see Brounen and De Koning (2012), and Ooi, Newell and Sing (2006).

However, increases in REIT market liquidity may be driven by domestic or foreign investors. Considering that attracting foreign investors represents a main objective of the introduction of REITs, the question arises as to whether foreign investors indeed improve the liquidity in a country's new REIT market.

The purpose of this study was to investigate the impact of foreign investments on liquidity after REITs were introduced. In the investigation, this study used South Africa as a laboratory. Compared to countries that use the introduction of the REIT structure as a way to develop their listed-property sector, South Africa already had a sophisticated public real estate market prior to the introduction of REITs in 2013. This study were therefore able to compare the impact of foreign investments on liquidity in the pre-REIT period (Q1/2010 to Q1/2013) and in the REIT period (Q3/2013 to Q1/2016). Accordingly, this study focused on companies that had been listed prior to 2013 and converted to REITs after REITs were introduced.

Using panel data and Prais-Winsten regression controlling for contemporaneous and serial correlation, this study found that foreign investments, as measured by a buy-sell index (BSI), had a significantly positive impact on activity liquidity measures such as turnover and trading volume in the REIT period, but not at all (turnover) or to a smaller degree (trading volume) in the pre-REIT period. The introduction of REITs in South Africa therefore appears to have improved the liquidity of listed-property companies through foreign investor trading. This study found evidence that foreign investor trading had a significantly negative impact on the Amihud (2002) illiquidity measure and bid-ask spread in the pre-REIT period, but this effect disappeared in the REIT period. The results suggested that the introduction of REITs eliminated the impact of foreign investor trading on the tightness and depth of the listed-property market in South Africa.

While previous studies analysed the development of international REIT markets (Brouning and De Koning, 2012; Schacht and Wimschulte, 2008; Ooi, Newell and Sing, 2006), no study exists that empirically investigates whether the introduction of REITs achieves the objective of attracting foreign capital and increasing liquidity in a new REIT market. Furthermore, compared to studies investigating liquidity in REIT markets in developed countries (Glascock and Lu-Andrews, 2014; Schweizer et al., 2013; Cannon and Cole, 2011; Huang, Liano and Pan, 2011; Brounen, Eichholtz and Ling, 2009; Subrahmanyam, 2007; Marcato and Ward, 2007; Bertin et al., 2005; Clayton and MacKinnon, 2000), liquidity in REIT markets in emerging countries is under-researched. This is unfortunate, considering that REITs have received increased attention in emerging countries, for example in Southeast Asia (Anuar and Soi Tho, 2011). In January 2017 the FTSE EPRA/NAREIT emerging-market index[6] consisted of 146 REITs from 15 emerging markets, which reflects the increased importance of REITs to emerging markets. The study aimed at providing more insights into REIT markets in emerging countries, particularly with regard to liquidity and foreign investors.

The remainder of this paper is structured as follows: Next, this study provide an overview of the listed-property sector in South Africa. Then the data and methodology is discussed, which is followed by the results and conclusion.

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[6] http://www.ftse.com/Analytics/FactSheets/temp/e5cdd0ff-7c66-4ca4-afc3-ee8138513338.pdf

5.2 The importance of REIT liquidity

Liquidity can be defined as the ability to quickly and easily sell an investment at market value (Brounen et al., 2009). Direct real estate investments are characterised by illiquidity, leading investors to tilt their international portfolios towards liquid investment alternatives. However, REITs offer investors a liquid alternative to direct real estate investment, making REITs more attractive, particularly to foreign investors who are unfamiliar with foreign market dynamics. In fact, Cannon and Cole (2011) found that portfolio inclusions of equity REITs increased with greater liquidity. In addition, liquidity represents a fundamental concern for international real estate investors (Brounen et al., 2009), with US investors regarding liquidity risk as the most important real estate investment risk consideration (Dhar and Goetzmann, 2005).

Brounen et al. (2009) argue that the increasing growth and interest in international securitised real estate may have affected share price liquidity, with liquidity possibly influencing firm value. Furthermore, Marcato and Ward (2007) argue that liquidity may impact investor returns. As such, the increased liquidity of SA REITs may enhance share value and investor returns. However, this will need to be investigated within the SA context in future, as it is beyond the scope of this study.

Within the emerging-market context, countries such as South Africa are to a greater extent reliant on foreign investment to reduce their budget deficit and contribute to economic growth. However, economic volatility and uncertainty may adversely affect international investment in South Africa. As such, an improved understanding of whether the adoption of international policies like the REIT structure improves liquidity and attracts foreign investment is important for future policy decision-making, also for other JSE sectors.

5.3 The South African listed-property sector

The listed-property sector in South Africa was established in 1969 and contained two types of companies: property unit trusts (PUTs) and property loan stocks (PLSs). PUTs and PLSs both directly invested in commercial real estate, however, they differed with regard to their tax treatment and regulation. It is noteworthy that the majority of listed real estate firms were PLSs prior to the introduction of REITs. The South African (SA) REITs were effectively introduced in May 2013. All listed PUTs and PLSs converted to REITs, and after the introduction of REITS, the PUT and PLS constructs were phased out. Additionally, between the introduction of REITs and when this investigation, 13 new REITs were listed on the Johannesburg Stock Exchange (JSE).

A REIT listed on the JSE is subject to a number of requirements, which are based on the global REIT standard. To qualify, an SA REIT must own a minimum of R300m in property (about USD22m) and earn at least 75% of its income from property rental or investment income. Additionally, it must distribute at least 75% of its pretax income to investors, keep its debt lower than 60% of gross asset value and appoint a risk management committee. In South Africa, REITs can either be 'company REITs' or 'trust REITs'. Both types of REITs invest solely in real estate. Company REITs are regulated by the Companies Act and their directors must ensure compliance with the Companies Act and the JSE listing requirements. The company can have either internal or external management. Trust REITs stem from PUTs, which were regulated by the Registrar of Collective Investment Schemes. Investors are protected by the trust deed and the trustees must ensure compliance with the Collective

Investment Schemes Control Act. The Act provides that the trust must have an external asset and property manager[7].

Prior to the introduction of REITs, the listed-property sector in South Africa was characterised by poor regulation and inconsistent tax treatment of PUTs and PLSs (Otto, 2008), which resulted in investor uncertainty and adversely affected the attractiveness of the public real estate sector to foreign investors. The introduction of REITs was aimed at simplifying the tax treatment and regulation of listed-property firms as well as at improving transparency and investor protection. This would remove barriers to foreign investment (Otto, 2008) and increase the international competitiveness of the listed-property sector in South Africa (Boshoff and Bredell, 2013).

Since their introduction, SA REITs have experienced exponential growth of almost 70% in market capitalisation, increasing the REIT sector's market capitalisation from about R230bn (about USD18bn) to almost R400bn (about USD31bn) in less than four years (SA REIT Association, 2017b). Monthly trades of SA listed-property companies increased by 220% from 2010 to 2015 (Rapp, 2015). Since 2013, 12 SA REITs have been included in global indices such as the FTSE EPRA/NAREIT index. In fact, Growthpoint Properties and Redefine Properties are among the top 10 constituents of the index (January 2017).

Initial survey-based evidence from property analysts, investors and other SA REIT stakeholders provides support for an increased liquidity in the listed-property sector following the introduction of REITs (Naidoo, 2014). However, this initial evidence does not account for the distinction between foreign and domestic trading activity. Considering that REITs were introduced to improve the attractiveness of the

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[7] For more information about SA REITs, please visit the SA REIT Association at www.sareit.com. For more information about PLS, PUT and REIT structures in South Africa, see Boshoff and Bredell (2013).

SA listed-property sector to foreign investors and increase foreign trading in SA REITs, this study expected that REIT share liquidity was significantly impacted by foreign investor trading in the REIT period (Q3/2013 to Q1/2016), but not in the pre-REIT period (Q1/2010 to Q1/2013).

5.3 Data

REITs were introduced in South Africa in May 2013 and a longitudinal data set of all listed PLSs and PUTs that had converted to SA REITs for the period of Q1/2010 to Q1/2016 were obtained. The observation period was restricted by the availability of foreign investor trade information, which the JSE started recording in 2010. Of the 48 SA REITs on the INET BFA database, 10 REITs delisted during the observation period. However, their delisting occurred five quarters or more after the introduction of the REIT structure. To eliminate any survivorship bias, these 10 REITs in the sample were retained. Additionally, 13 REITs went public after REITs were introduced. However, as this study focused on firms that had converted from a PUT or PLS to a REIT in 2013 and excluded newly listed REITs from the sample.

Due to a lack of data, the final sample included 31 listed firms that had converted from a PUT or PLS to a REIT. The REITs in the sample represented equity REITs, which were either diversified or specialised in office, retail, industrial, residential or other property types like hotels. Whereas multi-family REITs are an important REIT segment in developed countries such as the US, they are under-represented in the listed-property sector in South Africa. In fact, in February 2017 only one publicly traded REIT in the sample focused on residential real estate in South Africa (Indluplace). This study also excluded the REIT introduction quarter (Q2/2013) from the sample to ensure two mutually exclusive sub-samples. The final sample covered 567 REIT quarters (unbalanced panels). The pre-REIT period sample

(Q1/2010 to Q1/2013) contained 266 REIT quarters, while the REIT period sample (Q3/2013 to Q1/2016) included 301 REIT quarters.

The findings of Brounen, Eichholtz and Ling (2009) suggest that liquidity in international securitised real estate markets is multidimensional and therefore requires the use of more than one liquidity measure to capture these different dimensions. Consequently, this study employed four different proxies to measure REIT-level liquidity in the empirical analysis, which reflected different dimensions of liquidity (Bertin et al., 2005). Analogously to previous studies (Cannon and Cole, 2011; Brounen, Eichholtz and Ling, 2009; Marcato and Ward, 2007), due to the lack of availability of such data beyond the bid-ask spread, this study predominantly employed liquidity measures that did not require microstructure data. The liquidity measures can be classified as either activity measures (e.g. turnover) reflecting the extent of trading, or friction measures (e.g. bid-ask spread) reflecting price concessions for immediacy. While an increase in activity measures increases liquidity, an increase in friction measures reduces it (Bertin et al., 2005).

This study used share turnover and trading volume as two activity measures, in line with the findings by Brounen, Eichholtz and Ling (2009). In particular, the quarterly share turnover is defined as trading volume of shares divided by outstanding shares, in line with previous studies (Glascock and Lu-Andrews, 2014; Huang et al., 2011; Brounen, Eichholtz and Ling, 2009). Quarterly trading volume is defined as quarterly average of the quarterly closing price (in South African rand), multiplied by the quarterly share trading volume. This is in line with the findings by Cannon and Cole (2011). Data for both variables was derived from the INET BFA database and in the analysis the log of both variables (*logTURN* and *logRVOL*) was used.

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This study measured the friction dimension of liquidity by employing the bid-ask spread and Amihud (2002) illiquidity measure, which represents a price-impact measure (Glascock and Lu-Andrews, 2014; Cannon and Cole, 2011). The bid-ask spread reflects the cost of liquidity of a position (tightness dimension of liquidity) (Brounen, Eichholtz and Ling, 2009; Bertin et al., 2005), while the Amihud (2002) illiquidity measure reflects sensitivity of prices to changes in trading volume (depth dimension) (Brounen, Eichholtz and Ling, 2009; Amihud, 2002). The measures were in line with previous investigations into REIT liquidity using these friction measures (Glascock and Lu-Andrews, 2014; Cannon and Cole, 2011; Huang et al., 2011; Brounen, Eichholtz and Ling, 2009; Bertin et al., 2005). To derive the bid-ask spread, this study obtained quarterly bid and ask prices for individual firms from the INET BFA database. Then, this study calculated the quarterly average bid-ask spread (*BASPR*) and eliminated seven observations with negative bid-ask spreads, which was in line with previous studies (Cashman et al., 2016; Anand and Subrahmanyam, 2009).

The Amihud (2002) illiquidity measure is defined as the absolute quarterly firm-level return, divided by the quarterly trading volume, and has been found to correlate highly with microstructure liquidity measures (Amihud, 2002). The larger the Amihud (2002) illiquidity measure, the lower the trading liquidity of a firm's shares (Glascock and Lu-Andrews, 2014; Huang et al., 2011). This study obtained return and trading volume information from INET BFA and derived the quarterly average Amihud (2002) illiquidity measure, which was then log-transformed due to a high skewness and kurtosis (*logILLIQ*).

To measure foreign investor trading, this study obtained data about investments and divestments of foreign investors in firms in the sample directly from the JSE. This study then derived a quarterly buy-sell index (BSI), in line with Kumar and Lee (2006). The foreign investor BSI (*BSI*) is defined as the difference between foreign purchases and sales divided by the sum of foreign purchases and sales, as shown in Equation 1. A positive BSI indicates net buying behaviour of foreign investors, whereas a negative BSI indicates net selling behaviour:

$$BSI_{jt} = \frac{(B_{jt} - S_{jt})}{(B_{jt} + S_{jt})} \qquad \textbf{(1)}$$

where B_{jt} (S_{jt}) are the rand-denominated purchases (sales) of shares of firm j by foreign investors in quarter t.

To control for firm-specific, property market, economic and capital market factors that affect the relationship of foreign investor trading and REIT liquidity, this study included a number of control variables. Belgove and Van der Merwe Smit (2016) argued that market capitalisation is one of the most important drivers of liquidity for South African stocks. The effect of size on liquidity is in line with previous findings for US REITs (Marcato and Ward, 2007). This study controlled for REIT size by including the log of market capitalisation (*logMCAP*), defined as the quarterly average of daily closing cost multiplied by outstanding shares. At the firm level, this study also controlled for leverage (*LEV*), defined as total liabilities divided by total assets and market-to-book value (*MB*), defined as market capitalisation divided by book equity. To control for the operating performance of a REIT, this study derived an FFO proxy, which was calculated as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. Depreciation and capital gains or losses were then added to this amount. In the analysis, this study used the log of the FFO proxy (*logFFO*). A particular

challenge of research on South African REITs is that financial reporting is less frequent and some items needed to construct the variables are only provided annually. Consequently, this study used annual values for the quarters in the respective years. Stock-market and accounting information was obtained from the INET BFA database.

This study included binary variables in the model that controlled for the investment focus of REITs in the sample. While diversified REITs represent the reference group, this study included a dummy variable for office and industrial REITs (*OFFIND*), retail REITs (*RET*) and other specialised REITs (*OTH*), which included multi-family and hospitality REITs. This study also included a binary variable (*DUAL*) to control for REITs that had more than one class of stocks, as a number of REITs have class A and B shares, with different rights in terms of income distribution. This study furthermore controlled for the difference between company and trust REITs by including a binary variable *TRUST*, which was coded 1 for trust REITs and 0 for company REITs. Compared to company REITs, trust REITs represent the minority of REITs and only six of them (130 REIT quarters) were included in the sample.

At macroeconomic and stock-market level, this study controlled for the quarterly prime interest rate obtained from Liberta[8], quarterly change in GDP obtained from Stats SA[9] and the return on the JSE All Share Index obtained from INET BFA. A dummy (*IMPF*) was also included to account for the replacement of the South African finance minister on 9 December 2015. This event led to a R290bn (about USD22bn) decline in the market value of the 17 largest South African financial and property firms included in the JSE All Share Index within two days (Hogg, 2016) and may have had an impact on REIT share liquidity. This study accounted for listed-

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[8] http://liberta.co.za/blog/prime-interest-rate-in-south-africa-current-and-historical/

[9] http://www.statssa.gov.za

property market conditions by including the quarterly return on the SA Listed Property Index (SAPY).

Table 5.1 presents an overview of the continuous variables for the pre-REIT and REIT period, while Panel A in Table 5.2 provides further insights into the mean differences for foreign investor trading, liquidity, firm-level and macroeconomic variables. The mean foreign investor *BSI* in the pre-REIT period is significantly higher than the mean *BSI* in the REIT period, which suggests that foreign investors were more optimistic about PUTs and PLSs than about REITs. This finding is surprising, considering that one motivation for the introduction of the REIT structure was to make the listed real estate sector in South Africa more appealing to foreign investors by improving regulation, taxation and transparency.

Figure 5.1 plots the value-weighted quarterly average of listed-property company BSIs over the observation period and visually supports the finding that foreign investors exhibited a stronger net buying behaviour prior to the introduction of REITs in South Africa than afterwards. In fact, while the REIT introduction quarter (Q2/2013) shows a larger foreign investor *BSI* than the previous quarter, the REIT period contains a number of quarters in which foreign investors were net sellers, as is indicated by the negative *BSI*. While an investigation into explanations for this difference in the foreign investor *BSI* in the pre-REIT and REIT period was beyond the focus of this study, future investigations with appropriate data sets may further analyse whether this reduced optimism of foreign investors is driven by factors such as the South African economy, politics, commercial real estate market conditions or the REIT structure itself.

