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Real Estate Investment Trust Performance, Efficiency And Internationalization

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REAL ESTATE INVESTMENT TRUST PERFORMANCE, EFFICIENCY AND INTERNATIONALIZATION

by

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ABSTRACT

Real Estate Investment Trusts (REITs) are firms that own and manage income producing commercial real estate for the benefit of their shareholders. The three studies in this dissertation explore topics relating to best practices of REIT management and portfolio composition. Managers and investors can use the findings herein to aide in analyzing a REIT's performance and determining optimal investment policies. Utilizing REIT from SNL Real Estate and CRSP, the first two studies examine the role of international diversification upon performance, technical efficiency, and scale efficiency. The third study utilizes REIT data to examine technical and scale efficiency over a 21 year window and investigates characteristics of the REITs that affect the levels of efficiency.

CHAPTER 1 – PROFITABILITY OF REAL ESTATE INVESTMENT TRUST INTERNATIONALIZATION

Real Estate Investment Trusts (REITs) in the United States have grown extremely fast in terms of assets and market capitalization since the early 1990's. As with many industries, U.S. REITs began acquiring foreign properties as their size grew and they needed to seek new investment opportunities. This paper investigates the role of holding foreign assets upon the total return of U.S. based REITs from 1995 through 2010. We find that holding foreign properties in associated with negative relative performance when risk, size, and other common market factors are controlled for. Interestingly, the source of the negative performance is not related to the two largest areas for foreign investment, Europe and Canada. Instead, the negative performance is

detected when a REIT begins acquiring properties in other global regions such as Latin America and Asia/Pacific. This paper has broad ramifications for REIT investors and managers alike.

CHAPTER 2 – EFFECT OF INTERNATIONAL DIVERSIFICATION BY U.S. REAL ESTATE INVESTMENT TRUSTS ON COST EFFICIENCY AND SCALE

As U.S. based Real Estate Investment Trusts (REITs) have increased their degree and type of holdings overseas, there has yet to a study that has investigated such activity on the REIT's measures of cost efficiency and scale. Using data from 2010, Data Envelopment Analysis techniques are used to estimate measures of technical and scale efficiency that are then regressed against measures of international diversification and other controls to measure the impact of this global expansion. It is determined that REITs with foreign holdings are significantly larger than domestic REITs and are correspondingly 96% of foreign investing REITs are operating at decreasing returns to scale. Further almost every measure of foreign diversification is negative and significantly impacting scale efficiency. However, simply being a REIT with foreign holdings did positively and significantly associate with higher levels of technical efficiencies. Thus REITs that expand globally may have some advantages in operational efficiency but lose considerably in terms of scale efficiency by increasing their size as they move cross-border.

CHAPTER 3 – THE EVOLUTION OF TECHNICAL EFFICIENCY AND ECONOMIES OF SCALE OF REAL ESTATE INVESTMENT TRUSTS

Data Envelopment Analysis (DEA) is used to measure technical and scale efficiency of 21 years of Real Estate Investment Trust (REIT) data. This is the longest, most complete dataset ever analyzed in the REIT efficiency literature and as such makes a significant contribution as prior efficiency studies' data windows end in the early 2000's at latest. Overall, REITs appear to continue to operate at decreasing returns to scale despite rapid growth in total assets. Further, there is some evidence of improving technical efficiency overtime; however the finding is not strong. In summation, it appears that REITs have not improved on a relative basis despite the rapid growth, a finding that suggests a potential of a high degree of firm competition in the REIT industry. Finally, firm characteristics such as debt utilization, management and advisory structure, and property type specialization are tested for their impact upon technical and scale efficiency.

Dedicated to my grandfather, Dr. Walter Harris.

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CHAPTER ONE: PROFITABILITY OF REAL ESTATE INVESTMENT TRUST INTERNATIONALIZATION

I. Introduction

Publically traded Real Estate Investment Trusts (REITs) have become popular vehicles to make investments into commercial real estate assets for individual investors and institutions alike since the early 1990s. To date, market capitalization of publically traded equity REITs stands over $400 billion according to the National Association of Real Estate Investment Trusts. Given the increasing popularity of REITs as a mainstream investment, questions of what affects REIT performance are highly critical. This study seeks to fill a major gap in the literature by examining the effect of REITs internationalizing by purchasing properties outside of the United States.

Firms, such as REITs, may choose to expand internationally to stay competitive, grow profits, and ultimately increase shareholder wealth. Depending on firm and industry specific factors, it is rational to believe that expanding overseas can be either value enhancing or value destroying for a particular firm. Any firm has the explicit choice, subject to rational constraints, to invest or diversify operations overseas. Thus managers should only undertake international operations when there is an expectation for value enhancing benefits. I utilize a unique dataset of Real Estate Investment Trusts (REITs) based in the U.S. to determine if the decision to go overseas enhanced returns to shareholders or not. There is no a priori reason that a REIT must invest internationally to stay competitive with its peers. Nor is there an immediate rationale that suggests REITs will make higher or lower returns if they diversify internationally. Interestingly,

I find that REITs making cross-border property investments produce lower total returns to shareholders than do REITs who invest only in their home country. The obvious question one would ask is why does international investment decrease total return for U.S. based REITs when such activity is a choice and not a requirement? To answer this one needs to consider both the economic and strategic significance of property investment decisions by REIT managers. The conclusion of such analysis has important economic and strategic implications for REIT managers and investors as well as the broader business sector.

Indirect investing in real estate via investment products such as publically traded Real Estate Investment Trusts (REITs) has been a steadily growing trend since the law has allowed such vehicles to exist. Further, tax law changes during the 1990s in the United States have allowed REITs to act more as true businesses than as mere property conduits causing investments in REITs to increase even faster (Chan et. al., 2003). Many firms in all industries have steadily increased their international business ventures and investments as a means to increase revenues. According to Dastidar (2009), a firm listed in the Dow Jones Industrial Average receives 40% of its annual revenues, on average, from outside of the United States. Not surprisingly, the data I analyze herein shows a growing trend of international investments by U.S. based REITs from 1995 through 2010.

One may challenge the notion that total return to shareholders is the relevant benchmark to measure the performance of the decisions made by REITs with regards to international investing. It could be argued that REITs who invest overseas are a self-selected group whose underlying firm characteristics dictate the lower performance observed. Findings of Dastidar

(2009) show this may be the case for firms diversifying internationally as does Campa and Kedia (2002) show this may be the case for firms diversifying across industries. Gande, Schenzler, and Senbet (2009) finds increasing firm value, as measured by Tobin's q, with increasing percentages of foreign sales. These studies utilize business segment level data; my study uses property level data thus assumes no necessary difference in firm operations other than location. These endogeneity issues will be further addressed more explicitly in the methodology section.

While acknowledging the potential endogeneity issues, I put forth that total return to shareholders is a relevant metric to measure performance of REITs due to constraints imposed by U.S. tax law. A firm electing REIT status for U.S. taxation gains the benefit of allowing all profits to pass through the REIT directly to the shareholders untaxed. Hence U.S. REITs are not subject to the corporate income tax and thus there is no "double taxation" of dividends experienced by the majority of firms and industries in the United States. In exchange for this benefit, REITs are forced to follow explicit guidelines established by Congress. One such guideline is that at least 90% of net income must be paid to shareholders annually. This effectively curtails the potential to retain earnings for future investment or accrue large cash surpluses. Thus REITs are more dependent on the ability to raise capital via borrowing and secondary equity offerings to grow than most other firms. The cost and ease of such capital raising is directly related to total returns to shareholders in prior periods (Chan et. al., 2003). Thus I contend that the personal success and profit of REIT managers is more explicitly tied to total return than other firms in different industries, hence total return is a more appropriate performance benchmark for REITs than many other types of firms.

The remainder of this chapter is organized as follows. Section II reviews the literature and theoretical background; section III describes the characteristics and summary statistics of REIT internationalization; section IV outlines the theories and hypotheses to be tested herein given what is observed in the summary statistics; section V discuses the data and empirical methodology used; section VI reports the results of the empirical analysis; and section VII offers discussion of the results and concludes the chapter.

II. Literature Review

The bulk of the literature addressing international real estate investing does so from the perspective of an investor allocating across geographies to obtain optimal portfolio diversification; not directly investigating the question of firm managers doing such within a REIT structure. Wilson and Zurbruegg (2003) state that investigations into the benefits of international real estate diversification have not reached any firm conclusions. They show that a divergent literature has emerged with studies concluding that international real estate diversification is beneficial while others believe the added benefits do not outweigh the added costs and risks. Interestingly, many of the studies cited in this paper are researching this question using stock returns of property companies around the globe to construct "globally diversified" portfolios. This line of research does not answer the fundamental question of whether Real Estate Investment Trusts (REITs) are successful when they directly engage in cross-border investing activities as this paper is testing.

One study that does investigate the performance of cross-border investing public real estate companies is Eichholtz, et. al., (2001). This study compares the total stock returns of 18 international property companies against a calculated index of domestic property companies total stock returns designed to mimic the holdings of the international firms. The study concludes that investors would have been better off investing in the stocks of the domestic property firms directly than owning the stocks of the international property firms for the window 1984 through 1995. Eichholtz, et. al. (2011) compares the performance of international property companies versus local property companies over a longer time span. While the key intent of this study is to measure the effect of the level of economic integration and market transparency in the target countries upon the performance of international owners; their conclusions strongly indicate the potential challenges in REITs making cross-border acquisitions. The key finding of my study supports the conclusions of Eichholtz, et. al. (2001) and extends their findings in several key areas. First, this study compares cross-border investing REITs versus domestic only REITs in the same country, traded on the same public exchanges. Hence the finding can be more directly used by investors making strategic asset allocations to achieve the efficient mean-variance portfolio by including domestic and international real estate asset classes by adding such to a risky portfolio (Copeland et. al., 2005). This does require an assumption that all firms under study are investable with relatively equal transaction costs. Secondly, REIT managers and investors are more likely to benchmark peer performance against other REITs and investment opportunities within their home country; thus my paper's finding is one that REIT managers could have been aware of as they made foreign acquisition decisions year after year. Third, this paper uses a

larger dataset and investigation window (1995 through 2010) which occurs in a substantially different global business environment (Dunning, 2001).

While the finding presented herein and the finding of Eichholtz, et. al. (2001) are both of negative performance as a result of cross-border investments, it is rational, if not necessary, to assume that REIT managers made said cross-border investments with positive return expectations or at least mitigation of other sources of negative firm performance (Dastidar, 2009). There is evidence from the real estate literature that both demonstrate the potential for gains via cross-border investments and potential costs and pitfalls that may explain the negative performance found herein.