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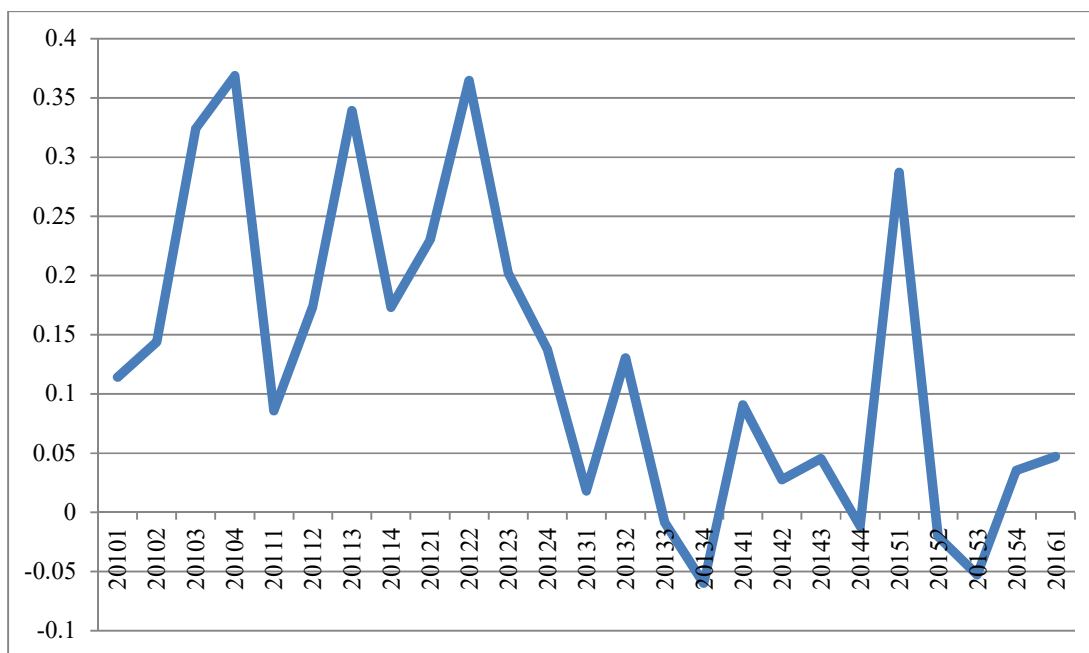
Note: The above graph presents the average foreign investor BSI for all REITs in a particular quarter, weighted by REIT market capitalisation, for the period of the first quarter 2010 to the first quarter 2016.

Figure 5.1: Weighted average foreign investor BSI for South African REITs from Q1/2010 to Q1/2016

As is shown in Table 5.1 and Table 5.2 (Panel A), turnover (*logTURN*) and trading volume (*logRVOL*) were, on average, larger in the REIT period, albeit not significantly. The average Amihud (2002) illiquidity measure (*logILLIQ*) was slightly larger in the pre-REIT period, however, the difference was also not statistically different. The mean bid-ask spread (*BASPR*) in the REIT period was significantly larger than in the pre-REIT period, which is somewhat surprising considering that the REIT structure was supposed to improve the liquidity in the listed-property sector. Overall, the descriptive results suggested that the introduction of REITs in South Africa did not lead to a significant increase in the liquidity of listed real estate shares compared to the pre-REIT period.

However, as is indicated in Table 5.2, after the introduction of REITs, REITs had a significantly larger size in terms of market capitalisation (*logMCAP*) than PUTs and PLSs, which was in line with the expectation that the introduction of REITs enabled growth in the listed real estate industry in South Africa. Furthermore, firms that converted from a PUT or PLS to a REIT had significantly higher FFO (*logFFO*) and lower leverage (*LEV*) in the REIT period. The higher FFO is likely to reflect improvements in operations and portfolio growth, while the lower mean leverage in the REIT period suggests that REITs started to align their leverage with REIT regulations, which require debt levels to be at most 60% of the gross asset value. Interestingly, mean firm-level returns (*RETURN*) and mean market-to-book values (*MB*) were significantly larger in the pre-REIT period than in the REIT period, which may indicate that foreign and domestic investors lowered their expectations about the future performance of REITs, whether due to economic, political or property-market-specific conditions.

While the mean JSE index returns (*JSERET*) in the pre-REIT and REIT period were not statistically different, the prime interest rate (*INT*) was significantly higher in the REIT period, and the listed-property index return (*PROPRET*) and change in GDP (*GDPChange*) were significantly lower in the REIT period. These descriptive statistics for macroeconomic variables may represent one explanation for the changed investment behaviour of foreign investors and the lower REIT returns and market-to-book values in the REIT period. In particular, the economic environment deteriorated in the REIT period, compared to the pre-REIT period, which had implications for the SA REIT sector.

Table 5.1: Summary statistics

	Mean	Median	StD	Min	Max
Panel A: Pre-REIT period					
BSI	0.20	0.25	0.54	-1	1
logTURN	-2.62	-2.54	0.57	-4.24	-0.83
logRVOL	3.06	3.26	1.60	-1.47	6.31
BASPR	0.02	0.01	0.06	0.00	0.54
logILLIQ	-4.16	-4.47	0.68	-4.61	0.61
RETURN	0.04	0.04	0.09	-0.29	0.81
LEV	0.57	0.61	0.26	0.04	0.95
MB	1.83	1.39	1.27	0.04	7.22
logFFO	14.08	14.25	1.78	0.00	15.99
logMCAP	8.06	8.28	1.17	5.39	10.70
JSERET	0.03	0.04	0.06	-0.09	0.12
PROPRET	0.04	0.04	0.04	-0.05	0.11
INT	0.09	0.09	0.01	0.09	1.00
GDPChange	2.65	2.32	1.23	1.20	4.63
Panel B: REIT period					
BSI	0.08	0.13	0.57	-1.00	1.00
logTURN	-2.64	-2.61	0.70	-4.60	-0.33
logRVOL	3.27	3.36	2.06	-4.31	7.16
BASPR	0.07	0.01	0.26	0.00	2.00
logILLIQ	-4.15	-4.49	0.75	-4.61	0.48
RETURN	0.02	0.01	0.11	-0.46	0.79
LEV	0.49	0.41	0.23	0.04	0.89
MB	1.26	1.07	0.72	0.09	4.38
logFFO	14.60	14.41	0.52	14.06	16.11
logMCAP	8.48	8.51	1.40	5.68	11.51
JSERET	0.03	0.03	0.04	-0.03	0.11
PROPRET	-0.02	-0.02	0.12	-0.20	0.18
INT	0.09	0.09	0.01	0.09	0.11
GDPChange	1.11	0.81	2.14	-2.02	4.90

Note: This table presents the summary statistics for the sample over the period of Q1/2010 to Q1/2016, without Q2/2013. The sample size for the full period was 567, of which 266 firm quarters were in the pre-REIT period and 301 in the REIT period (for BASPR, the pre-REIT sample was 262 firm quarters and the REIT sample was 298). BSI is the foreign investor buy-sell index, defined as the difference between purchase and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. logRVOL is the log of the quarterly average closing price multiplied by the quarterly share trading volume. BASPR is the bid-ask spread, defined as the difference between the quarterly bid and ask prices for individual firms. logILLIQ is the log of the Amihud (2002) illiquidity measure, defined as absolute quarterly firm-level return divided by quarterly trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. HYB is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.

Pair-wise correlations between foreign investor trading and the liquidity measures separated in the pre-REIT period (italics) and the REIT period (non-italics) are presented in Table 5.2 (Panel B). In the pre-REIT period, foreign investor BSI had a significantly negative albeit small correlation with the bid-ask spread (*BASPR*). It was not correlated with any of the other liquidity measures. In the REIT period, foreign investor BSI was significantly positively correlated with turnover and trading volume.

The correlations among illiquidity measures in the pre-REIT and REIT period were in the expected directions. In both periods, trading volume and turnover were significantly positively correlated, with 0.69 in the pre-REIT and 0.77 in the REIT period respectively. The bid-ask spread had a significantly negative correlation with trading volume and turnover, and a significantly positive correlation with *logILLIQ* in both periods. The Amihud (2002) illiquidity measure had a significantly negative and high correlation with turnover (-0.54 pre-REIT/-0.56 REIT period) and trading volume (-0.70/-0.66). While the correlation of turnover and trading volume in the REIT period was similar to the correlation of these two variables for continental Europe and the US, the correlation coefficients for the Amihud (2002) illiquidity that were measured and the two activity measures differed noticeably from those by Brounen, Eichholtz and Ling (2009). First, compared to the insignificant correlation of the Amihud (2002) illiquidity measure and turnover for the US, UK, Australia and Continental Europe, both measures had a significantly negative correlation for South African REITs. Second, while Brounen, Eichholtz and Ling (2009) found a positive correlation of dollar volume and Amihud (2002) illiquidity measure for the UK, US, Australia and Continental Europe, the correlation is significantly negative for South African REITs.

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Table 5.2: Mean differences and correlations

Panel A: Parametric T-tests				
	Pre-REIT	**REIT**	**T-statistic**	
BSI	**0.20**	**0.08**	**2.52**	**
logTURN	-2.61	-2.64	0.49	
logRVOL	3.06	3.27	-1.33	
BASPR	**0.02**	**0.07**	**-3.07**	***
logILLIQ	-4.16	-4.15	-0.16	
RETURN	**0.04**	**0.02**	**2.89**	***
LEV	**0.57**	**0.49**	**3.90**	***
MB	**1.83**	**1.26**	**6.52**	***
logFFO	**14.08**	**14.60**	**-4.55**	***
logMCAP	**8.06**	**8.48**	**-3.87**	***
JSERET	0.03	0.03	0.74	
PROPRET	**0.04**	**0.02**	**4.41**	***
INT	**0.09**	**0.092**	**-4.84**	***
GDPChange	**2.65**	**1.11**	**10.59**	***

Panel B: Pair-wise correlations					
	BSI	logTURN	logRVOL	BASPR	logILLIQ
BSI	1	**0.22*****	**0.12****	-0.02	-0.06
logTURN	*-0.01*	1	**0.77*****	**-0.26*****	**-0.56*****
logRVOL	*0.01*	*0.69****	1	**0.36*****	**-0.66*****
BASPR	*-0.14***	*-0.14***	*-0.36*****	1	**0.29*****
logILLIQ	*-0.08*	*-0.54*****	*-0.70*****	*0.24*****	1

Note: This table presents t-test (unequal variances) results and pair-wise correlations for variables in the sample (N=266 in the pre-REIT period and N=301 in the REIT period). Pair-wise correlations for the pre-REIT period are in italics. BSI is the foreign investor buy-sell index, defined as difference between purchase and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. logRVOL is the log of the quarterly average closing price multiplied by the quarterly share trading volume. BASPR is the bid-ask spread, defined as difference between the quarterly bid and ask prices for individual firms. logILLIQ is the log of the Amihud (2002) illiquidity measure, defined as absolute quarterly firm-level return divided by quarterly trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by the quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. HYB is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

5.4 Methodology

Longitudinal data sets have been found to suffer from the serial and contemporaneous correlation of residuals (Dufour and Khalaf, 2000; Beck and Kats, 1995). To assess whether serial correlation was present in the data set, this study employed the Wooldridge test for autocorrelation, which was significant at the 5% level for *logILLIQ* but not significant for the other liquidity measures of *logTURN, logRVOL* and *logBASP*. To assess whether contemporaneous correlation was present in the data set, this study employed the Pesaran and Frees test for cross-sectional dependence. Cross-sectional dependence or contemporaneous correlation of errors may be the result of a number of factors such as a common shock, unobserved effects or spatial dependence. Depending on whether the unobserved factors leading to cross-sectional dependencies are correlated with included predictors or not, the effect can range from biased estimated standard errors to the based fixed or random effects estimators (De Hoyos and Sarafidis, 2006). For the data set, the test statistics of the Pesaran and Fees test for all liquidity variables were significant at the 5% level, suggesting a rejection of the null hypothesis of cross-sectional independence. Considering the presence of serial and contemporaneous correlation, this study estimated the model as shown in Equation 2, with a Prais-Winsten regression with panel-corrected standard errors:

$$LIQ = \alpha + \beta_1 BSI + \beta_2 X + \beta_3 Y + \varepsilon \qquad \textbf{(2)}$$

where *LIQ* is the respective liquidity measure (*logTURN, logRVOL, BASPR and logILLIQ*), *BSI* is the buy-sell index for foreign investors, *X* is a factor of firm-level variables such as *RETURN, LEV, MB, logMCAP or logFFO* and *Y* is a factor of macroeconomic, stock and property-market variables such as GDP growth, prime interest rate, JSE All Share Index return and SA Listed Property Index return.

5.5 Results

The results of the Prais-Winsten regression for turnover (*logTURN*) are presented in Table 5.3. In the pre-REIT period, foreign investor trading (*BSI*) had no impact on turnover. However, after the introduction of REITs, foreign investor *BSI* had a significantly positive impact on turnover. Thus, a net buyer (net seller) behaviour of foreign investors increases (decreases) the liquidity of REIT shares, as proxied by turnover. In both periods, market capitalisation had a significantly positive impact on turnover. However, this impact was larger in the REIT period than in the pre-REIT period. The findings were consistent with previous studies for the listed-property market in South Africa (Belgove and Van der Merwe Smit, 2016) and REIT markets in developed countries such as the US (Brounen, Eichholtz and Ling, 2009; Marcato and Ward, 2007), that have identified the importance of market capitalisation for share liquidity.

Leverage (*LEV*) had a significantly positive impact on turnover in the pre-REIT and REIT period. Thus, the higher the leverage of a listed real estate firm, the higher the turnover. The direction of the relationship of leverage and liquidity is as puzzling as the significantly negative effect of market-to-book value (*MB*) on turnover in the REIT period. To ensure the results for *LEV* and *MB* were not the result of multicollinearity, this study investigated the pair-wise correlations of these variables with each other and other variables in the model. However, the largest pair-wise correlation identified was 0.59 for *LEV* and *MB* in the REIT period, which failed to support multicollinearity as an explanation for the results.

One explanation may be that, within the South African context, leverage may be perceived positively by foreign investors, as it signals information about the ability of an SA listed-property firm to access debt capital. Lower levels of leverage may

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signal a limited ability of a listed-property firm to access debt capital and thus a limited ability to take advantage of growth opportunities. A second explanation could be that, considering REITs are subject to strict South African lending legislation and debt level requirements, investors may be comfortable to invest in REITs with higher debt levels.

An explanation for the unexpected relationship of market-to-book value and turnover may be that REITs with lower market-to-book values represented older and larger REITs that may have had fewer growth opportunities but represented a lower investment risk to investors due to their characteristics, compared to newer, high growth REITs, and were therefore more liquid. Future studies may investigate the relationship of leverage or market-to-book value and SA REIT liquidity in more detail to provide more insights into the unexpected directions of these relationships.

Additionally, in the REIT period, the return of a REIT (*RETURN*) had a significantly positive impact on turnover. Compared to diversified REITs, industrial and office REITs (*OFFIND*) and other specialised REITs such as multi-family and hospitality (*OTH*) had a significantly higher turnover and were more liquid in the REIT period (*OFFIND*) or both periods (*OTH*). On the other hand, retail REITs (*RET*) had a significantly lower share liquidity than diversified REITs. The results were in line with those of Danielsen and Harrison (2007), who found that the property-type specialisation of US REITs has an impact on their share liquidity.

In both periods, REITs with more than one share class (*DUAL*) had a significantly lower turnover than REITs with only one share class. These results suggest that having more than one share class reduces the appeal of a listed-property firm to investors, which results in a lower share liquidity. Interestingly, anecdotal evidence from South African REITs suggests that they are aware of this effect, and

REITs such as Arrowhead or Hospitality Property Fund are considering or have completed the combination of different share classes into one to improve liquidity[10]. With the exception of *GDPChange* in the pre-REIT period, macroeconomic variables have no impact on the turnover of listed-property firms in South Africa. Overall, the model explains 83% of variability in turnover in the REIT period and 74% in the pre-REIT period.

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[10] http://www.arrowheadproperties.co.za/arrowhead/company-profile.php;
http://www.hpf.co.za/downloads/RLP.pdf

Table 5.3: Prais-Winsten regression results for turnover

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.08	1.34	**0.11**	**2.03****
RETURN	-0.47	-1.36	**1.20**	**3.70*****
LEV	**1.09**	**3.01*****	**1.00**	**2.91*****
MB	-0.03	-1.01	**-0.21**	**-3.34*****
logFFO	-0.003	-0.23	0.13	1.30
logMCAP	**0.08**	**1.95***	**0.21**	**3.43*****
OFFIND	0.11	0.89	**0.58**	**6.42*****
RET	-0.04	-0.37	**-0.16**	**-1.86***
OTHER	**0.43**	**2.11****	**0.73**	**3.67*****
DUAL	**-0.45**	**-2.11****	**-0.51**	**-3.37*****
TRUST	0.26	1.60	-0.01	-0.07
JSERET	1.05	1.61	-1.82	-1.33
PROPRET	-0.05	-0.07	0.57	0.42
INT	7.18	0.76	-31.85	-0.99
GDPChange	**-0.06**	**-1.74***	-0.05	-1.40
IMPF			0.25	0.86
Constant	**-4.27**	**-4.33****	-3.37	-1.02
N	*266*		*301*	
No. of groups	*30*		*31*	
Avg. obs	*8.87*		*9.71*	
R²	*0.74*		*0.83*	
Wald Chi²	*43.44****		*1368.38****	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logTURN. BSI is the foreign investor buy-sell index, defined as difference between purchase and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table 5.4 reports the regression results for trading volume (*logRVOL*). While foreign investor trading (*BSI*) had a positive effect, which was significant at the 10% level, on trading volume in the pre-REIT period, the effect of BSI increased in size and significance in the REIT period. In line with the results for turnover, this suggests that the introduction of REITs has improved share liquidity through foreign investments. The results for all other variables in the model were in line with Table 5.3. The model was able to explain 79% of variability in trading volume in the REIT period and 85% in the pre-REIT period.

The explanatory power of the model was noticeably larger than the one for the model used by Brounen, Eichholtz and Ling (2009), which included dividend yield, stock price and share of non-retail investors in addition to market capitalisation. The model in this earlier study was based on previous findings of studies investigating trading volume of non-real estate stocks. Its limited ability in explaining the trading volume of property shares led the authors to suggest that the trading volume of property shares may be driven by different fundamentals than the trading volume of non-real estate stocks. The results supported this suggestion not only for the liquidity of property shares as proxied by trading volume, but also for turnover and the Amihud (2002) illiquidity measure.

Overall, the results for liquidity proxies measuring the activity dimension suggested that the introduction of the REIT structure has increased the impact of foreign investors on the liquidity of listed-property companies in South Africa. Thus, the objective to attract more foreign investors and thereby improve the liquidity of the listed-property market appears to have been met.

Table 5.4: Prais-Winsten regression results for trading volume

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	**0.13**	**1.65***	**0.24**	**2.75***
RETURN	-0.25	-0.57	**1.61**	**3.20***
LEV	**2.19**	**3.44***	**0.93**	**1.73***
MB	**-0.10**	**-2.13***	**-0.21**	**-2.26***
logFFO	0.01	0.33	0.21	1.28
logMCAP	**0.97**	**13.60***	**1.14**	**10.80***
OFFIND	0.30	1.42	**0.85**	**6.76***
RET	-0.17	-1.22	**-0.54**	**-2.58***
OTHER	**0.61**	**2.61***	**0.91**	**4.16***
DUAL	**-1.29**	**-3.68***	**-0.98**	**-3.59***
TRUST	0.39	1.55	-0.46	-1.57
JSERET	**1.21**	**1.78***	-2.39	-1.45
PROPRET	0.004	0.00	0.91	0.54
INT	7.89	0.70	-48.49	-1.26
GDPChange	**-0.08**	**-2.20***	-0.06	-1.37
IMPF			0.30	0.85
Constant	**-6.26**	**-4.81***	-4.67	-1.12
N	*266*		*301*	
No. of groups	*30*		*31*	
Avg. obs	*8.87*		*9.71*	
R²	*0.85*		*0.79*	
Wald Chi²	*6162.79***		*3446.47***	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logRVOL. BSI is the foreign investor buy-sell index, defined as difference between purchases and sales of foreign investors divided by the sum of foreign purchases and sales. logRVOL is the log of the quarterly average closing price multiplied by the quarterly share trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

The results for bid-ask spread (*BASPR*) are presented in Table 5.5. In the pre-REIT period, foreign investor trading (*BSI*) had a significantly negative effect on bid-ask spread, which, however, disappeared in the REIT period. Considering that the bid-ask spread reflects the cost of transacting in a particular market (Bertin et al., 2005) or, more specifically, the cost to liquidate a position (Brounen, Eichholtz and Ling, 2009), this finding suggests that the introduction of REITs has eliminated the importance of foreign investors to the tightness of the listed-property sector. An explanation may be that the conversion of PUTs and PLSs to REITs and the associated changes to regulation and taxation have reduced the cost to liquidate a REIT share position, i.e. the tightness of the REIT market overall. Additionally, the introduction of REITs may have increased investments by domestic investors in the listed-property sector, which may have led to a reduction in the importance of foreign investments for listed-property market tightness. Future studies may use the findings as a starting point to investigate the impact of domestic investments on the performance and liquidity of the SA REIT market.

Market capitalisation had a significantly negative effect on bid-ask spread in both periods, which was in line with the findings of Cannon and Cole (2011). This suggests that larger firms are more liquid, which is in line with the findings in Table 5.3 and 5.4. In the pre-REIT period, a firm's return (*RETURN*) had a significantly positive impact on the bid-ask spread, which is consistent with the finding of Bhasin (1997) that the bid-ask spread is positively impacted by returns. In the REIT period, office and industrial REITs (*OFFIN*) and other REITs (*OTH*) had a significantly lower spread than diversified REITs. REITs with more than one share class and retail REITs had a significantly higher spread in both periods than firms with one share class or diversified REITs.

Except for interest rate in the pre-REIT period, macroeconomic variables had no impact on the bid-ask spread of listed-property firms in South Africa. The model was able to explain 21% (REIT period) and 37% (pre-REIT period) of variability in the spread, which was a noticeably lower explanatory power of the model for this variable than for the other liquidity proxies. One explanation for the low predictive power of the model may be that the bid-ask spread is an imperfect liquidity measure for various reasons such as large trading quantities, trading executed at prices within the spread or trading exceeding the maximum amount of shares for which the bid-ask is relevant (Bertin et al., 2005; Clayton and MacKinnon, 2000; Bhasin et al., 1997).

Table 5.5: Prais-Winsten regression results for bid-ask spread

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	**-0.02**	**-2.20****	-0.01	-0.52
RETURN	**0.08**	**3.32*****	0.05	0.54
LEV	-0.05	-1.30	-0.10	-0.81
MB	-0.003	-0.89	0.004	0.15
logFFO	-0.001	-0.76	-0.03	-0.74
logMCAP	**-0.02**	**-3.71*****	**-0.05**	**-2.30****
OFFIND	-0.01	-1.52	**-0.12**	**-2.11****
RET	**0.02**	**1.79***	**0.12**	**1.87***
OTHER	0.01	0.92	**-0.22**	**-2.57*****
DUAL	**0.02**	**2.80*****	**0.21**	**3.21*****
TRUST	0.01	1.02	-0.004	-0.18
JSERET	-0.03	-0.52	-0.09	-0.33
PROPRET	-0.06	-0.95	-0.25	-1.00
INT	**-2.98**	**-3.10*****	5.25	0.82
GDPChange	0.002	0.59	0.002	0.33
IMPF			0.08	1.41
Constant	**0.49**	**4.40*****	0.31	0.39
N	262		298	
No. of groups	30		31	
Avg. obs	8.73		9.61	
R²	0.37		0.21	
Wald Chi²	825.98***		53.90***	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for BASPR. BASPR is the bid-ask spread, defined as difference between the quarterly bid and ask prices for individual firms. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

The results for the second friction measure, the Amihud (2002) illiquidity measure, are presented in Table 5.6. In the pre-REIT period, foreign investor trading (*BSI*) had a significantly negative impact on the Amihud (2002) illiquidity measure. Analogously to the bid-ask spread, this effect disappeared in the REIT period.

Considering that the Amihud (2002) illiquidity measure reflects the depth of the listed-property market (Brounen, Eichholtz and Ling, 2009) by capturing the price response to trading volume (Amihud, 2002), the findings suggest that the introduction of REITs has eliminated the importance of foreign trading for the sensitivity of prices to trading volume. Analogously to the bid-ask spread, explanations for this change may be the increased domestic trading of SA REITs or structural and institutional changes brought upon the listed-property sector by the introduction of the REIT structure. Overall, the results for the friction measures, bid-ask spread and price impact, suggest that the introduction of REITs has eliminated the importance of foreign investment tightness and depth of the listed-property market in South Africa.

The significant impact of market capitalisation for market liquidity proxied by the price-impact measure was in line with the previous findings in Table 5.3, 5.4 and 5.5. Market-to-book value (*MB*) had a significantly negative impact on the Amihud (2002) illiquidity measure in both periods, while office and industrial REITs (*OFFIND)* had a significantly lower illiquidity than diversified REITs in the REIT period and other specialised REITs (*OTH*) in the pre-REIT period. In the pre-REIT period, trust REITs (*TRUST*) that had been PUTs in the pre-REIT period had a higher liquidity than PLSs (future company REITs). Lastly, compared to the REIT period and other liquidity measures, macroeconomic variables such as the JSE index return (*JSERET*) and change in GDP (*GDPChange*) had a significant impact on the illiquidity of listed-property shares in the pre-REIT period. The model explained 85% variability in the Amihud (2002) illiquidity measure in the REIT period and 93% in the pre-REIT period.

Table 5.6: Prais-Winsten regression results for Amihud (2002) illiquidity

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	**-0.11**	**-1.94***	-0.003	-0.04
RETURN	**2.24**	**4.81***	-0.46	-1.26
LEV	-0.02	-0.08	0.35	0.98
MB	**-0.13**	**-3.08***	**-0.14**	**-1.89***
logFFO	0.01	1.45	-0.01	-0.05
logMCAP	**-0.14**	**-4.62***	**-0.23**	**-2.33**
OFFIND	-0.10	-1.36	**-0.38**	**-3.68***
RET	-0.08	-1.39	0.30	1.63
OTHER	**-0.40**	**-1.93***	-0.01	-0.07
DUAL	**0.90**	**4.90***	**0.36**	**4.36***
TRUST	**-0.19**	**-2.12**	0.42	1.36
JSERET	**-1.00**	**-7.07***	1.06	0.64
PROPRET	-0.36	-0.74	0.31	0.18
INT	-5.23	-1.37	11.49	0.27
GDPChange	**0.03**	**2.35**	0.02	0.47
IMPF			-0.12	-0.30
Constant	**-2.56**	**-6.57***	-3.44	-0.79
N	266		301	
No. of groups	30		31	
Avg. obs	8.87		9.71	
R^2	0.93		0.85	
Wald Chi^2	1341.42***		103.81***	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logILLIQ. logILLIQ is the log of the Amihud (2002) illiquidity measure, defined as absolute quarterly firm-level return divided by quarterly trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

To assess the robustness of the findings, this study estimated the model in Equation 2 for a sample of firms that existed in both periods, i.e. this study excluded delisted firms and reports the results in Appendix C.4 to C.7. The results for trading volume and the Amihud (2002) illiquidity measured for the REIT period were in line with

Table 5.4 and 5.6 respectively. However, the coefficient on *BSI* was insignificant for both liquidity variables in the pre-REIT period.

Alternative regression models were employed as robustness tests for the results in Tables 5.3 to 5.6. Random effects GLS regressions with AR(1) disturbances provide the best alternative to Prais-Winsten on the basis of diagnostic tests, and the results for these regressions are included in Appendix C, Table C.8 to Table C.11. For turnover and returns, results are in line with the Prais-Winsten results, with BSI not significant in the REIT period. Trading volume results display significant results for size and BSI in the REIT period. The bid-ask spread liquidity measure yields no significant results, while Amihud (2002) illiquidity displays similar significance in the pre-REIT period for BSI, returns and market capitalisation. However, Prais-Winsten controls for specific issues such as contemporaneous correlation in the dataset, and as such represents the preferred methodology of this investigation.

Previous studies suggest that in the US, new REITs in the post-1993 period were more liquid than older, existing REITs (Marcato and Ward, 2007; Cole, 1998). In particular, Marcato and Ward (2007) investigated REITs that existed prior to 1993 and REITs that went public after 1993, and concluded that the new REITs were more liquid. To assess the relationship of age of an SA REIT with liquidity, this study created a sample of old REITs that were a PUT or PLS and had converted to a REIT, and new REITs that went public after the introduction of REITs in Q2/2013. While 13 REITs went public after Q2/2013, accounting and stock-market data was available for only 10 of them. As is shown in Table 5.7, the new REITs had a significantly higher turnover but lower trading volume than older REITs. Additionally, older REITs had a significantly higher bid-ask spread than new REITs. These findings, except trading

volume, were in line with previous findings of Marcato and Ward (2007) for US REITs.

The mean foreign investor *BSI* was negative for new REITs, i.e. foreign investors were net sellers, and positive for old REITs, i.e. foreign investors were net buyers. However, the difference between both *BSI* was not significant. Additionally, older REITs had a significantly larger market capitalisation and higher FFO. On the other hand, new REITs had a significantly lower leverage, which was in line with expectations, considering that new REITs had to adhere to more strict debt requirements from the start compared to older firms that had converted from a PUT or PLS structure.

The model in Equation 2 is estimated for new REITs only (*results not reported*). However, foreign investor *BSI* had no significant impact on either liquidity measure in either the pre-REIT or the REIT period. This finding may be the result of a relatively small sample size for new REITs or the lower attractiveness of these newer and smaller firms for foreign investors. Future studies with larger panel data sets for SA REITs may investigate the relationship of foreign investments with the liquidity of new REITs in more detail. Overall, the findings of this study are subject to limited data availability as a result of foreign JSE trading data only having been recorded from 2010. Therefore, future investigations can assess REIT market liquidity as the REIT market matures.

Table 5.7: Mean differences for new and existing REITs

	New REITs	Existing REITs	T-statistic	
BSI	-0.004	0.12	-1.37	
logTURN	**-3.13**	**-2.59**	**-7.34**	***
logRVOL	**2.22**	**3.40**	**-6.12**	***
BASPR	**0.04**	**0.08**	**-2.05**	**
logILLIQ	-4.10	-4.17	0.85	
RETURN	0.01	0.02	-0.84	
LEV	**0.34**	**0.50**	**-6.53**	***
logMCAP	**7.95**	**8.51**	**-4.08**	***
logFFO	**14.33**	**14.62**	**-6.62**	***

Note: This table presents the t-test results (unequal variances) for REITs that went public after Q2/2013 (new REITs, N=66; N=65 for BASPR) and REITs that existed as PLSs or PUTs before (old REITs, N=252; N=248 for BASPR). Delisted firms are not included. BSI is the foreign investor buy-sell index, defined as the difference between purchases and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

5.6 Conclusion

One major objective of the introduction of REITs in a number of countries such as South Africa has been the attraction of foreign investors and subsequent improvements to the liquidity of an existing or new listed-property sector. Using the listed-property sector in South Africa as a laboratory, this study investigated whether the introduction of REITs succeeded in increasing the liquidity of listed-property firms through foreign investments. This study found that, compared to the pre-REIT period, foreign investments had a significant impact on the activity dimension of REIT share liquidity in the REIT period. Thus, the introduction of REITs met the key objective of increasing market activity. On the other hand, while foreign investor trading had a significant impact on the depth and tightness of the listed-property market in the pre-REIT period, as proxied by the Amihud (2002) illiquidity measure

and the bid-ask spread, the introduction of REITs eliminated the importance of foreign investors for these dimensions of liquidity.

Compared to REIT markets in developed countries such as the US or UK, REIT markets in emerging countries have received limited attention in the REIT literature. The study represents a starting point to understanding the implications of introducing REITs in an existing securitised real estate market, particularly in an emerging economy. Relative to developed markets, emerging economies are more reliant on foreign investment. With previous studies providing evidence that REIT liquidity attracts investment (Cannon and Cole, 2011), a better understanding of SA REIT liquidity and the impact of the REIT structure introduction on REIT market liquidity is important to REIT policymakers and REITs in other emerging markets that are considering the adoption of this global structure. In addition, as liquidity represents an imperative risk consideration, greater transparency and information regarding emerging-market REIT liquidity will inform the investment decision-making of investors constructing international real estate portfolios.

Future studies may investigate the impact of different investor types such as block, insider, institutional or retail investors on REIT liquidity and performance to complement the study. Future investigations may furthermore focus on REITs in emerging economies to a larger degree to provide insights into the similarities and differences between the well-researched US REITs. Finally, in addition to liquidity, existing literature identifies returns and value as preferred performance indicators for international listed-property investors. In testing the relation between liquidity and share value, previous studies yielded mixed results (Brounen et al., 2009; Datar et al., 1998). Establishing the relation between liquidity and firm value as proxied by Tobin

Q is beyond the scope of this study and is suggested for future investigations regarding SA REIT value.

REFERENCES

Amihud, Y. Illiquidity and Stock Returns: Cross-Section and Time-Series Effects, *Journal of Financial Markets*, 2002, 5, 31–56.

Anand, A. and A. Subrahmanyam. Book/Market Fluctuations, Trading Activity, and the Cross-section of Expected Stock Returns, *Review of Behavioral Finance*, 2009, 1, 3–22.

Anuar, A. and C.Y. Soi Tho. Performance analysis of REITs: comparison between MReits and UK Reits, *Journal of Surveying, Construction and Property*, 2011, 2, 38–61.

Beck, N. and J.N. Katz. What to do (and not to do) with Time-Series Cross-Section Data, *The American Political Science Review*, 1995, 89:3, 634–647.

Belgrove, J.B. and E. van der Merwe Smit. The Controllable Determinants of Liquidity in the Context of Securitised Real Estate Companies in South Africa, *Management Dynamics*, 2016, 25:1, 2–15.

Bertin, W., P. Kofman, D. Michayluk and L. Prather. Intraday REIT Liquidity, *Journal of Real Estate Research*, 2005, 27:2, 155–176.

Bhasin, V., R.A. Cole and J.K. Kiely. Changes in REIT Liquidity 1990 – 1994: Evidence from Intraday Transactions, *Real Estate Economics*, 1997, 25:4, 615–630.

Boshoff, D.G.B. and E. Bredell. Introduction of REITs in South Africa, *Advanced Research in Scientific Areas Conference Proceedings*, 2013, 38–47.

Brounen, D. and S. de Koning. 50 Years of Real Estate Investment Trusts: An International Examination of the Rise and Performance of REITs, *Journal of Real Estate Literature*, 2012, 20:2, 197–223.

Brounen, D., P. Eichholtz, and D. Ling. The Liquidity of Property Shares: An International Comparison, *Real Estate Economics*, 2009, 37:3, 413–445.

Cannon, S.E. and R.A. Cole. Changes in REIT Liquidity 1988-2007: Evidence from Daily Data, *Journal of Real Estate Finance and Economics*, 2011, 43, 258–280.

Cashman, G.D., D.M. Harrison, M.J. Seiler and H. Sheng. Cross-Border Investment and Firm Liquidity, *Journal of Real Estate Portfolio Management,* 2016*, 22:2, 105–127.

Clayton, J. and G. MacKinnon. Measuring and Explaining Changes in REIT Liquidity: Moving Beyond the Bid-Ask Spread, *Real Estate Economics*, 2000, 28:1, 89–115.

Danielsen, B.R. and D.M. Harrison. The Impact of Property Type Diversification on REIT liquidity, *Journal of Real Estate Portfolio Management*, 2007, 13:4, 329–343.

Datar, V.T., Naikb, N.Y. and Radcliffec, R. 1998. Liquidity and Stock returns: An Alternative Test. *Journal of Financial Markets*, 1:2, 203-219.

Dhar, R. and Goetzmann, W.N. 2005. Institutional Perspectives on Real Estate Investing: the Role of Risk and Uncertainty. Journal of Portfolio Management, 32:4, 106-116.