Making cross-border investments entails managing several risks not present in domestic property investing such as currency, legal, and political risks (Geurts and Jaffe, 1996). Managing these risks must entail higher costs relative to domestic operations; therefore, I postulate that for a REIT to be successful in cross-border investments it must have a sustainable competitive advantage arising from firm resources meeting the conditions of Barney (1991) as stated above. Clearly, a REIT that chooses to acquire in foreign markets must allocate resources to manage and monitor such assets; whether or not the costs of such resources outweighs the benefits is one potential conclusion from the findings to be presented herein.

One distinct observation to be detailed in the next section is that REITs that choose to invest internationally are systematically much larger in terms of total assets and thus issues of economies of scale and technical efficiency may be present. Anderson, et. al. (2002); Lewis, et. al. (2003); and Ambrose, et. al. (2005) all find increasing returns to scale in the REIT industry as

well as state that management style can positively impact technical efficiency and other performance/cost metrics[1]. One possible motivation for a REIT to seek cross-border investments is to achieve maximum cost efficiencies. Cheng and Roulac (2007) conclude a large number of markets are needed to achieve geographic diversification within a real estate portfolio; this when taken with the findings on economies of scale, leads to possible need to look overseas for more investment opportunities to achieve geographic diversification and/or find opportunities with the necessary return and growth prospects to justify investment. Other ownership advantages may work for certain REITs due to their skill in business operations; Benjamin, et. al. (2006) finds that branded apartment complexes received 8% higher rents without sacrificing occupancy versus non-branded properties after controlling for property characteristics. This gives possible guidance as to why economies of scale may be present in the REIT industry and explains a method by which firms with brand power may be able exploit opportunities in foreign countries. Additionally, Brady and Conlin (2004) find that REIT-owned properties outperform non REIT-owned properties; however, this relationship may be attributable to REITs selecting better properties to purchase as opposed to their brand or management ability leading to the gains. Either way, this finding along with the other studies mentioned above give strong indication that the U.S. REIT industry may have or believe they have potential advantages to exploit in overseas markets.

The subject of geographic diversification has also been studied in both the domestic and international context. Mueller (1993) shows using U.S. physically and economic defined

[1] The finding of scale economies has been challenged by several later studies as discussed in Chapters 2 and 3. The reference to findings of economies of scale is to give rational explanations of why REIT managers may have been motivated to make foreign acquisitions.

geographic regions, diversification across both can lead to positive gains in the mean-variance framework of efficient portfolios. It is an obvious extension that the global markets offer any investor or firm greater potential for physical and economic region diversification. Moving global, Worzala and Sirmans (2003) presents a review of the literature regarding investing in international real estate stocks; they conclude that almost all studies reviewed showed international real estate diversification gains are possible if factors such as currency risk are controlled for or hedged. The conclusion is a positive inference to what may be experienced with direct cross-border property investment. Hastings and Nordby (2007) conclude that adding global property exposure to a domestic real estate portfolio can give increased diversification benefits. Idzorek, et. al. (2007) goes further to state that global commercial real estate may provide diversification benefits and enhanced returns for any well-balanced investment portfolio. To better achieve diversification benefits and risk-adjusted return, a real estate portfolio manager should consider real estate cycles when making acquisition and disposition decisions. Having a worldwide opportunity set may enhance the ability of the manager to select properties likely to achieve high risk-adjusted returns in any time period as various parts of the globe are likely to be in different stages of the real estate cycle at any given time (Pyhrr, et. al., 1999). Overall, the literature supports the notion that REIT managers should consider investing overseas, the potential to exploit other markets and/or reduce risk via diversification with global markets appears at least possible.

I should note that it is beyond the scope of this study to assess how effectively REIT managers selected foreign markets in which to invest and how well timed said foreign acquisitions were. I will however present the data that shows relative acquisitions and

dispositions internationally, however without underlying property performance data I cannot make such findings directly. Ke, Ng, and Wang (2010) show that home bias was present in the decisions of mutual fund managers when selecting companies for internationally diversified mutual funds; in short, fund managers were more likely to select the stock of foreign firms with a presence in their home market. Such bias has the potential to lead to suboptimal investment choices and/or failure to fully geographically diversify. Anecdotal review of the data suggests the REITs in my study who chose to invest internationally primarily did so in markets with historical ties to the U.S. such as Canada and Western Europe. Thus I cannot conclude that any of the REITs in my study are fully globally diversified. However, Qian, et. al. (2008) shows that most internationalization by firms is truly regional, rather than global and in fact what may be optimal is for firms to operate in a moderate number of regions than truly worldwide.

Beyond firm considerations and potential advantages of purchasing in foreign markets; a REIT who does so must also manage the associated transaction costs during acquisition, holding, and disposition. It is possible, and even suggested by some in the literature, that the increased transaction cost of cross-border investing mitigates potential diversification and market exploitation gains. Dos Santos, et. al. (2008) investigates cross-border mergers and acquisitions for value destroying diversification discounts; they find that international diversification does not destroy value while cross-industry diversification does. This is critical for the broad rationale of cross-border investments, a form of international diversification, as the opposite finding would lead one to suspect broad conditions of disadvantages from cross-border investing. One of the key costs of cross-border investing a firm would need to control for is currency risk. Ziobrowski, et. al. (1997) finds while currency hedging mechanisms are effective in controlling currency risk,

they are insufficient to produce gains from international real estate diversification in the mean-variance efficient portfolio context. In contrast, Johnson, et. al. (2006) presents a currency hedging strategy that reduces downside risk and produces superior risk-adjusted returns. If this strategy can be successfully implemented, a REIT may be able to avert currency issues via its use.

Another factor that could create either advantages or disadvantages as a result of cross-border acquisitions is taxation. Ziobrowski, et. al. (1996) finds no significant after-tax benefits for foreign investors purchasing U.S. real estate. This study is hardly conclusive on the issue of taxation as it relates to cross-border investments by U.S. REITs, but it does highlight potential difficulties in executing international investment strategies. It should also be noted that global laws regarding taxation of foreign investors as trended toward increased ease and liberalization over time in many countries since 1996. Lambson, et. al. (2004) develops a theoretical model and presents an empirical finding explaining that out-of-state buyers of real estate pay more for real estate than locals. The study explains the finding as the result of high search costs, biased beliefs, and haste in purchasing decisions of the out-of-area buyers. While the data used in this study related to a domestic apartment market and out-of-state buyers, this study may give the greatest insight into the potential problems faced by overseas property buyers. One could rationally expect the costs associated with buying out of state to be even higher for buying out of country.

The final empirical study to be discussed is Newell and Webb (1996). This study performs risk adjustments to returns of real estate and other asset classes across the U.S.,

Australia, and New Zealand and finds that after adjustments, real estate can provide portfolio diversification benefits for international investors. I suspect advantages and disadvantages exist for each REIT but not in a uniform manner. This would be consistent with the resource based view of the firm as described by Barney (1991).

III. History of REIT Industry Internationalization

This section will give a brief overview of what types of properties U.S. based REITs hold overseas, what regions of the globe they chose to own properties within, and give an historical view of acquisitions and dispositions conducted in foreign markets by REITs. To my knowledge no other study has presented such details on the U.S. REIT industry and certainly not over the same time span, 1995 through 2010. The first and most simple topic to address is where did REITs buy properties when they went outside of the U.S. borders? As shown in Figure 1, 78% of the properties held in foreign markets were in Canada. This comes as no surprise as Canada is a shared border nation with a very similar, integrated economy. Given that Canada does not present nearly the same challenges or benefits of global diversification (Castillo-Ponce and Ramirez-Acosta, 2008), I will specifically account for the role of REIT cross-border investing excluding Canada. This will be detailed in the data and methods sections. For the remainder of this descriptive discussion, foreign shall be consider all countries and regions outside of the United States excluding Canada.

The next largest region to receive the interest of U.S. REITs is Europe at 16%, which has been a popular choice by REITs since the start of the data window. Latin America, which

includes Mexico and the Caribbean, has about 3% of the remainder of international holdings. Latin America appeared to have been more popular in the earlier part of the data window; this was possibly spurn by the North American Free Trade Agreement which came into effect in 1994 (anecdotal review of the data shows that a bulk of Latin American purchases in the late nineties were in Mexico). Asia-Pacific, which includes Australia, also has a 3% approximate allocation; however acquisitions in this region became more popular in the early 2000s. It is rational to suspect that the Asian economic crisis of the late nineties dissuaded investment into the region at that time. A small fraction, 0.14%, of the properties was in other regions such as Africa or the Middle East; given the small number, I will largely discuss the other regions potential impacts. Table 1 details the numbers of foreign acquisitions and dispositions by year and presents the percentage of each of the total number of REIT acquisitions and dispositions. Generally, the foreign acquisitions represented about 2% of total acquisitions and dispositions about 1.5% of total meaning there appears to have been a bias to be a net acquirer of foreign properties. In the year 2006, foreign acquisitions toped 4.62% of the total; this corresponds to what many believe the top of the market for the U.S. assets. I infer that there is no discernible bias to more aggressive foreign acquisitions, except when the U.S. may have appeared relatively more pricy. On the disposition side, U.S. REITs have tended to be net sellers of foreign properties since 2009. In fact the disposition rate topped 9.75% in 2009, largely driven by a multi-billion dollar sale of Chinese industrial property by Prologis, a Denver based REIT. According to Prologis press releases, they sold the Chinese portfolio to an entity owned by the Singapore government to raise cash to pay down debt (Barris, 2008). I postulate that the increase in net selling may be due to the more robust commercial property markets that have developed in

locations such as Asia in the mid to late 2000s. Figure 2 presents graphically the annual rate of foreign acquisitions and dispositions and Figure 3 presents the same as the percentage of total each year. It should be noted that the SNL Property Database does not include acquisition/disposition data when such sale is related to a corporate level event that shifts or removes (or places) the REIT from the SNL databases. Examples of such includes merges, total acquisitions (especially if by a private, non-REIT entity), and potentially sales of entire divisions. These events are known to occur quite frequently throughout my data window. Thus, the data is viewed as instrumental in understanding REIT global investing activities but is not all encompassing.

Before discussing the characteristics and summary statistics of the REIT universe, I will address the topic of property type. As depicted in Figure 4, 29% of foreign properties were industrial, followed by 19% self-storage, 14% multiuse, 12% retail, and 12% hotel. Industrial REITs have always been aggressive in moving overseas as they state themselves to have advantages in operating industrial facilities, such as high-throughput distribution warehouses, and did so at the request of U.S. based tenants (Federal Express and UPS for example). In general, the international property mix is fairly diversified except for this industrial overweighting. Also noteworthy is the nearly complete lack of multifamily assets held overseas by U.S. based REITs, about 0.29%. Housing tends to be the most idiosyncratic in terms of tenant preference and legal contracting norms by country so I am not surprised by this finding. As a preview to my empirical methods, firm fixed effects will be employed in regressions to control for many factors, most notably property type of the REIT.