De Hoyos, R.E. and V. Sarafidis. Testing for Cross-Sectional Dependence in Panel-Data Models, *STATA Journal,* 2006, 6:4, 482–496.

Dufour, J. and L. Khalaf. Exact Tests for Contemporaneous Correlation of Disturbances in Seemingly Unrelated Regressions. 2000, Working Paper, *Center for Interuniversity Research in Quantitative Economics* (CIREQ), No. 11-2000.

Glascock, J. and R. Lu-Andrews. An Examination of Macroeconomic Effects on the Liquidity of REITs, *Journal of Real Estate Finance and Economics*, 2014, 49, 23–46.

Hogg, A. Calculating Zuma's R500bn #Nenegate Blunder – Rand Depreciation Excluded, 2016, http://www.biznews.com/undictated/2016/03/05/calculating-zumas-r500bn-blunder-the-effs-calculation-was-correct/ (last accessed: 22 October 2016).

Huang, G.C., K. Liano and M.-S. Pan. REIT Stock Splits and Liquidity Changes, *Journal of Real Estate Finance and Economics*, 2011, 43, 527–547.

Kumar, A. and C.M.C. Lee. Retail Investor Sentiment and Return Comovements, *Journal of Finance*, 2006, 61:5, 2451–2486.

Marcato, G. and C. Ward. Back from Beyond the Bid-Ask Spread: Estimating Liquidity in International Markets, *Real Estate Economics*, 2007, 35:4, 599–622.

Naidoo, H. *The Introduction of REITs to the South African Property Market: Opportunities for Fund Managers*. 2014, Unpublished thesis, Master of Management in Finance and Investments, University of the Witwatersrand, Johannesburg, South Africa.

Ooi, J.T.L., G. Newell and T.F. Sing, T.F. The Growth of REIT Markets in Asia, *Journal of Real Estate Literature*, 2006, 14:2, 203–222.

Otto, A. *Reforming the Listed Property Investment Sector in South Africa*. Discussion Paper, Department of National Treasury, 2008, www.treasury.gov.za/.../REJ%20discussion%20document.pdf (last accessed: 8 February 2017).

Rapp, L. Market Capitalisation of SA REITs increased around 43% over past year, 2015, http://propertywheel.co.za/2015/08/market-capitalisation-of-sa-reits-increased-around-43-over-past-year/ (last accessed: 8 February, 2017).

Schacht, U. and J. Wimschulte. German Property Investment Vehicles and the Introduction of G-REITs: An Analysis, *Journal of Property Investment and Finance*, 2008, 26:3, 232–246.

Schweizer, D., L.H. Hass, L. Johanning and B. Rudolph. Do Alternative Real Estate Investment Vehicles Add Value to REITs? Evidence from German Open-Ended Property Funds, *Journal of Real Estate Finance and Economics*, 2013, 47, 65–82.

SA REIT Association. Monthly Chart Book. January 2017, http://www.sareit.com/stats.php (last accessed: 8 February 2017).

Subrahmanyam, A. Liquidity, Return and Order-Flow Linkages Between REITs and the Stock Market, *Real Estate Economics*, 2007, 35:3, 383–408.

CHAPTER 6

CONCLUSION

REIT investment has become a global decision, with the REIT structure being adopted by more countries than before, particularly by emerging countries such as South Africa. Additionally, REITs themselves are increasing their global footprint with offshore real estate investments and secondary listings in foreign real estate markets. The adoption of the REIT structure represents one of the most prominent changes in the SA listed-property investment sector, encompassing REITs and preceding PUTs/PLSs, over the past decade. Motivated by a lack of transparency and inconsistent tax structures that adversely affected the industry's attractiveness to foreign investors, the adoption of the REIT regime was expected to resolve these concerns, improve global competitiveness and provide foreign investors with a familiar listed-property investment option. Since its inception, SA REIT growth has increased tremendously, almost doubling in market capitalisation from ZAR205 billion to approximately ZAR400 billion at the end of 2016 (SA REIT Association, 2017a). Subsequently, due to the changing dynamics of the SA listed real estate landscape, foreign investments have increased in importance. This study analysed several dimensions of foreign investments that are particularly relevant to the young SA REIT market. Firstly, foreign investors will only consider investments beneficial to the performance of their portfolios, emphasising the need to establish the potential diversification benefits of SA REITs for foreign investors. Secondly, within the emerging-market context and considering South Africa's economic dependence on portfolio inflows generated by inward equity investments, an understanding of what drives foreign investment is vital to motivate future investment and prevent capital outflows. Thirdly, evidence is required to assess whether the adoption of global real

estate standards does indeed improve capital inflows and market liquidity, which may further motivate future investments by global investors with a liquidity preference. A synopsis of the main findings for each of the dimensions investigated is provided next.

With regard to the question of whether SA REITs are attractive to foreign investors from a portfolio perspective, the third chapter has shown that SA REITs have diversification benefits in terms of variance reduction and Sharpe to foreign investors holding US REITs. However, the geographical investment focus of SA REITs has an impact on these diversification benefits. SA REITs with foreign holdings provide foreign investors with superior diversification relative to REITs with a local asset-based focus. Overall, the conclusion from this investigation was that SA REITs were attractive to foreign investors due to its diversification benefits.

Chapter four provided evidence that foreign investments in SA REITs were driven by push and pull factors. In general, US and EU business confidence served as significant push factors with commercial real estate market and stock-market performance pulling foreign investment to the SA REIT market. However, findings suggest that the importance of push and pull factors differed for different types of REITs. Push factors were more relevant for large cap REITs while pull factors determined foreign investment in small cap REITs. Over time, the factors that affected foreign investment in SA REITs have changed, with pull factors being more prominent in the pre-REIT period and push factors being more relevant in the REIT period. However, relative to the REIT period, push and pull factors had very little impact in driving foreign investments in the pre-REIT period. Additionally, this investigation has also shown that investors in SA REITs also displayed return chasing behaviour and selected investments based on performance relative to alternative investment markets. Overall, the findings of this study led to the conclusion that not

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only country-specific factors affected foreign investments in SA REITs, but also economic and capital market conditions in developed countries.

The fifth chapter focused on whether the introduction of SA REITs led to improvements in market liquidity through foreign investments. An in-depth analysis that used measures capturing multiple dimensions of liquidity showed that foreign investments positively affected activity measures such as trading volume and turnover in the REIT period. Friction measures like the bid-ask spread and Amihud (2002) illiquidity measure were negatively affected by foreign trading in the pre-REIT period. However, this negative effect disappeared in the REIT period, suggesting that the REIT introduction mitigated the effect of foreign investment on the depth and tightness dimensions of liquidity. Overall, the conclusion from this study was that the introduction of REITs in South Africa achieved the objective of improving liquidity in the listed-property market sector through foreign investments.

This study has shown that foreign investor behaviour is multidimensional, encompassing REIT structure familiarity, several macroeconomic, financial and property-market fundamentals in both the SA REIT market and markets that serve as investment alternatives. The findings of this study are relevant for foreign investors and portfolio managers in constructing international REIT portfolios as they expand their REIT investments to emerging markets. With lack of transparency noted as a challenge for emerging REIT markets (Ernst and Young, 2016), this study provides insight into the South African emerging REIT market and the diversification benefits of including SA REITs in international portfolios, which may reduce resistance to investment in SA REITs. For emerging-market REITs, the study improved current knowledge with regard to foreign investor buying (selling) behaviour and emphasised the potential impact on the local REIT market, such as push factors driving large-cap

SA REIT investment, potentially introducing volatility to the liquidity in the SA REIT market.

Overall, this study contributes to four of the twelve main focus areas of REIT management teams, namely the SA REIT regulatory environment, capital flows, capital allocation, and cross-border investment (Ernst and Young, 2016). In addition, REIT policymakers in the South African and other emerging markets may benefit from the findings in adapting policy to increase the attractiveness of the local REIT market to foreign investors. For government and JSE regulators, the REIT structure provides a good example of framing local investment opportunities in a context familiar to foreign investors by using internationally recognised structures. As such, other JSE sectors may follow this approach in attracting foreign investment.

Considering that SA REITs are heavily invested in international markets, other emerging markets impacted by similar home-market limitations such as deteriorating local market performance and limited availability of investment-grade property may also supplement their local real estate holdings with international investments. Hence, an opportunity exists to extend the findings of this study by investigating the implications of geographical focus on subsequent diversification benefits for foreign investors in these markets. Additionally, individual investor characteristics that may influence foreign REIT buying behaviour in emerging markets may be further investigated by future studies. Future research can also evaluate the domestic SA REIT investment trends in the pre- and REIT periods as local investors may differ from foreign investors in their interpretation of legislative changes and react differently to macroeconomic and political factors due to market familiarity and availability of home-market information.

REFERENCES

Ahmed, F., Arezki, R. and Funke, N. 2005. The Composition of Capital Flows: Is South Africa Different? *IMF Working Paper*, WP/05/40.

Akinsomi, O., Kola, K., Ndlovu, T. and Motloung, M. 2016. The performance of the Broad Based Black Economic Empowerment compliant listed property firms in South Africa. *Journal of Property Investment and Finance*, 34:1, 3–26.

Akinsomi, O. and Pagiwa, R. 2016. *Shareholder Wealth Effects from the Conversion of Property Listed firms into REITs: Evidence from South Africa.* Conference Paper, 23rd Annual European Real Estate Society Conference, January 2016.

Akinsomi, O., Pahad, R., Nape, L. and Margolis, J. 2015. Geographic Diversification Issues in Real Estate Markets in Africa. *Journal of Real Estate Literature*, 23:2, 261-295.

Akinsomi, O., Balcilar, M., Demirer, R. and Gupta, R. 2017a. The effect of gold market speculation on REIT returns in South Africa: a behavioural perspective. *Journal of Economics and Finance*, 41:774–793.

Akinsomi, O., Mkhabela, N. and Taderera, M. 2017b. The Role of Macro-economic Indicators in explaining direct commercial real estate returns: evidence from South Africa. *Journal of Property Research*, 35:1, 28-52.

Albuquerque, R., Bauer, G.H. and Schneider, M. 2009. Global private information in international equity markets. *Journal of Financial Economics*, 94:18–46.

Allen, M.T., Madura, J. and Springer, T.M. 2000. REIT Characteristics and the Sensitivity of REIT Returns. *Journal of Real Estate Finance and Economics*, 21:2, 141–152.

Amihud, Y. 2002. Illiquidity and Stock Returns: Cross-Section and Time-Series Effects. *Journal of Financial Markets*, 5:31–56.

Anand, A. and Subrahmanyam, A. 2009. Book/Market Fluctuations, Trading Activity, and the Cross-section of Expected Stock Returns. *Review of Behavioral Finance*, 1:3–22.

Anuar, A. and Soi Tho, C.Y. 2011. Performance Analysis of REITs: Comparison between M-REITs and UK-REITs. *Journal of Surveying, Construction and Property*, 2 (Special Issue):38–61.

Asabere, P., Kleiman, R. and McGowan, C. 1991. The risk-return attributes of international real estate equities. *Journal of Real Estate Research*, 6:2, 143–151.

Aurelio, M.M. 2006. Going Global: The Changing Pattern of U.S. Investment Abroad. *Economic Review – Federal Reserve Bank of Kansas City*, 91:3, 5–32.

Baek, I.M. 2006. Portfolio investment flows to Asia and Latin America: Pull, push or market sentiment? *Journal of Asian Economics*, 17:363–373.

Barry, C.B. and Rodriguez, M. 2004. Risk and return characteristics of property indices in emerging markets. *Emerging Markets Review*, 5:131–159.

Baum, C. 2016. *Why do we need a Goldman Sachs Financial Conditions Index?* [Online]. Available at: http://www.marketwatch.com/story/why-do-we-need-a-goldman-sachs-financial-conditions-index-2016-11-29 (last accessed on 8 February 2017).

Beck, N. and Katz, J.N. 1995. What to do (and not to do) with Time-Series Cross-Section Data. *The American Political Science Review*, 89:3, 634–647.

Bekaert, G. 1995. Market Integration and Investment Barriers in Emerging Equity Markets. *The World Bank Economic Review*, 9:1, 75–107.

Bekaert, G., Harvey, C.R. and Lumsdaine, R.L. 2002. The Dynamics of Emerging Market Equity Flows. *Journal of International Money and Finance*, 21:3, 295–350.

Belgrove, J.B. and Van der Merwe Smit, E. 2016. The Controllable Determinants of Liquidity in the Context of Securitised Real Estate Companies in South Africa. *Management Dynamics*, 25:1, 2–15.

Below, S.D., Stansell, S.R. and Coffin, M. 2000. The Determinants of REIT Institutional Ownership: Tests of the CAPM. *Journal of Real Estate Finance and Economics,* 21:3, 263–278.

Bertin, W., Kofman, P., Michayluk, D. and Prather, L. 2005. Intraday REIT Liquidity. *Journal of Real Estate Research*, 27:2, 155–176.

Bhasin, V., Cole, R.A. and Kiely, J.K. 1997. Changes in REIT Liquidity 1990 – 1994: Evidence from Intraday Transactions. *Real Estate Economics*, 25:4, 615–630.

Bodie, Z., Kane, A., and Marcus, A. J. 2014. *Investments* (Tenth Glob). McGraw Hill Education, Berkshire.

Bohn, H., and Tesar, L.L. 1996. U.S. equity investment in foreign markets: Portfolio rebalancing or return chasing? *American Economic Review*, 86:2, 77–81.

Bond, S.A., Karolyi, G.A. and Sanders, A.B. 2003. International Real Estate Returns: A Multifactor, Multicountry Approach, *Real Estate Economics*, 31:3, 481–500.

Boshoff, D.G.B. and Bredell, E. 2013. Introduction of REITs in South Africa. *Advanced Research in Scientific Areas Conference Proceedings*, 38–47.

Bouchouicha, R. and Ftiti, Z. 2012. Real Estate Markets and the Macroeconomy: A Dynamic coherence framework. *Economic Modelling*, 29, 1820–1829.

Boudry, W.I., Coulson, N.E., Kallberg, J.G. and Liu, C.H. 2012. On the hybrid nature of REITs. *Journal of Real Estate Finance and Economics*, 44:230–249.

Brennan, M. and Coa, H. 1997. International Portfolio Investment Flows. *Journal of Finance*, 52:5, 1851–1880.

Brounen, D. and De Koning, S. 2012. 50 Years of real estate investment trusts: An international examination of the rise and performance of REITs. *Journal of Real Estate Literature*, 20:2, 197–223.

Brounen, D., Eichholtz, P. and Ling, D. 2009. The Liquidity of Property Shares: An International Comparison. *Real Estate Economics*, 37:3, 413–445.

Byrne, P. and Lee, S. 1995. Real Estate Portfolio Analysis under Conditions of Non-Normality: The Case of NCREIF. *Journal of Real Estate Portfolio Management*, 3:1, 37–46.

Cannon, S.E. and Cole, R.A. 2011. Changes in REIT Liquidity 1988-2007: Evidence from Daily Data. *Journal of Real Estate Finance and Economics*, 43:258–280.

Carstens, R. and Freybote, J. 2017a. *Pull and Push Factors as Determinants of Foreign REIT Investments*, working paper.

Carstens, R. and Freybote, J. 2017b. *The Impact of Introducing REITs on Foreign Investments and Liquidity*, working paper.

Cashman, G.D., Harrison, D.M., Seiler M.J. and Sheng, H. 2016. Cross-Border Investment and Firm Liquidity. *Journal of Real Estate Portfolio Management,* 22:2, 105–127.

CBRE Research. 2017. EMEA Investor Intentions Survey 2017. *CBRE Research*, 1–13.

Chan, K.C., Hendershott, P. and Sanders, A.B. 1990. Risk and Return on Real Estate: Evidence from Equity REITs. *AREUEA Journal*, 18:431–452.

Cheng, P. and Liang, Y. 2000. Optimal Diversification: Is It Really Worthwhile? *Journal of Real Estate Portfolio Management*, 6:1, 7–16.

Cheng, P., Ziobrowski, A.J., Caines, R.W. and Ziobrowski, B.J. 1999. Uncertainty and Foreign Real Estate Investment. *Journal of Real Estate Research*, 18:3, 463–479.

Chong, J., Miffre, J. and Stevenson, S. 2009. Conditional correlations and real estate investment trusts. *Journal of Real Estate Portfolio Management*, 15:2, 173–184.

Chou, Y. and Chen, Y. 2014. Is the Response of REIT Returns to Monetary Policy Asymmetric? *Journal of Real Estate Research*, 36:1, 109–135.

Chuhan, P., Claessens, S. and Mamingi, N. 1998. *Equity and Bond Flows to Asia and Latin America*. Working Paper 1160. Policy Research Department, World Bank, Washington, D.C. Processed.

Clarke, J. and Berko, E. 1997. Foreign Investment Fluctuations and Emerging Market Stock Returns: The Case of Mexico. *Staff Report 24*. Federal Reserve Bank of New York: New York, NY.

Clarke, R.G., De Silva, H. and Thorley, S. 2006. Minimum-Variance Portfolios in the U.S. Equity Market. *The Journal of Portfolio Management*, 33:1, 10–24.

Clayton, J. and MacKinnon, G. 2003. The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns. *Journal of Real Estate Finance and Economics*, 27:1, 39-60.

Clayton, J. and MacKinnon, G. 2000. Measuring and Explaining Changes in REIT Liquidity: Moving Beyond the Bid-Ask Spread. *Real Estate Economics*, 28:1, 89–115.

Cole, R. 1998. *Changes in REIT liquidity 1990-94: the role of new REITs*. Paper presented at the 1998 AREUEA meeting, Chicago.

Conner, P. and Liang, Y. 2006. Ask Not Why International, Ask Why Not International. *Journal of Real Estate Portfolio Management*, 12:2, 187–194.

Conover, C.M., Friday, H.S. and Sirmans, G.S. 2002. Diversification Benefits from Foreign Real Estate Investments. *Journal of Real Estate Portfolio Management*, 8:1, 17–25.

Danielsen, B.R. and Harrison, D.M. 2007. The Impact of Property Type Diversification on REIT liquidity. *Journal of Real Estate Portfolio Management*, 13:4, 329–343.

Das, P., Freybote, J. and Marcato, G. 2015. An Investigation into Sentiment-Induced Institutional Trading Behavior and Asset Pricing in the REIT Market. *Journal of Real Estate Finance and Economics,* 51:160–189.

Das, P. and Thomas Jr, C.R. 2016. Strategic Development of REITs in India. *Journal of Real Estate Literature*, 24:1, 105–131.

Datar, V.T., Naikb, N.Y. and Radcliffec, R. 1998. Liquidity and Stock returns: An Alternative Test. *Journal of Financial Markets*, 1:2, 203-219.

Dhar, R. and Goetzmann, W.N. 2005. Institutional Perspectives on Real Estate Investing: the Role of Risk and Uncertainty. *Journal of Portfolio Management*, 32:4, 106-116.

De Beer, B. 2015. *South Africa's experience with capital flows since the financial crisis: From measurement to analysis.* Paper presented at the IFC satellite meeting during the 60th ISI conference, 24 July 2015.

De Hoyos, R.E. and Sarafidis, V. 2006. Testing for Cross-Sectional Dependence in Panel-Data Models. *STATA Journal,* 6:4, 482–496.

De Vita, G. and Kyaw, S. 2008. Determinants of capital flows to developing countries: a structural VAR analysis. *Journal of Economic Studies*, 35:4, 304–322.

De Wit, I. 2010. International Diversification Strategies for Direct Real Estate. *Journal of Real Estate Finance and Economics*, 41:4, 433–457.

Devos, E., Ong, S.E., Spieler, A.C. and Tsang, D. 2013. REIT Institutional Ownership Dynamics and the Financial Crisis. *Journal of Real Estate Finance and Economics*, 47:266–288.

Dufour, J. and Khalaf, L. 2000. *Exact Tests for Contemporaneous Correlation of Disturbances in Seemingly Unrelated Regressions.* Working Paper. Center for Interuniversity Research in Quantitative Economics (CIREQ), No. 11-2000.

Edison, H. and Warnock, F. 2008. Cross-Border Listings, Capital Controls, and Equity Flows to Emerging Markets. *Journal of International Money and Finance*, 27:1013–1027.

Eichholtz, P., Huisman, R., Koedijk, K. and Schuin, L. 1998. Continental Factors in International Real Estate Returns. *Real Estate Economics*, 26:3, 493–509.

Eichholtz, P., Koedijk, K. and Schweitzer, M. 2001. Global Property Investment and the Costs of International Diversification. *Journal of International Money and Finance*, 20:3, 349–366.

Eichholtz, P.M.A., Gugler, N. and Kok, N. 2011. Transparency, Integration, and the Cost of International Real Estate Investments. *Journal of Real Estate Finance and Economics*, 43:152–173.

Ernst and Young. 2016. Global perspectives: 2016 REIT report.

Fama, E.F. and French, K.R. 1993. Common Risk Factor in the Returns on Stocks and Bonds. *Journal of Financial Economics*, 33, 3–56.

Fernández-Arias, E. and Montiel, P.J. 1996. The Surge in Capital Inflows to Developing Countries: An Analytical Overview. *The World Bank Economic Review*, 10:1, 51–77.

Fratzscher, M. 2011. Push factors versus pull factors as drivers of global capital flows, *VOX CEPR's Policy Portal*, (January). [Online]. Available at: http://voxeu.org/article/drivers-global-capital-flows-pushes-or-pulls (last accessed on 18 July 2017).

Freybote, J. and Seagraves, P.A. 2017. Heterogeneous Investor Sentiment and Institutional Real Estate Investments. *Real Estate Economics*, 45:1, 154–176.

Friday, H.S., Sirmans, G.S. and Conover, C.M. 1999. Ownership Structure and the Value of the Firm: The Case of REITs. *Journal of Real Estate Research*, 17:1/2, 71–90.

Froot, K.A., O'Connell, P.G.J. and Seasholes, M.S. 2001. The Portfolio Flows of International Investors. *Journal of Financial Economics*, 59:2, 151–194.

FTSE Russell. 2017. FTSE EPRA/NAREIT Emerging Index. *FTSE Russell Factsheet,* 29 December 2017.

Gallo, J.G., Lockwood, L.J. and Zhang, Y. 2013. Structuring Global Property Portfolios: A Cointegration Approach. *Journal of Real Estate Research*, 35:1, 53–81.

Gallo, J.G. and Zhang, Y. 2010. Global Property Market Diversification. *Journal of Real Estate Finance and Economics*, 41:458–485.

Garvey, R. Santry, G. and Stevenson, S. 2001. The Linkages between Real Estate Securities in the Asia-Pacific, *Pacific Rim Property Research Journal*, 7:4, 240–258.

Geurts, T.G. and Jaffe, A. J. 1995. Risk and Real Estate Investment : An International Perspective. *Journal of Real Estate Research*, 11:2, 117–130.

Ghysels, E., Plazzi, A. and Valkanov, R. 2016. Why Invest in Emerging Markets? The Role of Conditional Return Asymmetry. *Journal of Finance*, 71:5, 2145–2192.

Giannotti, C. and Mattarocci, G. 2013. Risk Measurement Choice in Selecting REITs : Evidence from the US Market. *Journal of Real Estate Portfolio Management*, 19:2, 137–153.

Gibilaro, L. and Mattarocci, G. 2016. Are Home-biased REITs Worthwile? *Journal of Real Estate Portfolio Management*, 22:1, 19–30.

Giessing, R. 2017. *Why your portfolio needs listed property*. [Online]. Available at: https://www.fin24.com/Finweek/Investment/why-your-portfolio-needs-listed-property-20170329 (last accessed on 28 January 2018).

Giliberto, M. and Shulman, D. 2017. On the interest rate sensitivity of REITs: Evidence from twenty years of daily data. *Journal of Real Estate Portfolio Management*, 23:1, 7–20.

Giliberto, S.M. and Testa, B. 1990. Global Share Property Performance by Geographic Region. *Saloman Brothers Real Estate Research*, August 21.

Glascock, J. and Lu-Andrews, R. 2014. An Examination of Macroeconomic Effects on the Liquidity of REITs. *Journal of Real Estate Finance and Economics*, 49:23–46.

Glascock, J., Lu, C. and So, R. 2000. Further evidence on the integration of REIT, bond, and stock returns. *The Journal of Real Estate Finance and Economics*, 20:2, 177–194.

Glascock, J.L. and Kelly, L.J. 2007. The relative effect of property type and country factors in reduction of risk of internationally diversified real estate portfolios. *Journal of Real Estate Finance and Economics*, 34:3, 369–384.

Gordon, J.N., Canter, T.A. and Webb, J.R. 1998. The Effect of International Real Estate Securities on Portfolio Diversification. *Journal of Real Estate Portfolio Management*, 4:2, 83–91.

Hamelink, F. and Hoesli, M. 2004. What factors determine international real estate security returns ? *Real Estate Economics*, 32:3, 437–462.

Harris, P. and Mongiello, M. 2006. *Accounting and Financial Management* (First Edition). Routledge, New York, USA.

Hartzell, D.J., Watkins, D.E. and Laposa, S.P. 1996. *Performance characteristics of global real estate securities.* Paper presented at AREUEA annual meeting, New Orleans.

Hastings, A. and Nordby, H. 2007. Benefits of Global Diversification on a Real Estate Portfolio. *The Journal of Portfolio Management*, 33:5, 53–62.

Hatzius, J., Hooper, P., Mishkin, F.S., Schoenholtz, K.L., Watson, M.W. 2010. *Financial Condition Indexes: A Fresh Look After The Financial Crisis*. National Bureau of Economic Research, Working paper 16150.

Ho, D.H.K., Rengarajan, S. and Xie, E.J.Y. 2014. A Comparative Risk Analysis between the Markowitz Quadratic Programming Model and the Multivariate Copula Model for a Singapore REIT Portfolio. *Journal of Real Estate Portfolio Management*, 20:2, 125–145.

Hoesli, M., Lekander, J. and Witkiewicz, W. 2004. International Evidence on Real Estate as a Portfolio Diversifier. *Journal of Real Estate Research*, 26:2, 161–206.

Hogan Lovells. 2017. *Trends in cross-border Real Estate investment and the changing tax landscape*. June, 2017.

Hogg, A. 2016. Calculating Zuma's R500bn #Nenegate Blunder – Rand Depreciation Excluded, 2016, [Online]. Available at: http://www.biznews.com/undictated/2016/03/05/calculating-zumas-r500bn-blunder-the-effs-calculation-was-correct/ (last accessed on 22 October 2016).

Hong, G. and Lee, B.S. 2013. Does Inflation Illusion Explain the Relation between REITs and Inflation? *Journal of Real Estate Finance and Economics*, 47:1, 123–151.

Hu, J. and Mei, J.P. 1999. The Risk and Return of Emerging markets Property Stock Indexes. *Emerging markets Quarterly*, 3:1, 10–21.

Huang, G.C., Liano, K. and Pan, M.S. 2011. REIT Stock Splits and Liquidity Changes. *Journal of Real Estate Finance and Economics*, 43:527–547.

Jin, G.C., Grissom, T.V., and Ziobrowski, A.J. 2007. The Mixed-Asset Portfolio for Asia-Pacific Markets. *Journal of Real Estate Portfolio Management*, 13:3, 249–256.

JLL. 2016. The great African capital migration exploring trends impacting real estate capital flows in Sub-Saharan Africa. *Capital Markets Research*, October, 2016.

Kahn, B. 2015. *Capital Flow Management in South Africa*. Presentation to the IMF Conference on Managing Capital Flows: Lessons from Emerging Markets for Frontier Economies, 2 March 2015.

Kaminska, I. 2010. Asset classes: Correlation remains at highs reached in the crisis. *The Financial Times*, 27 October 2010.

Kantilal, H. 2016. *An analysis of the Real Estate Investment Trust tax regime on the South African property sector*. Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Magister Commercii* in South African and International Taxation at the Potchefstroom Campus of the North-West University.

Karolyi, G.A. and Sanders, A.B. 1998. The Variation of Economic Risk Premiums in Real Estate Returns. *Journal of Real Estate Finance and Economics*, 17:3, 245–262.

Kilian, A. 2017. *South African Reits make their mark among South Africa's top listed companies.* [Online]. Available at: http://m.engineeringnews.co.za/article/south-african-reits-make-their-mark-among-south-africas-top-listed-companies (last accessed on 18 February 2016).

Kohlert, D. 2010. The determinants of regional real estate returns in the United Kingdom: A vector error correction approach. *Journal of Property Research*, 27:1, 87–117.

KPMG. 2013. *SA REITs – what are the tax implications?* [Online]. Available at: http://www.kpmg.com/za/en/issuesandinsights/articlespublications/tax-and-legal-publications/pages/south-african-reits-tax-implications.aspx (last accessed on 18 February 2016).

Kumar, A. and Lee, C.M.C. 2006. Retail Investor Sentiment and Return Comovements. *Journal of Finance*, 61:5, 2451–2486.

Kyrychenko, V. and Shum, P. 2009. Who holds foreign stocks and bonds? Characteristics of active investors in foreign securities. *Financial Services Review*, 18:1–21.

Kyle, A. 1985. Continuous auctions and insider trading. *Econometrica*, 53:1315–1335.

Lambson, V.E., McQueen, G.R. and Slade, B.A. 2004. Do Out-of-State Buyers Pay More for Real Estate? An Examination of Anchoring-Induced Bias and Search Costs. *Real Estate Economics*, 32:1, 85–126.

Lamprecht, I. 2013. *SA REITs: Will investors benefit? How the new regime will impact costs, taxes and returns. 10 April.* [Online]. Available at: http://www.moneyweb.co.za/archive/sa-reits-will-investors-benefit/ (last accessed on 18 February 2016).

Lee, M-L., Lee, M-T and Chiang, K.C.H. 2007. Real Estate Risk Exposure of Equity Real Estate Investment Trusts. *Journal of Real Estate Finance and Economics*, 36: 165–181.

Lieser, K. and Groh, A.P. 2011. The Attractiveness of 66 Countries for Institutional Real Estate Investments. *Journal of Real Estate Portfolio Management*, 17:3, 191–211.

Lieser, K. and Groh, A.P. 2014. The Determinants of International Commercial Real Estate Investment. *Journal of Real Estate Finance and Economics*, 48:4, 611–659.

Lin, T.C. 2007. The Development of REIT Markets and Real Estate Appraisal in Taiwan. *Journal of Real Estate Literature*, 15:2, 281–300.

Ling, D.C. and Naranjo, A. 2002. Commercial Real Estate Return Performance: A Cross-Country Analysis. *Journal of Real Estate Finance and Economics*, 24:1/2, 119–142.

Liow, K.H. and Newell, G. 2016. Real Estate Global Beta and Spillovers: An International Study. *Economic Modelling*, 59:297–313.

Liow, K.H., Ho, K.H.D., Ibrahim, M.F. and Chen, Z. 2009. Correlation and volatility dynamics in international real estate securities markets. *Journal of Real Estate Finance and Economics*, 39:2, 202–223.

Liow, K.H. and Yang, H. 2005. Long-Term Co-Memories and Short-Run Adjustment

Securitized Real Estate and Stock Markets. *Journal of Real Estate Finance and Economics*, 31:3, 283–300.

Liow, K.H., Zhou, X. and Ye, Q. 2015. Correlations Dynamics and Determinants in International Securitized Real Estate Markets. *Real Estate Economics*, 43:3, 537–585.

Liu, C and Mei, J. 1994. An Analysis of Real Estate Risk using the Present Value Model. *Journal of Real Estate Finance and Economics*, 8:5–20.

Liu, C. and Mei, J. 1998. The Predictability of International Real Estate Markets, Exchange Rate Risks and Diversification Consequences. *Real Estate Economics*, 26:1, 3–39.

Lu, C., Tse, Y. and Williams, M. 2013. Return Transmission, Value at Risk, and Diversification Benefits in International REITs: Evidence from the Financial Crisis. *Review of Quantitative Finance and Accounting*, 40:293–318.

Lu, K.W. and Mei, J.P. 1999. The Return Distributions of Property Shares in Emerging Markets. *Journal of Real Estate Portfolio Management*, 5:2, 145–160.

Lui, L. and Zhang, L. 2008. Momentum profits, factor pricing, and macroeconomic risk. *Review of Financial Studies*, 21:2417–2448.

Malizia, E. and Simons, R. 1991. Comparing Regional Classifications for Real Estate Portfolio Diversification. *Journal of Real Estate Research*, 6:1, 53–77.

Marcato, G. and Ward, C. 2007. Back from Beyond the Bid-Ask Spread: Estimating Liquidity in International Markets. *Real Estate Economics*, 35:4, 599–622.

Markowitz, H. 1952. Portfolio Selection. *Journal of Finance*, 7:1, 77-91.

Markowitz, H. 1959. *Portfolio Selection: Efficient Diversification of Investments*, New York: John Wiley.

Mauck, N. and Price, S.M.K. 2017. Determinants of Foreign Versus Domestic Real Estate Investment: Property Level Evidence from Listed Real Estate Investment Firms. *Journal of Real Estate Finance and Economics*, 54:1, 17–57.

Miao, H., Morra, P. and Wu, Y. 2016. South Africa Selected Issues: Macro-financial

Linkages: Capital Flows, Sovereign Ratings, and the Financial Sector Nexus. *International Monetary Fund Country Report*, No. 16/218, 11–27.

Mokopanele, T. 2017. *South African listed property sector now one of the largest sectors on the JSE.* [Online]. Available at: http://sapropertyinsider.co.za/2017/05/12/south-african-listed-property-sector-now-one-the-largest-sectors-on-the-jse/ (last accessed on 30 January 2018).

Moneyweb.co.za. 13 Oct 2014. *REIT investments and tax – How your listed property holding will be taxed*. [Online]. Available at: www.moneyweb.co.za/uncategorized/reit-investments-and -tax-3/ (last accessed on 18 February 2016).

Moss, A., Clare, A., Thomas, S. and Seaton, J. 2015. Trend Following And Momentum Strategies for Global REITs. *Journal of Real Estate Portfolio Management*, 21:1, 21–31.

Mowat, A., Martins, P., Aserkoff, D., Batra, R., Tavaria, S., Sahu, N. and Chabriya, S. 2017. Global Emerging Markets Equity Research: Six in a Row. *J.P. Morgan Emerging Market Research*, 04 July, 2017, 1–23.

Mueller, G.R. and Ziering, B.A. 1992. Real Estate Portfolio Diversification Using Economic Diversification. *Journal of Real Estate Research*, 7:4, 375–86.

Myer, N.F.C. and Webb, J.R. 1993. Return Properties of Equity REITs, Common Stocks, and Commercial Real Estate: A Comparison. *Journal of Real Estate Research*, 8:1, 87–106.

Naidoo, H. 2014. *The Introduction of REITs to the South African Property Market: Opportunities for Fund Managers*. Unpublished thesis submitted for the degree of Master of Management in Finance and Investments at the University of the Witwatersrand, Johannesburg, South Africa.

NAREIT. 2016. [Online]. Available at: http://www.reit.com/nareit (last accessed on 18 February 2016).

National Treasury. 2007. *Reforming the listed property investment sector in South Africa.* [Online]. Available at: http://www.treasury.gov.za/public%20comments/REITS%20discussion%20document.

pdf (last accessed on 10 August 2017).