To begin analysis of the data, I code REITs by their location of holdings by year. A domestic REIT or D-REIT is one that has zero holdings outside of the United States; a foreign REIT or F-REIT is one with at least one non-U.S. holding; a Canadian holding REIT or C-REIT is one that has at least property in Canada; a European holding REIT or E-REIT is one with at least one holding in Europe; an X-REIT is one with at least one foreign holding not in either Canada or Europe, to signify those with more diverse holdings (the importance of such will be made evident in subsequent sections); a G-REIT is one with at least one holding in Canada, Europe, and at least one other region, to signify a "Global" REIT; and finally ExE-REIT which as at least one foreign holding but zero in either Canada or Europe, meant to signify an "Exotic" REIT. Table 2 summaries the number of each category of REIT in existence year by year and what percentage of the total number of REITs F-REITs and X-REITs represented. The number of each type is also presented graphically in Figure 5. The percentage of REITs with foreign holdings increased from 7.22% at the start of the sample to a high of 22.22% in 2007; similarly the number of REITs with a foreign holding outside of either Canada or Europe went from 2.22% in 1995 to a high of 12.88% in 2010. Overall, there appears to have been an increasing trend towards more REITs investing internationally. Even the "Global" and "Exotic" categories as defined by the authors have exhibited significant from the start to the end of the sample.

To assess characteristics such as average size and monthly return, Table 3 is constructed by aggregating all years of data by each REIT category. On average, F-REITs are 3.08 times larger than D-REITs in terms of total assets. In fact, simply having at least one Canadian property made a REIT 2.87 times larger than the average D-REIT. In short, owning foreign property is associated with being a larger REIT. This is practical as it likely necessary to acquire

in many markets to achieve desired size, thus at a certain point, going overseas may seem inevitable from the viewpoint of a REIT manager. Not surprisingly, the largest average size category is G-REIT, for those most globally diversified; an average G-REIT is 5.27 times larger than the average D-REIT.

Average monthly return for each category is also reported in Table 3. F-REITs and X-REITs suffer an average loss of monthly return of 0.36% and 0.58% respectively. Overall, not a single foreign categorization does better than the domestic average or the overall REIT average. It is of course possible that by globally diversifying the portfolio, these REITs become less risky and thus the reduction in total return is as of a result of the reduction of risk. To assess this possibility, risk adjusted monthly returns are calculated by dividing the monthly return by its corresponding measure of standard deviation. What emerges are risk adjusted figures that do not support the notion that the international buying REITs are providing the same or better risk adjusted returns. In fact just the opposite is observed in the summary statistics. It is worth noting the only category to deliver true negative performance on average is the "Exotic" category.

In summation, REITs are becoming more global overtime yet they appear to be performing worse on a risk adjusted basis as they do such. These summary statistics do not factor the intensity of holdings, only a zero or one dummy variable to denote membership in each defined category. This shall drive the formation of hypotheses and proposed tests to determine the true impact of foreign holding on U.S. based REITs.

IV. Theories and Hypotheses

Given the review of the summary statistics about REITs investing internationally in the prior section, it is the author's contention that the expectation of increasing international holdings or simply being categorized as a foreign holding REIT is negative upon total return performance relative to REITs with only domestic holdings. Yeaple (2009) presents a theoretical model and empirical investigation that concludes that firm heterogeneity and country-specific dynamics are both important in determining the structure and level of multinational activity by U.S. firms; suboptimal structure and/or level of activity could result in negative relative. Similarly, Guillen and Garcia-Canal (2009) state that multinational enterprise, via foreign direct investment, has been increasing with time since the late 19th century as a result of changing global business environments. They focus their discussion on the rise of new multinational enterprises from emerging markets as they seek new opportunities in developed countries; as such they propose the need for new theories to explain the path of international expansion by firms. I contend that many U.S. based REITs are only recently following the same path as opportunities to invest globally appear more feasible as a result of advancements of technology and market openness due to forces such as globalization. At this point in time, REITs may not have progressed enough along the learning curve to get positive gains from international investing.

Thus the following hypotheses are developed:

Hypothesis 1: A REIT with any foreign holdings (F-REIT) shall have lower relative performance than a REIT with only domestic holdings (D-REIT).

Hypothesis 2: As a REIT increases its percentage of foreign properties, its total return performance shall be decreasing.

Models derived to test these hypotheses empirically shall also make use of the more exacting international REIT classifications; Canadian holding REIT, C-REIT; European holding REIT, E-REIT; international REIT holding beyond Canada or Europe, X-REIT; Global REIT with Canada, Europe, and at least one other region, G-REIT; and Exotic REIT with only foreign properties in regions outside of Canada and Europe, ExE-REIT. These finer classifications and measures will allow for a more complete explanation of the underperformance of foreign holding REITs

V. Data and Methodology

The primary dependent variable for analysis shall be total return to shareholders calculated as the price apperception plus dividends received each period. An alternative measure of firm performance, return on average equity, is also used as its measure is less dependent on equity markets and more on traditional firm level accounting. The primary variables to test H1 will be dummy variables that take the value of one if the REIT fits each said category each year; for example, if a REIT holds at least one non-U.S. in property in 1996, F-REIT=1 for 1996 and so forth.

The primary independent variable to test H2 is FPERC defined as the percentage of properties located in foreign markets. A “foreign market” is defined as any location outside of

the United States. To test for a Canadian effect, CPERC is also used and defined as the percentage of properties located in Canada; to test for a European effect, EPERC is calculated similarly with all European properties; finally, XPERC is created using all foreign properties not in Canada or Europe. Unfortunately, the limited data makes creating percentage measures to correspond to the "Global" and "Exotic" classifications, G-REIT and ExE-REIT respectively, impractical. These variables are defined to be stable for each calendar year. Ideally, this would be allowed to vary monthly, but this cannot be accomplished due to the nature of the data. REITs typically hold properties for many years (Chan et. al., 2003) thus this limitation should not drastically impact results.

The first models tested are designed to check for potential endogeneity issues as suggested by Dastidar (2009) and Campa and Kedia (2002). This model utilizes the return on average equity measure to proxy for firm performance.

$$ROAE_{i,j} = a + b_1 FREIT_{i,j} + b_2 SIZE_{i,j} + b_3 DTA_{i,j} + b_4 EXPR_{i,j} + b_5 PM_{i,j} + c_i + e. \quad (1)$$

$$ROAE_{i,j} = a + b_1 FPREC_{i,j} + b_2 SIZE_{i,j} + b_3 DTA_{i,j} + b_4 EXPR_{i,j} + b_5 PM_{i,j} + c_i + e. \quad (2)$$

Where SIZE is the natural logarithm of total assets (proxy for firm size), DTA is the debt-to-assets ratio (proxy for leverage), EXPR is the expense-to-revenue ratio (proxy for firm efficiency), and PM is the profit margin (proxy for profitability). All alternative measures discussed herein are substituted where appropriate and reported in the tables and results sections. All measures are annual due to data constraints. Panel regression with firm fixed effects is used to generate results (Greene, 2008). The use of firm fixed effects controls for unobserved firm

heterogeneity and other static firm features including property type, type of management, type of advisor, and other similar characteristics that do not vary for each said REIT.

The following models employ monthly data with exception of the FPREC measure which varies year to year as discussed above. Anderson, et. al. (2005) and Ooi, et. al. (2009) show that REIT returns can be explained by multiple factors including the Fama-French (1993) factors and unique real estate factors. The Fama-French (1993) factors, excess return on market (Market Return-minus-Risk Free Return), return on the high-minus-low book to market equity ratio portfolios (HML), and return on the small-minus-big market capitalization portfolios (SMB) are included to control for their respective effects. Additionally, Ooi, et. al. (2009) show that prior momentum of prices may explain REIT returns and uses the method of Carhart (1997) to control for the momentum effect observed by Jegadeesh and Titman (1993). I also employ the Carhart (1997) model to control for the same effect. Benefield, et. al. (2008) shows that REITs also exhibit a unique, sector specific effect; thus the return on the Ziman equity REIT index is used to control for the unique real estate factor. Further, McGahan and Victer (2010) show that home country effects can determine part of a multinational's profitability; the use of the Ziman equity REIT index will act as a control for the U.S. REIT market in this study for those purposes as well. To control for a potential European effect, the total return of the FTSE/EPRA NAREIT Equity Index is included as well.

The following models are used to test H1 and H2 respectively. Alternative models that omit various above referenced factors were tested to check for robustness to specification, the results were inconsequential, thus the most complete models are presented and reported herein.

Additionally, all alternative international designations and measures are tested herein and shall be reported in the results section.

$$ExcessReturn_{i,j} = a + b_1FREIT_{i,j} + b_1EMR_j + b_2SMB_j + b_3HML_j + b_4MOM_j + b_5ZIMAN_j + b_6EPRA_j + c_i + e. \quad (3)$$

$$ExcessReturn_{i,j} = a + b_1FPREC_{i,j} + b_1EMR_j + b_2SMB_j + b_3HML_j + b_4MOM_j + b_5ZIMAN_j + b_6EPRA_j + c_i + e. \quad (4)$$

These represent the Four Factor model per Carhart (1997) with U.S. and European REIT factors added. ExcessReturn is the monthly total return of each REIT minus the corresponding one-month return on treasury bills. Once again, firm fixed effects are employed to control for unobservable firm specific factors (Greene, 2008).

The data used in the empirical studies comes from multiple sources. REIT property portfolio and property level data is from the SNL Real Estate Property Database; REIT financial statement data is from the SNL Financial North American REIT Database; and monthly data for the REITs' total return and market indices is from the Center for Research in Securities Prices database; and monthly small-minus-big, high-minus-low, and momentum factors are from Kenneth French via the Wharton Research Data Services system. The study window used, 1995 through 2010, is set as such because SNL Real Estate does not begin collecting acquisition dates in the property database until 1995, thus prior study is not feasible. As SNL collects its data from a variety of public and some private sources, data is not always complete for every firm and property; nonetheless the SNL database is regarded as the best for comprehensive historical data on REITs (Benefield et. al., 2008).

For a REIT to be included in the data set it must have property level data in SNL Real Estate Property Data, firm level data from SNL Financial, monthly return data from CRSP, and the headquarters must be located in the United States. This process eliminated mortgage REITs and non-traded REITs. What is left is an annual dataset with a total of 2,575 usable observations (firm years) from 338 unique firms and a monthly dataset with 31,632 usable observations (firm months) from 329 unique firms.