National Treasury. 2012. *Explanatory memorandum on the Taxation Laws Amendment Bill, 2012*. 10 December 2012.

National Treasury. 2013. *Explanatory memorandum on the Taxation Laws Amendment Bill, 2012*. 24 October 2013.

Nelson, A.J. 2017. U.S. Property Markets Shake Off Slowdown and Power On. U.S. *Colliers International Research Report*, 2017 Midyear Report.

Newell, G. and Worzala, E. 1995. The role of International property investment portfolios. *Journal of Property Finance,* 6:1, 55–63.

Ntuli, M. and Akinsomi, O. 2017. An Overview of the Initial Performance of the South African REIT Market. *Journal of Real Estate Literature*, 25:2, 365–388.

Olaleye, A. 2008. Property Market Nature and the Choice of Property Portfolio Diversification Strategies: The Nigeria Experience. *International Journal of Strategic Property Management*, 12:1, 35–51.

Olaleye, A. 2011. The effects of adding real estate into mixed-asset portfolios in South Africa. *Journal of Financial Management of Property and Construction*, 16:3, 272–282.

Ooi, J.T.L., Newell, G. and Sing, T. 2006. The Growth of REIT Markets in Asia. *Journal of Real Estate Literature*, 14:2, 203–222.

Otto, A. *Reforming the Listed Property Investment Sector in South Africa*. Discussion Paper, Department of National Treasury, 2008, [Online]. Available at: www.treasury.gov.za/.../REJ%20discussion%20document.pdf (last accessed on 8 February 2017).

Park, Y.W. and Bang, D.W. 2012. Direct Commercial Real Estate as an Inflation Hedge: Korean evidence. *Journal of Real Estate Portfolio Management*, 18:2, 187–203.

Peterson, J.D. and Hsieh, C.-H. 1997. Do Common Risk Factors in the Returns on Stocks and Bonds Explain Returns on REITs? *Real Estate Economics*, 25:2, 321–345.

Pham, A.K. 2012. The Dynamics of Returns and Volatility in the Emerging and Developed Asian REIT Markets. *Journal of Real Estate Literature*, 20:1, 79–96.

Pierzak, E. 2001. Payment Choice in REIT Property Acquisitions. *Journal of Real Estate Research,* 21(1–2):104–140.

Propertywheel. 2016. *SA's REITs strong among South Africa's top listed companies.* [Online]. Available at: https://propertywheel.co.za/2016/11/sas-reits-strong-among-south-africas-top-listed-companies/ (last accessed on 30 January 2018).

Quan, D. and Titman, S. 1999. Do real estate prices and stock prices move together? An international analysis. *Real Estate Economics*, 27:183–207

Ragsdale, C.T. 2015. *Spreadsheet Modelling and Decision Analysis*, Stamford: Cengage Learning.

Rangasamy, L. 2014. Capital Flows: The South African Experience. *South Afircan Journal of Economics*, 82:4, 551–566.

Rapp, L. 2015. *Market capitalisation of SA REITs increased around 43% over past year*. [Online]. Available at: http://propertywheel.co.za/2015/08/market-capitalisation-of-sa-reits-increased-around-43-over-past-year/ (last accessed on 8 February 2017).

Rapp, L. 2017. *South African listed property sector now one of the largest sectors on the JSE.* [Online]. Available at: http://sapropertyinsider.co.za/2017/05/12/south-african-listed-property-sector-now-one-the-largest-sectors-on-the-jse/ (last accessed on 10 August 2017).

Reuters News. 2005. *UK Property Industry Seen Pushing Tax-Exempt REITs,* May 17.

Rubens, J.H., Louton, D.A. and Yobaccio, E.J. 1998. Measuring the Significance of Diversification Gains. *Journal of Real Estate Research*, 16:1, 73–86.

S&P Dow Jones Indices. 2018. *Equity S&P Global REIT Index Fact Sheet.* [Online]. Available at: https://us.spindices.com/indices/equity/sp-global-reit-us-dollar (last accessed on 21 January 2018).

SA REIT Association. 2013. SA REIT Presentation. [Online]. Available at: http://www.sareit.com/docs/SAREIT_Presentation-23_May_2013.pdf (last accessed on 21 January 2018).

SA REIT Association. 2016a. *Monthly Chart Book. December 2016.* [Online]. Available at: http://www.sareit.com/stats.php (last accessed on 28 January 2018).

SA REIT Association. 2016b. *What is SA REIT.* [Online]. Available: http://www.sareit.com/101_WhatIsReits.php (last accessed on 2 November 2016).

SA REIT Association. 2017a. *Monthly Chart Book. January 2017.* [Online]. Available: http://www.sareit.com/stats.php (last accessed on 8 February 2017).

SA REIT Association. 2017b. *Monthly Chart Book. December 2017.* [Online]. Available: http://www.sareit.com/stats.php (last accessed on 28 January 2018).

SA REIT Association. 2017c. *SA REIT Brochure.* [Online]. Available at: http://www.sareit.com/docs/SA_REIT_brochure.pdf (last accessed on 21 January 2018).

Santero, T. and Westerlund, N. 1997. Confidence Indicators. *The OECD Observer*, 207: August/September.

Schacht, U. and Wimschulte, J. 2008. German Property Investment Vehicles and the Introduction of G-REITs: An Analysis. *Journal of Property Investment and Finance*, 26:3, 232–246.

Schweizer, D., Hass, L.H., Johanning, L. and Rudolph, B. 2013. Do Alternative Real Estate Investment Vehicles Add Value to REITs? Evidence from German Open-Ended Property Funds. *Journal of Real Estate Finance and Economics*, 47:65–82.

Seiler, M.J. and Seiler, V.L. 2005. Realistic portfolio allocation decision-making for the small US retail investor. *Journal of Real Estate Finance and Economics*, 31:3, 319–330.

Sharpe, W. 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19:425–442.

Shen, Y., Lu, C. and Lin, Z. 2012. International Real Estate Mutual Fund Performance: Diversification or Costly Information? *Journal of Real Estate Finance and Economics*, 44:394–413.

Shulman, D. 2015. Recent Evidence on the Interest Rate Sensitivity of REITs. *UCLA Economic Letter,* Ziman Center for Real Estate, January, 2015.

Smith, C. 2016. *SA REIT launches best practice recommendations.* [Online]. Available at: http://www.fin24.com/Companies/Property/sa-reit-launches-best-practice-recommendations-20160211 (last accessed on 8 February 2017).

South African Revenue Service (SARS). 2014. *Types of trust.* [Online]. Available at: http://www.sars.gov.za/ClientSegments/Businesses/Trusts/ Pages/Types-of-Trust.aspx (last accessed on 8 February 2017).

State Department Office of Investment Affairs. 2017. *South Africa - Investment Statistics*. State Department Office of Investment Affairs' Investment Climate Statement.

Stevenson, S. 2000. International Real Estate Diversification: Empirical Tests using Hedged Indices. *Journal of Real Estate Research*, 19:1/2, 105–131.

Stevenson, S. 2001. Bayes-Stein Estimators and International Real Estate Asset Allocation. *Journal of Real Estate Research*, 21:1/2, 89–103.

Subrahmanyam, A. 2007. Liquidity, Return and Order-Flow Linkages Between REITs and the Stock Market. *Real Estate Economics*, 35:3, 383–408.

Taylor, M.P. and Sarno, L. 1997. Capital Flows to Developing Countries : Long- and Short-Term Determinants. *The World Bank Economic Review*, 11:3, 451–470.

Temple, P. 2003. 'Correlation' a key to smart investing. *The Financial Times*, 29 May 2003.

Tesar, L. and Werner, I. 1995a. Home Bias and High Turnover. *Journal of International Money and Finance*, 14:4, 467–492.

Tesar, L. and Werner, I. 1995b. US Equity Investment in Emerging Stock Markets. *World Bank Economic Review*, 9(2–3): 109–130.

Van Niekerk, L. 2017. South Africa's Listed Property Sector is now an International Investment Destination. *SA REIT Association Property Journal*, 1st Edition (May): 13–16.

Van Niekerk, L. and Loonat, R. 2017. Property Sector Overview. *Nedbank CIB Sector Report*, 6 April 2017.

Viezer, T.W. 2000. Evaluating "Within Real Estate" Diversification Strategies. *Journal of Real Estate Portfolio Management*, 6:1, 75–95.

Wiegelmann, T. and Szumilo, N. 2017. Capital Flows: Investors leave the tap running. *IPE Real Assets*, January/February 2017.

Williams, G. 2017. *The investment case for listed property*. [Online]. Available at: https://www.fin24.com/Finweek/Investment/the-investment-case-for-listed-property-20170518 (last accessed on 8 February 2017).

Worzala, E. 1994. Overseas Property Investments: How Are They Perceived by the Institutional Investor? *Journal of Property Valuation and Investment*, 12:3, 31–47.

Worzala, E. and Sirmans, C.F. 2003. Investing in International Real Estate Stocks: A Review of the Literature. *Urban Studies*, 40:5–6, 1115–1149.

Yang, J., Zhou, Y. and Leung, W.K. 2012. Asymmetric correlation and volatility dynamics among stock, bond, and securitized real estate markets. *Journal of Real Estate Finance and Economics*, 45:2, 491–521.

Yat-Hung, C., Joinkey, S., Bo-Sin, T. 2008. Time-varying performance of four Asia-Pacific REITs. *Journal of Property Investment and Finance,* 26:3, 210–231.

Zhou, X. and Sah, V. 2009. Does Home Expertise Exist in Equity REITs? *Journal of Real Estate Portfolio Management*, 15:3, 281–288.

Ziobrowski, A.J. and Curcio, R.J. 1991. Diversification Benefits of U.S. Real Estate to Foreign Investors. *Journal of Real Estate Research*, 6:2, 119–142.

APPENDICES

Appendix A

Table A.1: Examples of SA REITs with foreign holdings and home-biased SA REITs

SA REITs with foreign holdings		Home-biased SA REITs	
REIT	**Market cap - Dec 2016 (ZAR)**	**REIT**	**Market cap - Dec 2016 (ZAR)**
Growthpoint Properties Ltd	73 271 713 751	SA Corporate Real Estate Fund Managers Pty Ltd	13 586 247 659
Redefine Properties Ltd	57 207 516 589	Vukile Property Fund Ltd	13 111 221 737
Fortress Income Fund Ltd	53 925 452 042	Investec Property Fund Ltd	10 846 534 848
Resilient REIT Ltd	45 908 180 511	Emira Property Fund Ltd	7 295 760 700
Hyprop Investments Ltd	29 144 646 322	Octodec Investments Ltd	5 766 945 137

Note: The market capitalisation for the respective REITs at the end of December 2016 was obtained from the IRESS database.

Table A.2: Sharpe ratio results for optimised REIT portfolios for the full period and the period excluding the crisis period

	USREIT	*US-SAREIT*	*Allocation to SAREITs*	*US-SAREITFOR*	*Allocation to SAREITs*
Full period	0.1417	0.1422	4%	**0.2717**	30%
Excluding crisis	0.2179	0.2588	10%	**0.3506**	30%

Note: The figures in bold indicate the portfolio with superior performance (higher risk-adjusted returns) for the relevant period.
' *', '**' and '***' denote significance at the 10%, 5% and 1% levels respectively.

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Table A.3: Sharpe ratio for US-SAREITFOR optimised portfolios separated by high and low foreign investment focus

Panel A: Optimised portfolios with SA REIT allocation constraint							
	USREIT	*US-SAREITFOR-LOW*	*W-test statistic*	*F-stat*	*US-SAREITFOR-HIGH*	*W-test statistic*	*F-stat*
Pre-crisis	0.3849	0.3952	0.0070	0.0355	**0.4016**	0.0114	0.0576
Crisis	0.0392	0.0398	0.0000	0.0001	**0.5299**	0.2788	0.7381
Post-crisis	0.4059	0.4141	0.0058	0.0432	**0.5265**	0.0965	0.7219
Pre-REIT period	0.0967	0.1182	0.0046	0.0585	**0.2970**	0.0781	0.9990
REIT period	0.3285	0.3344	0.0035	0.0118	**0.3774**	0.0312	0.1046
Panel B: Optimised portfolios with no SA REIT allocation constraint							
	USREIT	*US-SAREITFOR-LOW*	*W-test statistic*	*F-stat*	*US-SAREITFOR-HIGH*	*W-test statistic*	*F-stat*
Pre-crisis	0.3849	0.3952	0.0070	0.0355	**0.4016**	0.0114	0.0576
Crisis	0.0392	0.0398	0.0000	0.0001	**6.7412**	**45.373**	**120.103*****
Post-crisis	0.4059	0.4141	0.0058	0.0432	**0.5291**	0.0989	0.7396
Pre-REIT period	0.0967	0.1182	0.0046	0.0585	**0.4216**	**0.1668**	**2.1333****
REIT period	0.3285	0.3344	0.0035	0.0118	**0.3774**	0.0312	0.1046

Note: Following Rubens et al. (1998) the W-test and F-statistic are calculated to determine the superior performance of one portfolio relative to another. The figures in bold indicate the portfolio with superior performance (higher risk-adjusted returns) for the relevant period.

' *', '**' and '***' denote significance at the 10%, 5% and 1% levels respectively.

Table A.4: Robustness Sharpe ratio results for US-SAREITFOR optimised portfolios separated by foreign investment focus

Panel A: Optimised portfolios with SA REIT allocation constraint							
	USREIT	*US-SAREIT*	*W-test statistic*	*F-stat*	*US-SAREITFOR*	*W-test statistic*	*F-stat*
Pre-crisis	0.1830	0.2828	0.0450	0.2280	**0.2606**	0.0333	0.1688
Crisis	0.1241	0.0398	-0.0136	-0.0360	**0.5299**	0.2614	0.6919
Post-crisis	0.1656	0.4238	0.1481	1.1077	**0.5406**	0.2578	**1.9275***
Pre-REIT period	0.1572	0.1425	-0.0043	-0.0550	**0.3172**	0.0741	0.9472
REIT period	0.1630	0.3387	0.0859	0.2882	**0.3797**	0.1146	0.3845
Panel B: Optimised portfolios with no SA REIT allocation constraint							
	USREIT	*US-SAREIT*	*W-test statistic*	*F-stat*	*US-SAREITFOR*	*W-test statistic*	*F-stat*
Pre-crisis	0.1830	0.2828	0.0450	0.2280	**0.2619**	0.0340	0.1722
Crisis	0.1241	0.0398	-0.0136	-0.0360	**6.7412**	**44.74**	**118.428***
Post-crisis	0.1656	0.4238	0.1481	1.1077	**0.5484**	0.2660	**1.989***
Pre-REIT period	0.1572	0.1425	-0.0043	-0.0550	**0.3120**	**0.0709**	0.9063
REIT period	0.1630	0.3387	0.0859	0.2882	**0.3797**	0.1146	0.3845

Note: Following Rubens et al. (1998) the W-test and F-statistic are calculated to determine the superior performance of one portfolio relative to another.   The figures in bold indicate the portfolio with superior performance (higher risk-adjusted returns) for the relevant period.

' *', '**' and '***' denote significance at the 10%, 5% and 1% levels respectively.

Appendix B

Figure B.1: Foreign investment in the SA REIT sample
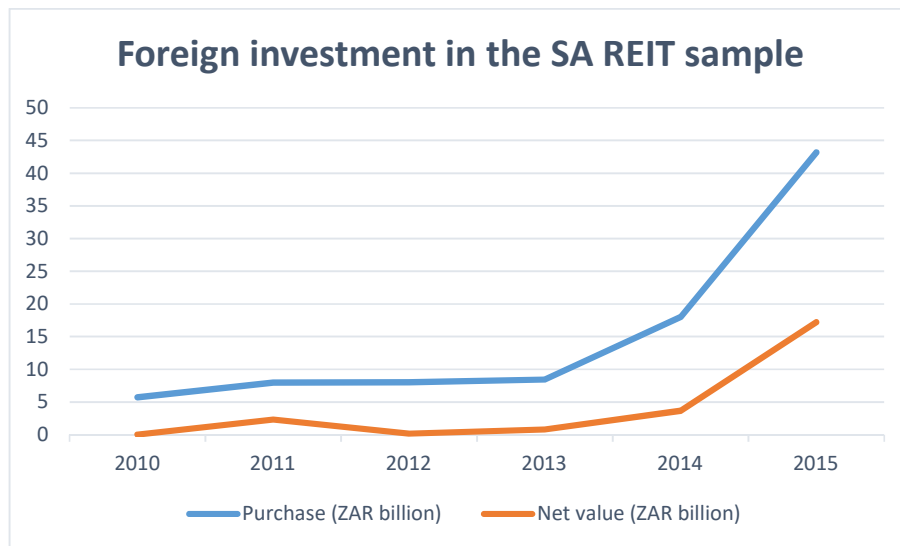
Source: JSE foreign investment data

Table B.1: Panel VAR results for pull factors – REIT period

		GDP growth			SA bond
		Coefficient			Coefficient
FBSI	$FBSI_{t-1}$	**0.17 (0.000) *****	**FBSI**	$FBSI_{t-1}$	**0.13 (0.005) *****
	$FBSI_{t-2}$	**0.06 (0.152)**		$FBSI_{t-2}$	0.03 (0.420)
	$FBSI_{t-3}$	0.05 (0.227)		$FBSI_{t-3}$	0.00 (0.642)
	$FBSI_{t-4}$	0.01 (0.768)		$FBSI_{t-4}$	-0.004 (0.924)
	$FBSI_{t-5}$	-0.04 (0.327)		$FBSI_{t-5}$	-0.06 (0.155)
	$FBSI_{t-6}$	-0.0007 (0.983)		$FBSI_{t-6}$	-0.03 (0.402)
	GDP_{t-1}	0.04 (0.464)		$SABOND_{t-1}$	**-0.19 (0.003)*****
	GDP_{t-2}	0.04 (0.506)		$SABOND_{t-2}$	0.03 (0.597)
	GDP_{t-3}	-0.002 (0.970)		$SABOND_{t-3}$	-0.07 (0.151)
	GDP_{t-4}	0.08 (0.184)		$SABOND_{t-4}$	0.06 (0.223)
	GDP_{t-5}	-0.06 (0.331)		$SABOND_{t-5}$	-0.06 (0.285)
	GDP_{t-6}	**0.10 (0.054) ***		$SABOND_{t-6}$	0.04 (0.324)
GDP	$FBSI_{t-1}$	**0.07 (0.005) *****	**SA BOND**	$FBSI_{t-1}$	0.03 (0.290)
	$FBSI_{t-2}$	0.004 (0.842)		$FBSI_{t-2}$	0.03 (0.246)
	$FBSI_{t-3}$	0.02 (0.322)		$FBSI_{t-3}$	0.01 (0.553)
	$FBSI_{t-4}$	**0.04 (0.080) ***		$FBSI_{t-4}$	-0.02 (0.412)
	$FBSI_{t-5}$	**0.04 (0.043) ***		$FBSI_{t-5}$	-0.02 (0.514)
	$FBSI_{t-6}$	**0.04 (0.067) ***		$FBSI_{t-6}$	0.006 (0.764)
	GDP_{t-1}	**0.88 (0.000)*****		$SABOND_{t-1}$	**0.67 (0.000) *****
	GDP_{t-2}	-0.0002 (0.991)		$SABOND_{t-2}$	**0.29 (0.000) *****
	GDP_{t-3}	**-0.54 (0.000)*****		$SABOND_{t-3}$	**0.10 (0.000) *****
	GDP_{t-4}	**0.43 (0.000) *****		$SABOND_{t-4}$	**-0.40 (0.000) *****
	GDP_{t-5}	-0.003 (0.805)		$SABOND_{t-5}$	**0.27 (0.000) *****
	GDP_{t-6}	**-0.15(0.000)*****		$SABOND_{t-6}$	0.003 (0.894)

Granger causality test					
Equation	*Equation*	*Chi-square*	*Equation*	*Equation*	*Chi-square*
FBSI	**GDP**	**11.25***	**FBSI**	**SA BOND**	**15.75****
GDP	**FBSI**	**14.54****	**SA BOND**	**FBSI**	5.87
No. of obs	*No. of obs*	*1016*	*No. of obs*	*No. of obs*	*1016*
No. of panels	*No. of panels*	*42*	*No. of panels*	*No. of panels*	*42*
Avg. no. of T	*Avg. no. of T*	*24.19*	*Avg. no. of T*	*Avg. no. of T*	*24.19*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. GDP is the GDP growth in the previous quarter. Exchange rate is the rand/dollar exchange rate. P-values in brackets.

'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table B.2: Panel VAR results for push factors – REIT period

	US bond			*Exchange rate*	
		Coefficient			*Coefficient*
FBSI	FBSI$_{t-1}$	**0.16 (0.000) *****	**FBSI**	FBSI$_{t-1}$	**0.12 (0.011) ****
	FBSI$_{t-2}$	0.05 (0.178)		FBSI$_{t-2}$	0.03 (0.495)
	FBSI$_{t-3}$	0.04 (0.289)		FBSI$_{t-3}$	0.01 (0.814)
	FBSI$_{t-4}$	0.01 (0.764)		FBSI$_{t-4}$	-0.02 (0.679)
	FBSI$_{t-5}$	-0.04 (0.306)		FBSI$_{t-5}$	-0.06 (0.126)
	FBSI$_{t-6}$	-0.01 (0.784)		FBSI$_{t-6}$	-0.04 (0.377)
	USBOND$_{t-1}$	-0.005 (0.556)		EXRATE$_{t-1}$	-0.08 (0.154)
	USBOND$_{t-2}$	-0.002 (0.812)		EXRATE$_{t-2}$	-0.03 (0.545)
	USBOND$_{t-3}$	0.001 (0.896)		EXRATE$_{t-3}$	-0.07 (0.109)
	USBOND$_{t-4}$	-0.006 (0.576)		EXRATE$_{t-4}$	0.06 (0.235)
	USBOND$_{t-5}$	-0.004 (0.676)		EXRATE$_{t-5}$	0.07 (0.167)
	USBOND$_{t-6}$	0.0001 (0.992)		EXRATE$_{t-6}$	-0.02 (0.609)
US BOND	FBSI$_{t-1}$	-0.06 (0.770)	**EXRATE**	FBSI$_{t-1}$	0.004 (0.926)
	FBSI$_{t-2}$	-0.03 (0.863)		FBSI$_{t-2}$	0.04 (0.221)
	FBSI$_{t-3}$	-0.20 (0.294)		FBSI$_{t-3}$	0.03 (0.405)
	FBSI$_{t-4}$	0.12 (0.534)		FBSI$_{t-4}$	-0.03 (0.324)
	FBSI$_{t-5}$	-0.17 (0.354)		FBSI$_{t-5}$	0.007 (0.834)
	FBSI$_{t-6}$	0.01 (0.953)		FBSI$_{t-6}$	0.05 (0.137)
	USBOND$_{t-1}$	**1.29 (0.000) *****		EXRATE$_{t-1}$	**0.97 (0.000) *****
	USBOND$_{t-2}$	**-0.25 (0.000)*****		EXRATE$_{t-2}$	**-0.14 (0.003) *****
	USBOND$_{t-3}$	**0.12 (0.025)****		EXRATE$_{t-3}$	**0.63 (0.000) *****
	USBOND$_{t-4}$	**-0.19 (0.000)*****		EXRATE$_{t-4}$	**-0.45 (0.000) *****
	USBOND$_{t-5}$	**0.18 (0.001)*****		EXRATE$_{t-5}$	**0.20 (0.000) *****
	USBOND$_{t-6}$	**-0.07 (0.059)***		EXRATE$_{t-6}$	**-0.21 (0.000) *****

Granger causality test					
Equation	*Equation*	*Chi-square*	*Equation*	*Equation*	*Chi-square*
FBSI	**US BOND**	10.27	**FBSI**	**EXRATE**	**13.81****
US BOND	**FBSI**	2.32	**EXRATE**	**FBSI**	6.72
No. of obs	*No. of obs*	*1016*	*No. of obs*	*No. of obs*	*1016*
No. of panels	*No. of panels*	*42*	*No. of panels*	*No. of panels*	*42*
Avg. no. of T	*Avg. no. of T*	*24.19*	*Avg. no. of T*	*Avg. no. of T*	*24.19*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. GDP is the GDP growth in the previous quarter. Exchange rate is the rand/dollar exchange rate. P-values in brackets.

'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table B.3: Panel VAR results for push factors – REIT period

GS financial conditions			NAREIT return		
		Coefficient			*Coefficient*
FBSI	$FBSI_{t-1}$	**0.14 (0.003) *****	**FBSI**	$FBSI_{t-1}$	**0.19 (0.000) *****
	$FBSI_{t-2}$	0.04 (0.336)		$FBSI_{t-2}$	**0.07 (0.076) ***
	$FBSI_{t-3}$	0.03 (0.512)		$FBSI_{t-3}$	0.06 (0.140)
	$FBSI_{t-4}$	-0.001 (0.981)		$FBSI_{t-4}$	0.03 (0.452)
	$FBSI_{t-5}$	-0.05 (0.200)		$FBSI_{t-5}$	-0.03 (0.480)
	$GSFCI_{t-1}$	**-1.61 (0.062)***		$NAREIT_{t-1}$	0.01 (0.028)
	$GSFCI_{t-2}$	-0.05 (0.627)		$NAREIT_{t-2}$	0.002 (0.742)
	$GSFCI_{t-3}$	-0.04 (0.687)		$NAREIT_{t-3}$	**0.01 (0.019) ****
	$GSFCI_{t-4}$	0.0003 (0.998)		$NAREIT_{t-4}$	**0.01 (0.024) ****
	$GSFCI_{t-5}$	0.12 (0.194)		$NAREIT_{t-5}$	0.007 (0.212)
GSFCI	$FBSI_{t-1}$	0.007 (0.732)	**NAREIT**	$FBSI_{t-1}$	0.10 (0.732)
	$FBSI_{t-2}$	0.02 (0.266)		$FBSI_{t-2}$	**-0.47 (0.083) ***
	$FBSI_{t-3}$	**0.03 (0.072) ***		$FBSI_{t-3}$	-0.17 (0.517)
	$FBSI_{t-4}$	0.001 (0.955)		$FBSI_{t-4}$	0.05 (0.831)
	$FBSI_{t-5}$	-0.004 (0.835)		$FBSI_{t-5}$	0.03 (0.887)
	$GSFCI_{t-1}$	**1.06 (0.000) *****		$NAREIT_{t-1}$	**-0.17 (0.000) *****
	$GSFCI_{t-2}$	**-0.12 (0.016) ****		$NAREIT_{t-2}$	**0.05 (0.085) ***
	$GSFCI_{t-3}$	**0.26 (0.000) *****		$NAREIT_{t-3}$	**0.12 (0.000) *****
	$GSFCI_{t-4}$	**-0.21 (0.001) *****		$NAREIT_{t-4}$	**-0.23 (0.000) *****
	$GSFCI_{t-5}$	**0.21 (0.000) *****		$NAREIT_{t-5}$	**-0.26 (0.000) *****

Granger causality test					
Equation		*Chi-square*	*Equation*		*Chi-square*
FBSI	GSFCI	**11.27***	**FBSI**	NAREIT	**14.49****
GSFCI	FBSI	4.95	**NAREIT**	FBSI	4.24
No. of obs		*1016*	*No. of obs*		*1016*
No. of panels		*42*	*No. of panels*		*42*
Avg. no. of T		*24.19*	*Avg. no. of T*		*24.19*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. P-values in brackets.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table B.4: Panel VAR results for pull factors – REIT period

		Interest rate			*JSE index*
		Coefficient			*Coefficient*
FBSI	$FBSI_{t-1}$	**0.16 (0.001)***	**FBSI**	$FBSI_{t-1}$	**0.14 (0.002)***
	$FBSI_{t-2}$	0.04 (0.307)		$FBSI_{t-2}$	0.03 (0.425)
	$FBSI_{t-3}$	0.04 (0.404)		$FBSI_{t-3}$	0.02 (0.608)
	$FBSI_{t-4}$	0.003 (0.936)		$FBSI_{t-4}$	-0.01 (0.780)
	$FBSI_{t-5}$	-0.05 (0.178)		$FBSI_{t-5}$	-0.05 (0.199)
	$INTRATE_{t-1}$	**-0.13 (0.097)***		JSE_{t-1}	-1.42 (0.235)
	$INTRATE_{t-2}$	0.16 (0.117)		JSE_{t-2}	-0.31 (0.678)
	$INTRATE_{t-3}$	**-0.23 (0.030)****		JSE_{t-3}	-0.80 (0.329)
	$INTRATE_{t-4}$	**0.23 (0.041)****		JSE_{t-4}	0.67 (0.373)
	$INTRATE_{t-5}$	-0.13 (0.231)		JSE_{t-5}	-0.13 (0.860)
INT RATE	$FBSI_{t-1}$	**0.03 (0.079)***	**JSE index**	$FBSI_{t-1}$	-0.001 (0.677)
	$FBSI_{t-2}$	-0.01 (0.476)		$FBSI_{t-2}$	-0.001 (0.721)
	$FBSI_{t-3}$	0.003 (0.868)		$FBSI_{t-3}$	-0.002 (0.407)
	$FBSI_{t-4}$	-0.01 (0.518)		$FBSI_{t-4}$	-0.002 (0.317)
	$FBSI_{t-5}$	0.009 (0.563)		$FBSI_{t-5}$	0.001 (0.395)
	$INTRATE_{t-1}$	**1.03 (0.000)***		JSE_{t-1}	**0.49 (0.000) ***
	$INTRATE_{t-2}$	**0.06 (0.000)***		JSE_{t-2}	**0.25 (0.000) ***
	$INTRATE_{t-3}$	**-0.06 (0.000)***		JSE_{t-3}	**-0.08 (0.035) ***
	$INTRATE_{t-4}$	**-0.07 (0.000)***		JSE_{t-4}	**-0.07 (0.035) ***
	$INTRATE_{t-5}$	**0.08 (0.000)***		JSE_{t-5}	**0.13 (0.001) ***

		Granger causality test			
Equation		*Chi-square*	*Equation*		*Chi-square*
FBSI	INTRATE	**15.57****	**FBSI**	JSE	**11.20***
INTRATE	FBSI	6.59	**JSE**	FBSI	3.99
No. of obs		*1016*	*No. of obs*		*1016*
No. of panels		*42*	*No. of panels*		*42*
Avg. no. of T		*24.19*	*Avg. no. of T*		*24.19*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. JSE index is the JSE All Share Index. P-values in brackets.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table B.5: Panel VAR results for push factors – REIT period

BCI USA			BCI EU		
		Coefficient			*Coefficient*
FBSI	FBSI$_{t-1}$	**0.18 (0.000)***	**FBSI**	FBSI$_{t-1}$	**0.18 (0.000)***
	FBSI$_{t-2}$	**0.08 (0.050)**		FBSI$_{t-2}$	**0.08 (0.051)**
	FBSI$_{t-3}$	0.06 (0.174)		FBSI$_{t-3}$	0.06 (0.153)
	FBSI$_{t-4}$	0.02 (0.673)		FBSI$_{t-4}$	0.02 (0.611)
	FBSI$_{t-5}$	-0.03 (0.484)		FBSI$_{t-5}$	-0.02 (0.540)
	BSIUSA$_{t-1}$	**0.06 (0.028)**		**BSIEU$_{t-1}$**	**0.12 (0.052)***
	BCIUSA$_{t-2}$	**-0.16 (0.017)**		**BCIEU$_{t-2}$**	**-0.27 (0.037)**
	BCIUSA$_{t-3}$	**0.16 (0.068)***		**BCIEU$_{t-3}$**	**0.28 (0.078)***
	BCIUSA$_{t-4}$	-0.03 (0.712)		BCIEU$_{t-4}$	-0.04 (0.771)
	BCIUSA$_{t-5}$	-0.03 (0.582)		BCIEU$_{t-5}$	-0.11 (0.356)
BCIUSA	FBSI$_{t-1}$	0.01 (0.840)	**BSIEU**	FBSI$_{t-1}$	-0.02 (0.402)
	FBSI$_{t-2}$	0.01 (0.823)		FBSI$_{t-2}$	-0.02 (0.202)
	FBSI$_{t-3}$	0.07 (0.107)		FBSI$_{t-3}$	0.02 (0.317)
	FBSI$_{t-4}$	0.01 (0.792)		FBSI$_{t-4}$	-0.02 (0.175)
	FBSI$_{t-5}$	-0.02 (0.632)		FBSI$_{t-5}$	0.003 (0.846)
	BSIUSA$_{t-1}$	**2.35 (0.000)***		BSIEU$_{t-1}$	**2.09 (0.000) ***
	BCIUSA$_{t-2}$	**-2.36 (0.000)***		BCIEU$_{t-2}$	**-1.88 (0.000) ***
	BCIUSA$_{t-3}$	**1.53 (0.000)***		BCIEU$_{t-3}$	**1.13 (0.000) ***
	BCIUSA$_{t-4}$	**0.96 (0.000)***		BCIEU$_{t-4}$	**-0.89 (0.000) ***
	BCIUSA$_{t-5}$	**0.60 (0.000)***		BCIEU$_{t-5}$	**0.92 (0.000) ***
Granger causality test					
Equation		*Chi-square*	*Equation*		*Chi-square*
FBSI	BCIUSA	**13.01**	**FBSI**	BSIEU	**11.91***
BSIUSA	FBSI	3.39	**BSIEU**	FBSI	7.48
No. of obs		*1016*	*No. of obs*		*1016*
No. of panels		*42*	*No. of panels*		*42*
Avg. no. of T		*24.19*	*Avg. no. of T*		*24.19*

Note: This table presents the Panel VAR results for the sample of SA REITs from January 2010 to December 2016. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. JSE index is the JSE All Share Index. P-values in brackets.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table B.6: Random effects regression results (full sample)

Pull factors			Push factors		
	Coefficient	*P-value*		*Coefficient*	*P-value*
Cap rate	**0.09*****	**0.002**	Exchange rate	-0.01	0.485
Interest rate	-0.02	0.566	GS fin conditions	-0.09	0.171
SA bond	-0.02	0.527	NAREIT	-0.004	0.224
SA bond rating	0.07	0.239	US corp. bond	-0.002	0.461
JSE index	0.22	0.335	US business conf.	0.002	0.607
GDP growth	0.01	0.856	EU bus. conf.	0.001	0.774
IMPF	-0.01	0.912	Leverage	-0.07	0.516
Leverage	-0.08	0.459	Size	0.0002	0.989
Size	0.01	0.887			
Constant	-2.80	0.291	Constant	9.40	0.157
N	*2268*		*N*	*2266*	
No. of groups	*47*		*No. of groups*	*47*	
Avg. obs	*48.3*		*Avg. obs*	*24.82*	
Wald Chi²	*26.82****		*Wald Chi²*	*62.00****	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from January 2010 to December 2016, separated by the South African exposure of firms. FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price on a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence is based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table B.7: Random effects regression results separated by period