VI. Results of Empirical Analysis

The first set of regressions test the model(s) presented above as equation 1 and are presented in table 4. The coefficient on F-REIT, a dummy variable taking the value of one in any year the REIT has at least one non-U.S. holding, is negative and significant at the five percent level. This supports hypothesis one stating that holding foreign assets will decrease total return performance of the REIT, proxied by return on average equity in this analysis. To further determine if certain locations of foreign assets mattered, dummies for having holdings in Canada (C-REIT) and Europe (E-REIT) are created. Coefficients on both of these variables are insignificant, indicating that simply holding property in either Canada and/or Europe had no effect upon return. X-REIT a dummy variable taking the value of one when a REIT had at least one foreign holding outside of Canada or Europe had a negative coefficient that is significant beyond the one percent level; thus indicating that the negative return performance observed is due to holdings in more exotic/less developed regions (at least relative to Canada and Europe) such as Asia-Pacific and Latin America. Further, G-REIT, a REIT with at least one holding in

Canada, Europe, and at least one other region, had an insignificant coefficient. Meanwhile, ExE-REIT, a REIT with foreign holdings none of which are located in Canada or Europe, was negative and significant beyond the one percent level as well. Thus, these regressions yield two strong conclusions. First, a general confirmation of negative relative performance due to foreign holdings, and second, the source of the negative holdings is limited to regions outside of Canada and Europe. This is meaningful as only a relatively small component of REITs holdings tend to lie in these regions.

The second set of regressions utilizes equation two from above and thus substitutes the dummy variables indicating foreign holding status for the actual percentage measurements of amount of foreign holdings. The first is F-PERC, the percentage of properties held outside of the United States. This measure was negative and significant beyond the one percent level, thus supporting hypothesis two that states that the negative relative performance is increasing as the foreign holdings are increased. Further percentages of holdings in Canada (C-PERC) and Europe (E-PERC) are tested as well. Similar to the prior regressions, these measures come back insignificant indicating that increasing Canadian or European holding had no effect on relative performance. The final percentage measure is X-PERC, the percentage of foreign properties excluding those in Canada and Europe. This measure's coefficient is negative and significant beyond the one percent level. This confirms hypothesis two and states that the level of negative relative performance is increasing in the holdings outside of the U.S., Canada, and Europe. A finding that is consistent to those in the first set of regressions reported. These results are reported in table 5.

The next model specification is from equation 3 and utilizes well known market risk factors to control for known explanations of excess return. Here total return is directed measured as the excess total return on the stock of each traded REIT. Thus this measure is exactly what an investor could have experienced and thus the most relevant return metric to test. The first set of regressions uses the same dummy variables described above that relate to the foreign holding status of each REIT. Coefficients on F-REIT, X-REIT, and ExE-REIT are negative and significant as before. E-REIT (Europe) is also insignificant as before. Interestingly C-REIT (Canada) and G-REIT are now negative and significant as well. Thus, the liability of foreign holdings appears to extend deeper in market returns than accounting based measures. These results are reported in table 6 and support hypothesis one.

The final model specification as shown in equation 4 replaces the dummy variables discussed above with the aforementioned percentage of foreign holding measures. Here the findings are exactly the same as in the first model specification. F-PERC, the percentage of the property portfolio held overseas and X-PERC, the percentage of the property portfolio not located in the U.S., Canada, or Europe both have negative coefficients significant beyond the one percent level. Meanwhile the coefficients on the percentage of properties in Canada (C-PERC) and Europe (E-PERC) are not significant, same as in the prior model specification. Thus hypothesis two is further supported and once again in the same fashion; increasing foreign holdings decreases relative total return, but only in those properties held outside of the Canada and Europe. Since the more definitive C-PERC is insignificant while the more general C-REIT dummy measure is negative and significant, I conclude that Canadian holdings do not impact relative total return performance. Given that many REITs with Canadian holdings also have

holdings outside of Canada and Europe, I suspect that C-REIT simply picked up these effects. These results are presented in table 7.

VII. Discussion and Conclusion

The results of the empirical analyses are fairly conclusive. Investing in markets outside of the United States, Canada, and Europe had negative impacts upon the total return performance in both market return and accounting based return measures. Before discussing likely causes of such negative performance, I will attempt to explain why it is rational for holdings in Canada and Europe to have had no impact on performance.

Canada is more than just a close neighbor to the United States, it is also its largest trading partner and as such as an economy that is very linked to the domestic economy of the United States (Castillo-Ponce & Ramirez-Acosta, 2008). Thus, it is very likely that entering Canada was no more difficult or even costly than entering another state or region within the U.S. Anecdotal review of the Europe holdings of U.S. based REITs reveal that the majority of the holdings were located in Western Europe and generally within highly developed, established cities. Thus, could it be that these European as well as the Canadian assets were no more difficult to manage or preformed differently in any systematic manor from the domestic assets? While simultaneously, those foreign assets located outside of Canada and Europe either performed worse or were substantially more difficult to manage and control transaction costs? As stated in the literature review, there are many potential issues to control for that could give rise to reduced performance

when investing overseas. The literature also gives some clues as to why Europe and Canada may be different as well.

As stated above Canada and the United States are closely linked in many fashions beyond the obvious physical one, thus I doubt few would be surprised to learn that holding Canadian properties did not affect performance when other factors are controlled for directly or via the firm fixed effects. Europe is not nearly as obvious. Jackson, Stevenson, and Watkins (2008) demonstrate that large international office markets (they focus on New York City and London) exhibit strong linkages that often lead to similar patterns in returns and pricing movements. This can occur despite true differences in the underlying local economies. I should note that is a general truth about the United States where segmented property markets can vary greatly by metropolitan statistical area, or even within submarkets, but pricing movements are all impacted by a single capital market (Geltner, et. al., 2007). Cheng and Roulac (2007) and Lee (2001) state that property type can be far more determinate in portfolio returns than geographic diversification. Both of these papers focused on markets within a single country, the United States and the United Kingdom respectively; nonetheless, if these large markets are integrated than for large U.S. REITs making cross border investments into Canada and Europe is not much different than investing in another market or region within the United States. My findings support as much.

Eichholtz, Gugler, and Kok (2011) find that underperformance of real estate companies that invest internationally is decreasing overtime and, in their sample, disappears at the end (it should be noted their sample ends in 2007 which corresponds to a period where massive gains

were seen across almost all real estate markets and sectors). Further their study states that transparency, a measure defined by an index published by the global real estate services firm Jones Lang LaSalle, can partially explain underperformance. Hence investing in markets with low transparency and other institutional/economic factors occurs at higher cost and thus lower performance on a relative basis. Relating this to my study, by any measure of transparency or other local market function, Canada and Europe dominate on a relative basis most of Asia-Pacific and Latin America. Thus, one rational explanation for the decreasing returns with increasing percentage of foreign properties outside of Canada and Europe (X-PERC) is that these investments are occurring in markets that all in all create higher transaction and monitoring costs. The fact that the dummy variable X-REIT, denoting a firm with at least one foreign property outside of Canada or Europe, is negative and significant with regards to explaining performance suggest that a REIT must be incurring unique cost or other structural elements to simply operate in these countries.

This is both logical and intuitive. Investing in Mexico (defined within the Latin America region per SNL Real Estate) for example would involve employing acquisition, asset management, and all other firm functions with specific skills appropriate to Mexico. Further, Mexico has historically more currency, political, and general economic uncertainty as compared to Canada and Europe (at least in my analysis window of 1995 through 2010). Thus, my general findings fit common sense expectations. Asia suffered severe economic problems in the late nineties and has only slowly been developing more modern real estate institutions and legal frameworks, such as REIT legislation on par with the United States. These differences likely impacted the ability of REIT managers in the U.S. to successfully execute investments in these

regions, at least as relatively compared to other domestic acquisitions or those in Canada or Europe.

Does this mean that REIT managers acted foolishly and improperly when investing internationally outside of Canada and Europe? Not necessarily if viewed over a long enough time horizon. Eichholtz, et. al. (2011) does suggest decreasing underperformance (even if the sample window is biased) with time as transparency and integration of global real estate markets improve. Thus, these U.S. REITs may gain advantages in the future that compensate, even partially, for the underperformance realized in earlier years. A large component of return on real estate assets is often realized upon sale of the asset or the entire firm as is often the case for REITs. Thus, it is possible that these REITs will see excessively high relative profits upon final sale and disposition of their assets in foreign markets outside of Canada and Europe. This could likely be fueled by the fact that these regions, especially Asia, have developed their own more robust, fully functioning real estate capital markets and thus more investors will likely compete for their assets when placed on the market for sale.

There is evidence beyond idle speculation that this is likely. Take the case of ProLogis (as U.S. based REIT trading on the NYSE under the ticker PLD) selling the bulk of their China portfolio in 2009. The firm was facing a need for cash due to the market crash and resulting capital crunch. They chose to sell their Chinese portfolio and other miscellaneous Asian assets to GIC Real Estate, a wholly owned entity of the government of Singapore, for $1.3 billion dollars. The proceeds were used to pay off debt and otherwise stabilize the firm's entire portfolio. According to the company, the assets were not being sold in distress and did not represent a

negative view on Asia or China (Barris, 2008). One logical view of this transaction is as follows. ProLogis needed cash but selling U.S. assets was impractical given the market conditions, on a relative basis their China portfolio was worth more to the well capitalized Singapore government and thus the best asset to sell. This may not appear on face to be a great "success" story, but it is hard to refute the notion that the geographic diversification did not improve the outcome of the investors in this situation (many REITs teetered on insolvency with few resources left to raise capital at this particular moment in history).

In conclusion, it is my belief that benefits to global diversification by U.S. REITs will likely become more apparent overtime. Nonetheless, this area demands further study. Questions as to cost efficiency and market timing still exist and demand research to answer. Further, the optimal method for individual and intuitional investors to invest in global real estate is still open for some debate. My current finding and those of others, suggest that investing in "domestic only" REITs and real estate operating companies across the globe may be optimal; but even this topic demands further investigation.

CHAPTER TWO: EFFECT OF INTERNATIONAL DIVERSIFICATION BY U.S. REAL ESTATE INVESTMENT TRUSTS ON COST EFFICIENCY AND SCALE

I. Introduction

The real estate investment trust (REIT) market has rapidly expanded over the past decade. In fact, total market capitalization at the end of 1990 was only $5 billion and by year end 2010 was nearly $359 billion, representing over 7,000% growth. In fact, the 1990s and early 2000s were very volatile times in the U.S. REIT industry. Many significant structural changes occurred, especially after the 1993 Revenue Reconciliation Act. This change, significantly increased capital flows into the market by allowing participation of institutional investors. During this rapid period of growth, the market also saw a large number of initial public offerings and merger and acquisition activities.

In addition to the overall growth and regulatory changes in the REIT market, another phenomenon is occurring, the internationalization of US based REITs. Chapter one shows that the percentage of US REITs with foreign holdings grew from 7% in 1995 to over 20% by the end of 2010. This growing internationalization trend is certainly not specific to REITs. In fact, Dastidar (2009) shows that international diversification is an increasingly common phenomenon amongst many of the world's largest firms and industries. While growing internationalization is common across sectors, it is unclear how this is affecting the REIT market. In general, the real estate literature contends that of all asset types, real estate is one of the most unique and

differentiated as the markets tend to be highly segmented and contain heterogeneous assets. Each specific property type requires different investment skills and different geographies most certainly behave differently as unique economic, demographic, and even political forces impact real estate investment across various locales. These ideas have been explored domestically and have generally shown that "out of market buyers" generally underperform. The economic rationale is that the only way in which the "out of market buyer" is able to purchase as asset in one of these markets is to fundamentally overpay relative to what the informed "in-market buyer" would be willing to pay[2]. International investing takes this to a further extreme; thus, extrapolating this finding would suggest that firms engaging in these activities may experience declines in performance and efficiency.

While very little literature exists in this area, the studies that do generally provide some evidence to this point. For example, Eichholtz, et. al. (2001) finds property companies with international holdings underperformed a weighted index of domestic property companies based on each firm's weighted international holdings. Chapter one finds that Real Estate Investment Trusts (REITs) making cross-border property investments produce lower total returns to shareholders than REITs who invest only in their home country. However for the case of U.S. based REITs, the negative performance appears to be driven by foreign acquisitions outside of Canada and Europe. Given that regions outside of those two, mainly Asia-Pacific and Latin America, make up a much smaller component of the total international portfolio than Europe and especially Canada, it is worthy to investigate what is driving this finding. Since operating in multiple global regions, in this case whole continents, may likely drive up costs relative to being

[2] For example, see Lambson, et. al. (2004), and the working paper by Ling and Petrova (2011).

geographically focused. This study will look at the role that international holdings had upon cost efficiency, the ability to produce outputs (total assets for REITs) at minimal costs (total expense for REITs).

Given the growth in assets, the significant changes in the regulatory environment, and the growth of international REIT holdings, it is surprising that there have not been any recent efficiency studies in the REIT sector that addresses these core changes. In this study, I fill this gap in the literature. In particular, utilizing the most recent REIT data from SNL, I estimate the efficiency of REITs using a non-parametric technique termed Data Envelopment Analysis (DEA). In addition to measuring overall efficiency in the "new" environment, I estimate economies of scale of REITs. This is critical as most of the older studies have found firms to be operating at largely increasing returns to scale. However, with the exponential growth that has occurred in this space, it is interesting to determine if firms have potentially grown too fast and may now be operating at decreasing returns to scale. Finally, for the first time, my study will estimate technical and scale efficiencies of REITs that utilize an international strategy relative to those that stay strictly domestic. The results of my study are significant and have important implications. First, the rapid growth in REITs has occurred so fast that it appears as if the majority of REITs are operating at decreasing returns to scale. This result contradicts many of the prior studies that used data when the average market capitalization rates were quite low. In addition, the prior studies that found increasing returns to scale either forced a functional form on the data or potentially inappropriately estimated scale efficiency using a non-parametric procedure. In terms of overall operational efficiency, there is no statistical difference between REITs that have international holdings relative to pure domestic REITs. In fact, REITs with

international holdings are actually better at minimizing their total costs relative to their asset base, or have greater "technically efficiency". However, the foreign REITs are significantly more scale inefficient and appear to have grown their expenses at a faster rate than their asset base. REITs with foreign holdings are substantially larger than pure domestic REITs, and as such, 96% of the foreign group is operating at decreasing returns to scale. Overall, my study finds that REITs with foreign holdings possess some relative ability to cost minimize but have potentially grown too fast and are operating at decreasing returns to scale. The on-going growth of internationalization suggests that REITs perceive long-term value by engaging in this process. I suggest that as the financial markets grow and become more global, the largest and most cost efficient REITs are placing stakes in foreign markets where they perceive strong future investment opportunities. Over time, management must believe that scale economies can be achieved outside of their home markets and that the decisions to acquire international will be value-maximizing. Future research needs to investigate the evolution of scale economies over time for these largest firms to determine if growth strategies involving international acquisitions do indeed bear fruit in terms of efficiency and performance.

The remainder of this chapter is organized as follows. Section II reviews the literature and provides the theoretical background for the study; section III outlines the theories and hypotheses to be tested herein; section IV discuses the data and empirical methodology used; section V reports the results of the empirical analysis; and section VI concludes the chapter.

II. Literature Review

To date, I am aware of no other studies that have attempted to address the impact of foreign acquisitions on REIT operating and scale efficiency. I believe that this is important given its increasing prevalence in practice; further, prior studies give reasons to suspect that cross-border investments may increase costs relative to domestic investments. Geurts and Jaffe (1996) finds that cross-border investments require management of currency, legal, and political risks not present in domestic acquisitions; management of such risks likely generates additional costs. Ziobrowski, et. al. (1996), and Ziobrowski, et. al. (1997) discuss tax impacts and currency impacts of international real estate investing respectively. Both demonstrate that tax and currency concerns of cross-border property acquisitions may not be readily controllable and thus generate additional costs relative to domestic acquisitions. While not directly related to cross-border property investing, Lambson, et. al., (2004) presents a very compelling study that shows that out-of-state apartment buyers paid higher prices relative to in-state buyers. They cite one of the reasons for such was higher search costs in the acquisition process. It stands to reason that if search costs are higher for out-of-state buyers, then they are necessarily higher for out-of-country buyers as well. These findings are echoed in a working paper by Ling and Petrova (2011) as well. As such, my study will address key questions on the overall efficiency of REITs in this new environment and most importantly assess the implications of international investing.

Many studies have looked at operating and scale efficiencies in the REIT industry and specifically used such analyses to assess the impact of various REIT characteristics and portfolio compositions upon the efficiency measures. Bers and Springer (1997) is the first known REIT

economy of scale study and specifically finds that economies of scale may be present in the REIT industry and that degree of leverage and management structure can impact such while property type diversification and geographic concentration (U.S. regions only) had little impact. Ambrose, et. al. (2000), finds no size economies; REITs have little "brand" impact; and that geographic concentration yielded little benefit. Yang (2001) utilizes firm characteristics such as Net-Leased and Self-Managed as controls when determining overall economies of scale in the REIT industry; the study supports the existence of scale economies, but uses a very narrow data set (120 REITs in year 1997) to do so. Lewis, et. al. (2003) uses a Bayesian stochastic frontier model to find most REITs were relatively cost efficient and faced increasing returns to scale; the study finds that management characteristics do impact efficiencies but property type diversification does not. Ambrose, et. al. (2005) utilizes property type dummy variables and debt to asset ratios as controls when assessing the existence of economies of scale in the REIT industry; the study concludes with overall support for the existence of scale economies. Miller, et. al. (2006) finds that self-management decreases efficiency and higher levels of debt increases efficiency, two findings that are contrarian with much of the REIT efficiency literature. Miller and Springer (2007) goes farther in reversing course by finding more evidence of diseconomies of scale and reaffirms that higher debt levels improve efficiency.

All the above referenced efficiency studies use methods that calculate efficiency measures and economy of scale determinations via some form of frontier that generally requires specification of functional form and makes parametric assumptions. The following studies utilize Data Envelopment Analysis (DEA) or similar Linear Programming (LP) techniques to determine efficiency measures as is done in this study. The first such study that uses DEA techniques on

REIT data is Anderson, et. al. (2002). This study finds REITs are generally operating at increasing returns to scale, internal management increases all types of efficiency, higher debt levels lower input utilization, and increasing property type diversification improves scale efficiency while reducing technical efficiency. Devaney and Weber (2005) utilizes an LP technique to show that measures of technical efficiency are different when REITs are classified by property type and advisor relationship (internal versus external); overall this paper finds the majority of REITs are operating at increasing returns to scale. Topuz, et. al. (2005), utilizes DEA techniques to find that REITs are operating at decreasing returns to scale since the late 1990's, further they state that increased debt utilization lowers efficiency and increased geographic and property type concentration enhances efficiency. This study does identify properties as Foreign for the purpose of creating each REITs geographic concentration index (a Hirschman-Herfindahl index method) but does not specifically report any results as to the impact of foreign holdings directly; however, the finding of the study herein generally supports the same finding of Topuz, et. al. (2005).

In summation, the literature on REIT efficiency broadly supports the use of DEA methods and subsequent tests of firm characteristics to assess impact of such upon the measures of efficiency found. This paper is the first to my knowledge to use measures of foreign diversification and similar classifications to explain REIT scale economies or technical efficiency.

III. Theories and Hypothesis

Chapter one finds relative negative total return performance increasing in the percentage of foreign properties held by U.S. based Real Estate Investment Trusts (REITs); and such negative performance is arising from foreign holdings outside of Canada and Europe. One potential explanation for this finding is that REITs fail to properly utilize costs given level of assets when investing in these relatively distant locations. As prior literature suggests, there could be unique costs and expenditures the REIT may incur by entering these markets and thus efficiency is reduced without appropriate compensation in return. Thus the following hypothesis is formulated:

Hypothesis 1: A REIT with any foreign holdings (FREIT) shall have lower technical efficiency than a REIT with only domestic holdings (DREIT).

This is potentially logical as simply moving outside of domestic boundaries can cause new expenses and different operational requirements to be met regardless of intensity of foreign investment. Further, intensity or degree of foreign holdings may also be impactful upon technical efficiency and thus the following alternative hypothesis is specified:

Hypothesis 1A: As a REIT's percentage of foreign properties increases, its levels of technical efficiency shall decrease.

In other words, proper utilization of costs given total assets should be decreasing in the percentage of the property portfolio that is foreign. As is performed in chapter one, alternative classifications of foreign REITs and percentages of portfolio that is foreign will tested to see if

similar issues are detected. These classifications and measures include CREIT and CPREC relating to holding property in Canada and the percentage of property in Canada; EREIT and EPERC relating to holding property in Europe and the percentage of property in Europe; XREIT and XPREC relating to holding foreign property outside of Canada and Europe and the corresponding percentage of such; GREIT relating to a REIT with holdings in Canada, Europe, and at least one other global region (such as Asia or Latin America); and ExEREIT relating to with foreign holdings but none in Canada or Europe.

I also focus on estimating economies of scale for this study. As denoted above, the early studies seem to find increasing returns to scale utilizing older data. As the studies began to utilize more recent data and better estimation procedures, evidence of diseconomies of scale started to emerge. As the market has continued exponential growth, I state the following second hypothesis:

Hypothesis 2: Given the rapid increase in REIT size, the number of firms operating at decreasing returns to scale is higher than found in prior studies.

And, since firms with foreign holdings tend to be the largest and fastest growing REITs, I add the following hypothesis:

Hypothesis 2a: REITs with foreign holdings will have a higher propensity to be operating at decreasing returns to scale than pure domestic REITs.

Hypothesis 2b: A REIT's scale efficiency will be negatively impacted by having foreign holdings and increasing in intensity of such holdings.