	Pre-REIT period		REIT period	
	Coefficient	*P-value*	*Coefficient*	*P-value*
Pull factors				
Cap rate	0.05	0.407	**0.10***	**0.002**
Interest rate	0.09	0.387	-0.11	0.066
SA bond	0.07	0.209	-0.08	0.057
SA bond rating	0.06	0.547	0.04	0.590
JSE index	1.13	0.114	**1.17**	**0.012**
GDP growth	0.06	0.485	-0.05	0.271
IMPF			0.07	0.410
Leverage	**-0.30***	**0.091**	0.12	0.398
Size	0.05	0.143	-0.001	0.972
Constant	**-14.31***	**0.094**	**-11.74**	**0.017**
N	844		1424	
No. of groups	33		47	
Avg. obs	25.6		33.74	
Wald Chi²	12.61		33.74***	
Push factors				
Exchange rate	-0.13	0.291	-0.03	0.224
GS fin conditions	0.08	0.606	**-0.14**	**0.084***
NAREIT	0.002	0.704	-0.007	0.121
US corp. bond	0.007	0.392	-0.002	0.683
US business conf.	**0.01***	**0.047**	**-0.02**	**0.015**
EU bus. conf.	-0.009	0.241	**0.04***	**0.006**
Leverage	-0.24	0.161	0.11	0.423
Size	0.05	0.133	-0.01	0.749
Constant	-8.96	0.589	**14.65***	**0.070**
N	842		1424	
No. of groups	33		47	
Avg. obs	25.5		30.30	
Wald Chi²	13.65		30.14***	

Note: This table presents the Prais-Winsten regression results (with panel-corrected standard errors) for the sample of SA REITs from January 2010 to December 2016, separated for the REIT (May 2013 to December 2016) and pre-REIT period (January 2010 to April 2013). FBSI is the buy-sell index, in line with Kumar and Lee (2006), for foreign investors in SA REITs. Cap rate is the property-specific cap rate. Interest rate is the SA prime interest rate. JSE index is the JSE All Share Index. GDP growth is the GDP growth in the previous quarter. SA bond is the price of a 10-year SA government bond. Exchange rate is the rand/dollar exchange rate. GSFCI is the Goldman Sachs Financial Conditions Index, measuring financial conditions in the US based on the US T-bond yield, S&P500 index, federal funds rate, trade-weighted dollar and investment-grade credit spread. NAREIT is the return on the NAREIT all equity REIT index. US corporate bond represents the BUHY index. US and EU business confidence is based on the monthly OECD survey. Leverage is a firm's leverage, defined as total liabilities divided by total assets. Size is the log of the market capitalisation for a particular REIT. IMPF is coded 1 for December 2015, 0 otherwise.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Appendix C

C.1: Chapter 3 tables variables	
Variables	**Portfolios**
Table 3.4 – Panel A	
Portfolio variance	US REIT
	US-SA REIT
Table 3.4 – Panel A	
Sharpe ratio	US REIT
	US-SA REIT
Table 3.5 – Panel A	
Portfolio variance	US REIT
	US-SA REIT
Table 3.5 – Panel B	
Portfolio variance	US REIT
	US-SA REITSA
	US-SA REITFOR
Table 3.6 – Panel A	
Sharpe ratio	US REIT
	US-SA REIT
Table 3.6 – Panel B	
Sharpe ratio	US REIT
	US-SA REITSA
	US-SA REITFOR
Table 3.7 – Panel A	
Sharpe ratio	US REIT
	US-SA REIT
Table 3.7 – Panel B	
Sharpe ratio	US REIT
	US-SA REITSA
	US-SA REITFOR

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C.2: Chapter 4 tables variables	
Table 4.3	
Dependant variable	**Independent variables**
FBSI	Cap rate
	Interest rate
	SA bond
	SA bond rating
	JSE index
	GDP growth
	Impact factor for Q4/2015 to Q1/2016
	Leverage
	Size
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Foreign exposure
Table 4.4	
Dependant variable	**Independent variables**
FBSI	Cap rate
	Interest rate
	SA bond
	SA bond rating
	JSE index
	GDP growth
	Impact factor for Q4/2015 to Q1/2016
	Leverage
	Size
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Foreign exposure

Table 4.5	
Dependant variable	**Independent variables**
FBSI	Cap rate
	Interest rate
	SA bond
	SA bond rating
	JSE index
	GDP growth
	Impact factor for Q4/2015 to Q1/2016
	Leverage
	Size
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Foreign exposure

Table 4.6	
Dependant variable	**Independent variables**
FBSI	Cap rate
	Interest rate
	SA bond
	SA bond rating
	JSE index
	GDP growth
	Impact factor for Q4/2015 to Q1/2016
	Leverage
	Size
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Foreign exposure

C.3: Chapter 5 tables variables	
Table 5.3	
Dependant variable	**Independent variables**
Log of turnover	BSI
	Return
	Leverage
	Market-to-book value
	LogFFO (funds from operations)
	logMCAP (market capitalisation)
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Trust/company REIT binary variable
	JSE All Share Index return
	Property index (SAPY) return
	Interest rate
	Change in GDP
	Impact factor for Q4/2015 to Q1/2016
Table 5.4	
Dependant variable	**Independent variables**
Log of trading volume	BSI
	Return
	Leverage
	Market-to-book value
	LogFFO (funds from operations)
	logMCAP (market capitalisation)
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Trust/company REIT binary variable
	JSE All Share Index return
	Property index (SAPY) return
	Interest rate
	Change in GDP
	Impact factor for Q4/2015 to Q1/2016

Table 5.5	
Dependant variable	**Independent variables**
Bid-ask spread	BSI
	Return
	Leverage
	Market-to-book value
	LogFFO (funds from operations)
	logMCAP (market capitalisation)
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Trust/company REIT binary variable
	JSE All Share Index return
	Property index (SAPY) return
	Interest rate
	Change in GDP
	Impact factor for Q4/2015 to Q1/2016

Table 5.6	
Dependant variable	**Independent variables**
Log of Amihud (2002) illiquidity	BSI
	Return
	Leverage
	Market-to-book value
	LogFFO (funds from operations)
	logMCAP (market capitalisation)
	Office/industrial binary variable
	Retail binary variable
	Other property type binary variable
	Dual binary variable
	Trust/company REIT binary variable
	JSE All Share Index return
	Property index (SAPY) return
	Interest rate
	Change in GDP
	Impact factor for Q4/2015 to Q1/2016

Table C.4: Prais-Winsten regression robustness results for turnover

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.09	1.33	**0.12**	**2.12****
RETURN	-0.27	-0.72	**1.27**	**3.74*****
LEV	**1.21**	**3.56*****	**1.25**	**3.39*****
MB	-0.04	-1.44	**-0.30**	**-3.74*****
logFFO	0.004	0.54	0.12	1.07
logMCAP	**0.06**	**1.89***	**0.22**	**3.08*****
OFFIND	0.37	1.00	**0.74**	**5.54*****
RET	-0.14	-1.20	**-0.16**	**-1.72***
OTHER	**0.42**	**2.22****	**0.74**	**4.18*****
DUAL	**-0.63**	**-2.78*****	**-0.57**	**-3.80*****
TRUST	0.26	1.61	**0.15**	**1.65***
JSERET	0.78	1.03	-1.53	-1.06
PROPRET	-0.30	-0.34	-0.06	-0.04
INT	6.47	0.57	-19.37	-0.59
GDPChange	-0.05	-1.29	-0.03	-0.90
IMPF			0.13	0.41
Constant	**-4.10**	**-3.75****	-4.42	-1.30
N	*196*		*252*	
No. of groups	*23*		*24*	
Avg. obs	*8.52*		*10.5*	
R²	*0.75*		*0.84*	
Wald Chi²	*66.97****		*268.82****	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logTURN. BSI is the foreign investor buy-sell index, defined as difference between purchase and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table C.5: Prais-Winsten regression robustness results for trading volume

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.14	1.48	**0.20**	**2.28****
RETURN	0.07	0.15	**1.81**	**3.64*****
LEV	**2.40**	**4.66*****	**1.60**	**2.87*****
MB	**-0.11**	**-1.94***	**-0.35**	**-3.23*****
logFFO	**0.02**	**1.76***	0.15	0.95
logMCAP	**0.88**	**10.11*****	**1.22**	**11.16*****
OFFIND	0.23	0.41	**1.15**	**6.27*****
RET	**-0.46**	**-2.96*****	**-0.49**	**-2.40****
OTHER	**0.64**	**2.92*****	**0.99**	**5.36*****
DUAL	**-1.86**	**-4.06*****	**-1.06**	**-4.06*****
TRUST	0.23	1.39	0.03	0.18
JSERET	0.83	1.05	-2.14	-1.19
PROPRET	-0.27	-0.27	-0.67	-0.40
INT	5.00	0.36	-26.18	-0.67
GDPChange	-0.07	-1.58	-0.06	-1.37
IMPF			-0.30	-0.76
Constant	**-5.25**	**-3.54*****	0.18	0.47
N	196		252	
No. of groups	23		24	
Avg. obs	8.52		10.5	
R²	0.87		0.83	
Wald Chi²	1055.95***		2839.07***	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logRVOL. BSI is the foreign investor buy-sell index, defined as difference between purchases and sales of foreign investors divided by the sum of foreign purchases and sales. logRVOL is the log of the quarterly average closing price multiplied by the quarterly share trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

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Table C.6: Prais-Winsten regression robustness results for bid-ask-spread

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.02	0.36	0.002	0.07
RETURN	**0.31**	**2.00****	0.08	0.69
LEV	0.15	1.07	0.02	0.12
MB	0.01	0.68	-0.04	-1.12
logFFO	0.001	0.32	-0.05	-1.13
logMCAP	0.02	0.84	-0.01	-0.59
OFFIND	0.19	1.33	**-0.10**	**-2.39****
RET	0.04	1.38	0.11	1.27
OTHER	0.39	2.35	**-0.24**	**-2.94*****
DUAL	**-0.31**	**-2.04****	**0.25**	**3.29*****
TRUST	**0.07**	**1.74***	-0.19	-1.35
JSERET	**0.83**	**-2.79*****	-0.15	-0.32
PROPRET	-0.37	-1.05	-0.42	-0.82
INT	**-15.06**	**-3.13*****	6.56	0.54
GDPChange	**0.03**	**1.87***	0.005	0.46
IMPF			0.08	0.70
Constant	**0.99**	**1.98****	0.25	0.19
N	*196*		*252*	
No. of groups	*23*		*24*	
Avg. obs	*8.52*		*10.5*	
R²	*0.15*		*0.16*	
Wald Chi²	*67.71****		*44.95****	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for BASPR. BASPR is the bid-ask spread, defined as difference between the quarterly bid and ask prices for individual firms. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table C.7: Prais-Winsten regression results for Amihud (2002) illiquidity

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	-0.09	-1.39	0.02	0.21
RETURN	**2.07**	**4.11***	-0.15	-0.43
LEV	0.05	0.19	0.06	0.18
MB	**-0.12**	**-2.49***	**-0.15**	**-1.99***
logFFO	0.008	1.33	0.05	0.51
logMCAP	**-0.17**	**-4.68***	**-0.29**	**-3.66***
OFFIND	**-0.48**	**-2.57***	**-0.36**	**-3.75***
RET	-0.13	-1.21	0.21	1.31
OTHER	**-0.44**	**-2.35***	-0.04	-0.24
DUAL	**0.81**	**4.67***	**0.32**	**3.86***
TRUST	**-0.25**	**-2.23***	0.03	0.79
JSERET	**-1.16**	**-3.51***	1.04	0.62
PROPRET	-0.28	-0.48	-0.25	-0.14
INT	-7.75	-1.14	4.83	0.11
GDPChange	**0.02**	**0.88**	0.03	0.70
IMPF			0.003	0.01
Constant	**-2.14**	**-3.46***	-2.93	-0.64
N	196		252	
No. of groups	23		24	
Avg. obs	8.52		10.5	
R²	0.90		0.73	
Wald Chi²	3715.58***		94.24***	

Note: This table presents the results for the Prais-Winsten regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logILLIQ. logILLIQ is the log of the Amihud (2002) illiquidity measure, defined as absolute quarterly firm-level return divided by quarterly trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. OFFIND, RET and OTH are binary variables coded 1 for office and industrial REITs, retail REITs or other specialised REITs respectively. Diversified REITs are the reference group. DUAL is a binary variable coded 1 for REITs with more than one share class. TRUST is a binary variable coded 1 for trust REITs and 0 for company REITs. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.

*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table C.8: Regression results for turnover

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.005	1.09	0.006	0.96
RETURN	**-0.066**	**-2.11****	**0.16**	**4.70*****
LEV	0.26	1.30	0.008	0.802
MB	0.003	1.05	0.0002	0.979
logFFO	-0.0001	-0.04	**0.023**	**1.70***
logMCAP	0.003	0.96	0.003	0.48
JSERET	1.05	1.61	-0.12	-0.74
PROPRET	-0.03	-0.38	-0.71	-0.44
INT	1.12	1.22	-0.14	-0.04
GDPChange	-0.004	-1.39	-0.002	-0.57
IMPF			0.001	0.04
Constant	-0.064	-0.69	-0.27	-0.72
N	266		301	
No. of groups	30		31	
Avg. obs	8.9		9.7	
R^2	0.079		0.13	
Wald Chi^2	13.63		39.76***	

Note: This table presents the results for the random effects regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logTURN. BSI is the foreign investor buy-sell index, defined as difference between purchase and sales of foreign investors divided by the sum of foreign purchases and sales. logTURN is the log of the quarterly share turnover, defined as trading volume of shares divided by outstanding shares. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.

Table C.9: Regression results for trading volume

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	0.73	0.22	**18.52**	**1.93****
RETURN	-11.52	-0.55	**107.71**	**2.11****
LEV	-6.03	-0.21	-21.85	-0.28
MB	-2.50	-0.74	13.06	0.68
logFFO	-0.54	-0.45	26.33	0.98
logMCAP	**32.91**	**6.68*****	**119.80**	**6.99*****
JSERET	39.06	0.98	156.20	0.67
PROPRET	48.09	1.03	-249.75	-1.07
INT	64.59	0.10	5675.64	1.02
GDPChange	**-4.39**	**-2.01****	-0.17	-0.03
IMPF			-21.21	-0.40
Constant	**-185.82**	**-2.23*****	**-1799.52**	**-2.77*****
N	*266*		*301*	
No. of groups	*30*		*31*	
Avg. obs	*8.9*		*9.7*	
R^2	*0.22*		*0.55*	
Wald Chi^2	*109.32****		*120.78****	

Note: This table presents the results for the random effects regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logRVOL. BSI is the foreign investor buy-sell index, defined as difference between purchases and sales of foreign investors divided by the sum of foreign purchases and sales. logRVOL is the log of the quarterly average closing price multiplied by the quarterly share trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table C.10: Regression results for bid-ask spread

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	-0.005	-0.16	0.001	0.05
RETURN	-0.19	-1.14	-0.15	-1.01
LEV	0.02	0.18	-0.15	-1.11
MB	-0.009	-0.57	0.04	1.03
logFFO	-0.001	-0.09	0.02	0.26
logMCAP	-0.02	-1.04	0.04	1.40
JSERET	0.56	1.54	0.33	0.48
PROPRET	0.32	0.79	0.41	0.60
INT	7.28	1.48	-4.34	-0.27
GDPChange	-0.02	-0.90	-0.001	-0.06
IMPF			-0.09	-0.64
Constant	-0.45	-0.95	-0.21	-0.12
N	266		301	
No. of groups	30		31	
Avg. obs	8.9		9.7	
R^2	0.03		0.10	
Wald Chi^2	7.78		22.39**	

Note: This table presents the results for the random effects regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for BASPR. BASPR is the bid-ask spread, defined as difference between the quarterly bid and ask prices for individual firms. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*

Table C.11: Regression results for Amihud (2002) illiquidity

	Pre-REIT period		REIT period	
	Coefficient	*Z-value*	*Coefficient*	*Z-value*
BSI	**-0.02**	**-1.66***	-0.017	-1.32
RETURN	**0.45**	**6.05*****	-0.09	-1.21
LEV	0.05	1.54	-0.01	-0.22
MB	-0.01	-1.61	0.004	0.24
logFFO	-0.002	-0.04	0.0002	0.01
logMCAP	**-0.01**	**-1.98****	-0.01	-1.18
JSERET	-0.12	-0.77	-0.002	-0.01
PROPRET	**-0.38**	**-2.15****	0.24	0.63
INT	2.50	2.27	1.23	0.14
GDPChange	-0.005	-0.60	-0.002	-0.23
IMPF			-0.02	-0.23
Constant	-0.100	-0.47	0.02	0.02
N	266		301	
No. of groups	30		31	
Avg. obs	8.9		9.7	
R^2	0.19		0.04	
Wald Chi^2	61.77***		10.78	

Note: This table presents the results for the random effects regression (panel-specific AR, autocorrelation is calculated based on the autocorrelation of residuals, heteroskedastic panels) for logILLIQ. logILLIQ is the log of the Amihud (2002) illiquidity measure, defined as absolute quarterly firm-level return divided by quarterly trading volume. RETURN is the quarterly return for a REIT. LEV is the semi-annual leverage, defined as total liabilities divided by total assets. logMCAP is the log of the quarterly market capitalisation, defined as outstanding shares multiplied by quarterly closing price. MB is the quarterly market-to-book value, defined as market capitalisation divided by book equity. logFFO is the log of the annual funds from operations, defined as earnings before tax, depreciation and amortisation (EBITDA) less the sum of tax, interest and depreciation. JSERET is the quarterly return on the JSE All Share Index. PROPRET is the quarterly return on the South African Listed Property Index (SAPY). INT is the quarterly prime interest rate. GDPChange is the quarterly change in GDP. IMPF is a binary variable coded 1 for Q4/2015 and Q1/2016.
*'***', '**' and '*' denote significance at the 1%, 5% and 10% levels respectively.*