Once again the various measures and classifications of foreign activity will be tested as discussed above.

IV. Data and Methodology

To test the hypotheses, I utilize Data Envelopment Analysis (DEA), which is a non-parametric linear programing technique that defines an efficient frontier utilizing all of the data available. Essentially, DEA defines a hypothetical optimal or best-practice firm from combinations of inputs and resulting outputs from all firms in the dataset and then measures efficiencies as the distance from the frontier to the actual firm data point. Thus, you can think of an efficiency measure as given a unit of input, how much level of output did the optimal firm produce; the distance between the actual firm's output and the hypothetical optimal firm is the measure of inefficiency. Because this method does not specify any functional form nor rely on parametric assumptions, it allows the data to speak for itself. This has some obvious advantages over parametric techniques as there is no joint testing of functional form implied. Conversely, this comes with the cost of extreme influence of outliers and larger inefficiency measures that are not necessarily as controllable by the firm as DEA may imply. However, my tests are concerned with relative, rather than absolute efficiency scores and as such I believe DEA is an appropriate method to estimate REIT efficiency (Cooper, Seiford, and Zhu, 2011).

My method involves calculating a frontier via DEA by defining inputs and outputs. I define total assets as REIT output which is largely consistent with prior literature (Anderson et. al., 2002, Topuz et. al., 2005, Springer, 1998, for instance). As with all REIT efficiency studies,

inputs are hard to measure due to data limitations. I define REIT input as total expenses broken into sub-categories of interest expense, general and administrative expense, and other expense (this category is created by subtracting interest and G&A expense from total expense and thus includes management fees, property operating expense, and all other miscellaneous expenses). DEA requires all expense categories to be non-negative[3]; this limitation influenced my decision to utilize my "other expense" category as it would result in the fewest number of observations lost due to missing data (not all firms define subcategory expenses the same when tabulated by SNL). This methodology is also widely supported by the literature including Anderson, et. al. (2002).

DEA requires the defining of decision making units (DMUs), a DMU in this study is an individual REIT. Efficiency measures are returned as constant returns to scale efficiency (CRS) which represents overall technical efficiency; variable returns to scale efficiency (VRS) which represents technical efficiency; and scale efficiency which is calculated as the ratio of CRS efficiency/VRS efficiency. Further I conduct DEA under both input and output orientations. Depending orientation, an inefficient DMU could be classified as operating at either decreasing or increasing returns to scale. I will present results from the input oriented models herein; however, robustness checks show that disagreement between models is not a significant issue.

Figure 6 shows how the efficient frontier is constructed for five hypothetical DMUs, A, B, C, D, and H. The constant returns to scale frontier is defined by ray OBC and the variable returns to scale is defined by AB, BC, and CD. Figure 7 shows how this framework allows for an

[3] Although such a non-negativity requirement can be relaxed, the DEA model choice is only limited to the variable returns to scale (Ali and Seiford, 1990).

inefficient DMU to be classified into one of six regions. Three regions (I, II, and III), provide the same classification (increasing returns to scale, or IRS, constant returns to scale, CRS, or decreasing returns to scale, DRS, respectively) regardless of input or output model orientation. In other words, Regions I, II and III provide unique returns to scale classifications. Regions IV, V, and VI all could potentially identify an inefficient DMU as IRS, CRS, or DRS depending on model orientation (Zhu, 2009, and Gregoriou and Zhu, 2005). The three measures of efficiency are calculated for each REIT and will be used in the international diversification tests in my second stage regressions.

Nearly all of the aforementioned studies on economies of scale of REITs state that one of the key variables that explain cost efficiency is degree of leverage. Thus the debt-to-asset ratio shall be included to control for degree of leverage which has been shown to affect cost structure. Other key variables routinely used in DEA studies with REIT data include a dummy variable if the REIT is self-managed, a dummy variable if the REIT is self-advised, a dummy variable if the REIT engages primarily in the ownership of net leased properties, and dummy variables for the various property type classifications assigned to equity REITs by data providers such as SNL. In this study all dummy variables take the value of one if the category applies. The property type categories as specified by SNL Real Estate are Retail, Office, Industrial, Residential (includes apartments and multifamily), Healthcare, Hotel, Self-Storage, and Specialty. The omitted property type dummy variable is Diversified. All of the aforementioned items relate to structural characteristics of the REIT and thus may impact technical and scale efficiencies and are used to control for such in this study. The variable(s) of interest in this study are percentages of

properties held in foreign markets and the dummy variables indicating if a REIT has any foreign holdings.

Thus, the following models are used to test for the effect of foreign holdings on the measures of efficiency from the DEA procedures.

A) $CRSEfficiency_i = a + b_1FREIT_i + b_2DRATIO_i + b_3SELFMAN_i + b_4SELFADV_i + b_5NETLEASE_i + B_{6\text{-}13}PROPTYPE(s)_i + e.$

B) $VRSEfficiency_i = a + b_1FREIT_i + b_2DRATIO_i + b_3SELFMAN_i + b_4SELFADV_i + b_5NETLEASE_i + B_{6\text{-}13}PROPTYPE(s)_i + e$

C) $ScaleEfficiency_i = a + b_1FREIT_i + b_2DRATIO_i + b_3SELFMAN_i + b_4SELFADV_i + b_5NETLEASE_i + B_{6\text{-}13}PROPTYPE(s)_i + e.$

D) $CRSEfficiency_i = a + b_1FPREC_i + b2DRATIOi + b3SELFMANi + b4SELFADVi + b5NETLEASEi + B_{6\text{-}13}PROPTYPE(s)i + e.$

E) $VRSEfficiency_i = a + b_1FPREC_i + b_2DRATIO_i + b_3SELFMAN_i + b_4SELFADV_i + b_5NETLEASE_i + B_{6\text{-}13}PROPTYPE(s)_i + e.$

F) $ScaleEfficiency_i = a + b_1FPREC_i + b_2DRATIO_i + b_3SELFMAN_i + b_4SELFADV_i + b_5NETLEASE_i + B_{6\text{-}13}PROPTYPE(s)_i + e.$

Where FPERC is the percentage of properties held in all foreign markets, FREIT is a dummy variable that takes value of one if the REIT had any foreign holdings; these are replaced with the appropriate classifications and measures of the alternative international specifications as needed. CRS and VRS refer to constant returns to scale and variable returns to scale respectively.

The data used in this study is from the SNL Real Estate Property Database and the SNL Financial North American REIT Database for 2010. For a REIT to be included in the data set it must have property level data in SNL Real Estate Property Data, firm level data from SNL Financial, and the headquarters must be located in the United States. This process eliminated mortgage REITs. What is left is a dataset of 124 equity REITs. The summary statistics describing the data is contained in Table 8. The sample shows that 20.16% of the REITs have foreign holdings (25 out of the 124). I term these as FREITs. On average, 12.17% of the properties owned by an FREIT were located internationally.

As mentioned above, the DEA efficient frontier method requires the defining of REIT inputs and outputs. Following the literature, I denote REIT outputs as Total Assets. The average size of REITs in terms of Total Assets was $7.8 billion for firms in the FREIT category and only $2.7 billion for domestic only REITs (DREITs). The average total expenses for the FREITs was $1.6 while the average total expense for the DREITs as only $0.5 billion. The specific categories of expenses including interest expense, G&A expenses and other expenses are also contained in table 8 along with descriptive statistics for the other classifications of REITs. It is worth noting that as the definition of foreign REIT is made more "global" the average size of REIT becomes larger. Hence, those with foreign holdings outside of Europe and Canada, XREIT, had an average size of $9.5 billion and those with holdings in Europe, Canada, and at least one other region had an average size of $9.3 billion.

V. Results of Empirical Analysis

The average measures of efficiency via DEA are presented with the summary statistics in table 8. I find overall efficiency scores very similar to the prior studies that measured efficiency using DEA. The overall efficiency scores, CRS efficiency, are similar between FREITs and DREITs and other REIT classifications; only categories that exhibit wide differences are those with relatively small numbers of firms, GREIT and ExEREIT. Table 9 shows that the difference between FREIT and DREIT CRS efficiency is not statistically different via a parametric t-test. However, when I examine technical efficiency and scale efficiency separately, significant differences emerge. First, from a pure point of keeping expenses low due to asset size and ignoring scale issues (pure technical efficiency) I find that FREITs are statistically better (See Tables 8 and 9). However, the exact opposite is true on scale where it appears that FREITs have grown to large too fast and are much less scale efficient than their DREIT counterparts. Further, when comparing the alternative specifications against the mean of those not in the category (See Table 10), Canadian REITs (CREITs), European REITs (EREITs), Foreign beyond Canada and Europe (XREIT), and Global REITs (GREITs) are all less scale efficient than those not in category implying all REITs with foreign holdings may suffer from scale inefficiency regardless of location of investment. Since FREITs may actually be more technically efficient, they may possess some structural advantages in foreign direct investing. It is important to note that these t-tests do not allow for any control for use of and cost of leverage, a factor well known to impact efficiency. Thus, if this finding of superior technical efficiency disappears for FREITs once leverage is controlled for, it may be that the finding from the t-tests is largely driven by different

borrowing costs. Further, since acquiring properties overseas is an active choice a REIT must make voluntarily, it is rational to believe they perceived some internal justification for taking on the endeavor. However, the level of optimal size is still to be addressed.

When examining scale efficiencies via an input oriented model, I find that 96% of FREITs are operating at deceasing returns to scale (Region III), 4% are operating at constant returns to scale (Region II), and none are operating at increasing returns to scale. While the result is not as strong for DREITs, still the vast majority (78%) are operating at decreasing returns to scale (Region III). However, there still are 18% of the firms operating at increasing returns to scale which tend to be the very smallest REITs in the DREIT category (See Table 8). In fact, I find that the average firm size of firms operating at constant returns to scale is $1.6 billion in total assets which actually smaller than the average size of REITs in either category. However, the average size of firms operating at increasing returns to scale was very small at $0.8 billion. The average size of firms operating at decreasing returns to scale was over $4 billion which is still well below the average size of FREITs at $7.8 billion. To ensure the robustness of the results, I also estimated an output oriented model[4]. The findings confirm the results and in fact suggest that even more firms are operating at decreasing returns to scale.

Tables 11 through 16 reports the results of the second stage regression equations denoted above. To simplify the findings, table 17 is presented to summarize the results of all such regressions. No foreign REIT classification (dummy variable) or percentage of foreign holdings measure is significant with regards to Constant Returns to Scale (CRS) efficiency which denotes overall technical efficiency. The value of utilizing DEA is the ability to decompose the measure

[4] For ease of exposition, I do not report the output oriented results. However, they are nearly identical in all metrics.

into Variable Returns to Scale (VRS) efficiency and scale efficiency. With regards to VRS efficiency, dummy variables for foreign holding REIT (FREIT), European holding REIT (EREIT), and foreign holding REIT outside of Canada and Europe (XREIT) all showed a positive and significant coefficient. This implies that these REITs may possess some degree of actual technical advantage in utilizing inputs (expenses) to generate outputs (assets). Owning properties overseas creates the potential for obvious issues in management and other business operations; it is plausible that these firms have invested in systems and infrastructure that makes them more efficient in overall technical operation. The finding with regards to FREIT is consistent with the findings of the t-tests presented in table 9. This finding of course does not support acceptance of hypothesis 1, and in fact suggests the contrary.

With regards to measures of intensity of foreign investment, I examine the variables FPERC, CPERC, EPERC, and XPERC which measure the percentage of properties located internationally, in Canada, Europe, and internationally but outside of Canada and Europe respectively. Once again, no measure of foreign investing intensity is significant in explaining CRS efficiency. However, neither is any in explaining VRS efficiency. Thus, it appears to be the case that whatever advantage is enjoyed by such firms is static to the firm and not increasing as the intensity of foreign ownership increases. This gives no support for hypothesis 1a.

As noted in the summary statistics presented in table 8, foreign investing REITs are significantly larger in terms of total assets than their domestic only counterparts. Thus it is rational to suspect differences with regards to economies of scale or scale efficiencies may be present. As is shown in the t-tests presented in tables 9 and 10, foreign REITs (FREITs),

Canadian REITs (CREITs), European REITs (EREITs), Foreign excluding Canada and Europe (XREIT), and Global REITs (GREITs), all have significantly lower average scale efficiency scores. Only the smallest and most limited international classification, Exotic Only REITs (ExEREIT) or those with foreign holdings but none in Canada or Europe, had an insignificant t-test. These results hold throughout the secondary regressions presented in tables 15 and 16 and summarized in table 17. Being a foreign holding REIT of all classifications (except ExEREIT) was associated with lower levels of scale efficiency. The result is consistent for all measures intensity of foreign investing implying that increasing one's percentage of assets held overseas also decreased one's scale efficiency. This gives strong support for hypotheses 2a and 2b. Further, given the summary statistics and t-tests, strong support for hypothesis 2 exists as well.

While not the direct mission of this study, there are a few worthy points regarding the findings of the control variables used in the second stage regressions. First debt to asset ratio (DRATIO) is negative and significant in every single second stage regression; meaning it clearly reduced overall technical efficiency (CRS), technical efficiency (VRS), and scale efficiency, a finding consistent with prior literature. This is logical as increased levels of debt generally allow for increased levels of assets to be acquired as is common in the investment real estate industry; and thus increased debt levels increase interest expense which is used in the DEA procedures. Being self-advised (SELF-ADV) is also statistically negatively associated with all three measures of efficiency. A self-advised REIT internalizes all costs of advisory such as headquarters expenses, salaries, benefits, etc. as opposed to an externally-advised REIT that is charged a fee which is normally a fixed percentage of total assets to carry out the same function. In regards to expense management, much of the prior studies referenced herein that test advisory

relationship find the same negative relationship to being self-advised. Primarily investing in net leased (NET LEASE) assets is positively and significantly related to higher levels of CRS and VRS efficiency; this is highly logical as net lease arrangements directly pass many variable expenses of the properties to the tenants and thus is less risky to the owners of the REIT. The variable for self-management (SELF-MAN) was insignificantly related to all measures of efficiency. With regards to the property type control variables, retail was positively and significantly related to higher levels of CRS and hotel was negatively and significantly related to levels of CRS and VRS. Retail properties often have better expense pass-through mechanisms (such as partial net leases) than other property types thus the finding is rational. Hotel properties often incur business operation expenses which can be much more daunting to manage than traditional property operating expenses thus that finding is fairly logical as well.

VI. Discussion and Conclusion

The REIT industry has grown and expanded from a small niche sector to a major asset class that receives investment dollars from large institutions and individual investors across the spectrum; as such REIT assets have grown rapidly over the past twenty years. Over the past few years, international real estate diversification via REIT ownership has become a common topic of discussion by industry practitioners. REIT managers have clearly taken notice as now over 20% of REITs now have foreign properties in their portfolios, up from 7% in 1995 as stated in chapter one. Few if any studies examine the impact of international strategies on REIT efficiency and economies of scale. Further, no recent study has addressed the current operational

efficiencies of REITs given the rapid changes in size, technology, regulation, and internationalization. My study fills some of these gaps in the literature. Specifically, I utilize data envelopment analysis (DEA) to assess current level of operating efficiency of REITs, economies of scale, and the impact that international investing strategies have on these metrics. I find that growth has occurred so rapidly that most REITs are now operating at decreasing returns to scale, a finding that was not the case 10 or 20 years ago. In addition, I find that the REITs with foreign holdings are very large; relatively technically efficient (minimizing costs given their size); however, are very scale inefficient and operate at decreasing returns to scale. In fact, 96% of REITs with foreign holdings are operating at decreasing returns to scale. Further, they are increasing their level of diseconomy of scale as their percentage of properties located internationally is increased. Thus, I conclude the foreign investing REITs may gain some advantages in technical efficiency but lose significantly in scale efficiency. Thus the logic of a REIT growing a portfolio via international diversification as stated by some in the REIT industry seems highly circumspect at best. The notion that a REIT that is investing overseas could become "too large" from an operational standpoint is not hard to rationalize. Why international REITs are more technically efficient but not increasing in intensity is more difficult to understand especially given the loss of scale efficiency that occurs simultaneously. One logical explanation is in the availability and cost of debt financing utilized by these firms. Larger internationally diversified REITs may be enjoy lowering bowering costs and do in fact utilize lower levels of debt (see table 8) and thus generating technical efficiency (interest expense is a component of expenses utilized by the DEA procedures used herein). In summation, this study does not find overall support for REITs to grow larger by diversifying overseas.

CHAPTER THREE: THE EVOLUTION OF TECHNICAL EFFICIENCY AND ECONOMIES OF SCALE OF REAL ESTATE INVESTMENT TRUSTS

I. Introduction

The modern Real Estate Investment Trust (REIT) era is said to have begun in the early 1990's per industry groups such as the National Association of Real Estate Investment Trusts (NAREIT). While various industry participants, academics, and investors often hold differing opinions on the significance of such, all agree that REITs are a major force in the institutional real estate investment world and have opened investing in commercial real estate assets to a much broader, diverse set of investors. In fact, the SNL Real Estate database grows from 73 individual REITs with an average of $172 million in total assets in 1990 to 230 REITs with an average total asset size of over $3 billion in 2010; this growth trend was consistently robust throughout the twenty plus years analyzed. As with any high-growth industry, questions as to best practices, optimal size, optimal scope, and other key firm operational decisions have become hotly debated with often conflicting viewpoints and research to support each side.

There are two distinct viewpoints commonly postulated by REIT analysts and other industry participants including REIT managers. The first is that a REIT is simply a portfolio of properties and thus its value and returns are a simple function of the performance of the underlying portfolio. Under this view, a REIT's managers should build an optimal portfolio according to their management skill and market conditions while minimizing headquarters level

expenses. In essence, this view holds that REITs are simple conduits to direct investments in commercial real estate and that REIT managers do not explicitly add excess value, sometimes referred to as "enterprise value", and only add costs in exchange for their services. According to this view such costs should be minimized to maximize return to investors; this is analogous to many investment professionals' views of the mutual fund industry, in fact this view may describe a REIT as a mutual fund of properties.

The second view postulates that REITs are fully functioning enterprises that can create (or destroy) value along the same lines of any traditional industrial firm. This view contends that REITs not only select and hold properties for the benefit of their shareholders, but that the REIT can generate higher returns by improving operating efficiencies, implementing vertical integration of related services, and a host of other value enhancing activities that require a headquarters level of management to implement (brand name marketing is one such activity, Brady and Conlin, 2004). These divergent views center on a key question, does the real estate know who owns it? In other words, can the owner of property make it perform better simply because they own it (this is distinctly different and unique from property management skill)? There is broad literature that states that the performance of an individual property, and thus a portfolio of properties, is a function of the interactions of the real estate markets and capital markets (Geltner, et. al., 2007 and Phyrr, et. al., 1999); thus, an owner should not be able improve operations simply via acquisition and inclusion into the firm's broader portfolio. Yet, REITs often do at times trade at premiums to Net Asset Value (Anderson, Clayton, MacKinnon,

and Sharma, 2005) implying the market perceives a potential "enterprise" value[5] is sometimes present. Thus research into the characteristics of REITs and resulting impacts on efficiency and performance are highly valuable to researchers, practitioners, and investors focused on REITs and other real estate investment vehicles.

Important questions that have been addressed in the REIT literature and amongst industry participants include proper geographic diversification, property type diversification, and operational characteristics such as use of internal or external advisors and management. One specific line of research has examined technical and scale efficiency of REITs and has returned sometimes conflicting findings dependent on functional forms selected, methods used, and data window analyzed. As will be discussed in the literature review, findings of decreasing returns to scale and increasing returns to scale have been observed in the REIT literature. This paper uses Data Envelopment Analysis (DEA) to present technical and scale efficiency measures using the longest time horizon with the most firms of any study to date. This is made possible by the decision of the data provider, SNL Real Estate, to compile the most comprehensive set of REIT data known and as such some of the data has only been feasibly useable for the last few years. Further, this study uses a single, simple DEA methodology (input orientation) to find the measures of technical and scale efficiency making the results comparable across time. Secondly, this study conducts a series of tests to determine if certain REIT practices, such as property type focus and self-advisory/management, positively or negatively impact efficiency measures.

[5] Justifications and explanations for premiums and discounts to traded REIT Net Asset Values is beyond the scope of this study; however, enterprise value due to headquarters skill/abilities is an often cited justification for a REIT's premium to NAV, however differences exist in explaining such phenomena. Boudry, Kallberg, and Liu (2010), discuss REIT premiums and discount to NAV with regards to REIT security issuance, their finding suggest REITs do time the equity markets which supports the view that REITs can add "enterprise" value via decision making.

This study will show that REITs are increasingly operating at decreasing returns to scale and may in fact have grown increasingly too large. Measures of technical efficiency are highly variant and do not appear to exhibit any discernible patterns over the 21 years analyzed. Since these techniques and resulting measures are based on relative firm efficiencies, it is not conclusive to say that REITs have or have not improved or declined in regards to technical efficiency. Further, the results of the secondary regressions using firm characteristics do yield some interesting insights into potential best practices for REITs. Further, this paper concludes with discussion as to why these measures of efficiencies matter and how it could impact the use and growth of REITs as a dominant vehicle to invest in commercial real estate. Finally, commentary of how these findings support or fail to support the aforementioned debate on the role and purpose of REITs will be provided.

The remainder of this chapter is organized as follows; section II reviews the literature, section III presents the Data Envelopment Analysis (DEA) methods used and presents the efficiency measures; section IV discusses the theories and hypotheses that explain what impacts the calculated efficiency measures; section V presents the data and methodology used to test the stated theories and hypotheses; section VI presents the results of the empirical analysis; and section VII concludes the paper and offers discussion of the results.

II. Literature Review

The cost efficiency concept, defined by deviations from an efficient frontier (often referred to as X-inefficiencies), was first introduced by Leibenstein (1966). Berger et. al. (1993) summarizes how research on technical and cost efficiency was further directed to financial institutions over time. Following such, several studies examine the role of cost efficiencies and economies of scale in the REIT industry. While efficiency studies using various techniques including DEA have been performed since at least the 1960's, the first study into the efficiency of Real Estate Investment Trusts (REITs) is Bers and Springer (1997). This study analyzes the efficiency of the REIT industry from 1992 through 1994 using the translog cost function and finds that economies of scale exist but are widely variant and sensitive to model specification. While this was the first REIT efficiency paper, many other efficiency studies have been published regarding real estate lending, real estate brokerage, and the banking industry; see Anderson, Lewis, and Springer (2000) for a review of this literature. Ambrose, et. al. (2000) utilizes a subset of 41 multifamily equity REITs from 1990 through 1997 and finds no size economies exists. Yang (2001) analyzes 120 REITs in 1997 utilizing three cost functional forms and finds supporting evidence for economies of scale, but the result is dependent on functional form selected. Lewis, Springer, and Anderson (2003) analyze cost efficiencies of REITs from 1995 to 1997 with a Bayesian stochastic frontier model; this study finds that REITs are relatively cost efficient and face increasing returns to scale. Ambrose, Highfield, and Linneman (2005) find evidence of lower costs and hence higher efficiencies in REITs following mergers and consolidations; further, they utilize stochastic frontier methods to determine potential economies

of scale from data on REITs spanning 1990 through 2001. The first study to offer evidence of decreasing returns to scale in the REIT industry is Miller, Clauretie, and Springer (2006) which utilizes a stochastic frontier with a panel data methodology on REIT data from 1995 to 2003; their study further suggested that inefficiency may have increased over time. This result is further extended by Miller and Springer (2007) utilizing a similar panel data driven stochastic frontier methodology on REITs from 1995 to 2003 as well. Stochastic frontier estimation methods are also used on a dataset of REITs from 1998 to 2005 by Chung, Fung, and Hung (2010); this study finds average inefficiency of REITs to be around 45.5% and that increased institutional ownership can reduce inefficiency over time.

The first paper to utilize DEA on REITs is Anderson et. al. (2002). This study analyzed technical efficiency and economies of scale of the REIT industry from 1992 through 1996 and finds REITs are relatively inefficient due to both failures to utilize inputs efficiency and achieve proper economies of scale. This paper further suggests that REITs are operating at increasing returns to scale and can improve overall efficiency by becoming larger. Topuz, Darrat, and Shelor (2005) investigate technical, allocative, and scale efficiencies using DEA procedures on a data set of REITs spanning 1989 to 1999. This paper also finds that REITs are largely inefficient and explains that restrictive regulation and tax codes may be partially to blame. In contrast to Anderson et. al. (2002) this paper finds evidence of decreasing returns to scale; however the authors do reconcile this disagreement of findings by stating the scale diseconomies are largely evident in the late 1990s and that the dataset utilized by Anderson et. al. (2002), (years 1992 to 1996) corresponds to a U-shaped pattern of performance also evidenced by the broader macro economy. Topuz and Isik (2009) extend this finding by using a DEA type method that calculates

change in efficiency overtime by each individual firm utilizing the same data window, 1989 to 1999. This paper suggests REITs do make significant strides towards improving efficiency but technologies overall do not maintain or evolve; they suggest REITs aggressive growth tactics may not be as successful as desired.

In all, it is clear that there is substantial disagreement on the operating efficiency of REITs and on the scale efficiencies of REITs. The problems here are manifold. First, none of the aforementioned studies utilize data for the last 5 years and the majority of studies utilize data from the 1990s. The rapid changes in the regulatory environment, combined with changes in technology and the average size of the REITs since this time certainly creates issues and thus it is unlikely that the prior studies are able to capture how scale efficient REITs have become today. As such, I utilize the longest, most consistent and current series of data (SNL Real Estate data from 1990 through 2010) to determine if all of these changes have impacted the overall technical and scale efficiency of REITs. On the scale side, I overcome many of the estimation weaknesses of the prior studies. First, I avoid trying to specify a functional form that is needed in the parametric stochastic frontier studies denoted above; which if poorly specified can impact scale measures. Additionally, for the first time in the real estate literature, I employ a more sophisticated DEA technique that can more accurately denote if firms are operating at increasing, constant, or decreasing returns to scale. The past studies had the potential to misclassify certain firms[6].

[6] Studies such as Anderson et. al. (2002) utilize input-oriented DEA techniques to classify firms as operating at either increasing, constant, or decreasing returns to scale. Zhu (2009) shows that choice of orientation of the DEA model can lead to different classifications depending on which Region the inefficient REIT lies in after the construction of the frontier (see Figure 7). It is possible that these prior REIT efficiency studies misclassified some

III. DEA Methods and Results

Data Envelopment Analysis (DEA) is a linear programming technique that uses all available data to construct efficiency frontiers and find measurements of Constant Returns to Scale (CRS) efficiency, which represents overall technical efficiency; Variable Returns to Scale (VRS) efficiency, which represents pure technical efficiency or utilization of inputs given the level of outputs; and Scale Efficiency which measures the firm's ability to operate at the minimum cost point on the efficient frontier. Section IV of Chapter two gives an in depth explanation of the exact DEA methods used herein and how such frontiers are created. Decision Making Units (an individual REIT in a specific year) are classified as either operating at increasing returns to scale (IRS), constant returns to scale (CRS), or decreasing returns to scale (DRS) by DEA region (see figures 6 and 7). This study utilizes the input-oriented DEA models, however robustness tests indicate very low levels of disagreement between the results of the input-oriented models presented herein and the results of the output-oriented models ran but omitted from presentation for brevity.

DEA efficiency measures are presented in two distinct fashions in this study. The primary method is by constructing a DEA frontier and taking resulting measurements of CRS, VRS, and scale efficiency year by year using each individual year's set of data. This method creates 21 distinct frontiers, one for each year of analysis. Since technology and industry variables change frequently, it is common practice in DEA studies to calculate frontiers based on one year's data

returns to scale findings given the a priori chosen specification. This paper presents the results of the input orientation DEA models, output orientation models were ran and the classifications made were identical over 90% of the time, thus I have chosen to only present the input oriented results for brevity.

(Anderson, et. al., 2002). Measures of efficiency are relative and thus yearly comparison is generally regarded as valuable in determining best practices while still allowing for improvements and changes in technology to impact the industry at large. The secondary method takes each firm year observation and classifies it as a distinct Decision Making Unit (DMU) and creates a single frontier using all 4,166 firms from the entire dataset. This method's results will be used to better understand the results of the yearly frontier measures and give inference to what has occurred in the REIT industry overtime.

Table 18 presents summary statistics of the REITs analyzed herein and the resulting measures of efficiency from the DEA analyses. Figure 8 graphically depicts the rise in overall level of average total assets and corresponding level of total expenses, further the average expense ratio (total expenses/total assets) trended upwards from starting averages around 15% to a high of nearly 21% in 2006. This suggests the potential of declining cost efficiency; however the measure is considerably variant over the 21 year analysis window. Figure 9 graphically depicts average levels of Constant Returns to Scale (CRS) efficiency by both the yearly and single frontier methods; in general measures of CRS efficiency have been widely variant over the analysis window and show no clear pattern of improvement or degradation via the yearly frontier method. As can be seen in Figure 10, the same can be said for measures of Variable Returns to Scale (VRS) efficiency via the yearly frontier method but not the single frontier method. The single frontier method indicates that firms in the earlier part of the analysis window had a lower measure of VRS efficiency and then the latter part of the sample; 10% from 1990 through 2000, and 14% from 2001 through 2010. While not entirely conclusive, this does support the potential for REITs to be showing improvement in technical efficiency overtime. Scale efficiency

measures, depicted in Figure 11, show a similar situation. The yearly frontier methods are quite wildly variant while the single frontier method shows gradual decline overtime. This gradual decline of scale efficiency is consistent with some prior literature and potentially very meaningful as REITs have grown rapidly in terms of total assets over the same window. This suggests that as REITs have gotten larger they have been increasingly operating at decreasing returns to scale.

Table 18 also presents the percentages of REITs that have been classified as operating at either decreasing, constant, or increasing returns to scale (DRS, CRS, or IRS) according to the DEA measures. On average 71.18% of REITs in the yearly frontiers are operating at DRS which is very similar to the 70.54% found in the single frontier. Correspondingly only 3.36% (0.17%) of firms are operating at CRS per the yearly (single) frontiers and 25.46% (29.29%) at IRS. This is potentially very interesting as the average level of assets for REITs classified as DRS has only steadily rose over the 21 year analysis window, see Figure 12. Level of average assets has also grown for CRS and IRS REITs but not in any uniform pattern, see Figures 13 and 14. This suggests that rapidly expanding assets corresponds with operating at decreasing returns to scale in the REIT industry. Details on the level of average assets by return to scale classification and DEA method used is presented in Table 19.

IV. Theories and Hypotheses

The second part of this study is to explore the impact that various REIT characteristics had upon measures of efficiencies as calculated by the aforementioned Data Envelopment Analysis techniques. Firm characteristics, such as use of debt, have the potential to explain how a firm will be able to utilize assets and otherwise manage costs and thus directly impact levels of technical efficiency which is measured as Variable Returns to Scale (VRS) efficiency in this study. Further, these same characteristics may encourage or otherwise incentivize a firm to increase or decrease its level of assets and thus its scale efficiency. Constant Returns to Scale (CRS) efficiency describes overall technical efficiency and thus relates both pure technical efficiency (VRS) and scale efficiency. The results of how these firm characteristics, which are largely controlled by the REIT's managers, impact the various efficiency measures can give guidance to best practices for REIT management. Additionally, the presence or lack thereof of significant results will give information on the debate about the role of REITs presented in the introduction. If REITs are simple property portfolios, then few of these measures should be significant; if however, many are significant, whether positively or negatively, it gives credence to the theory that REITs do have an impact due to their entity level structure and headquarters apparatus. The following hypotheses are constructed to be tested herein.

Hypothesis 1: As a REIT's debt to asset ratio (DRATIO) increases, its levels of CRS, VRS, and Scale efficiency will decrease.

Incurring more debt necessarily entails the incurrence of additional interest expense which can likely decrease VRS efficiency; further increased levels of debt allow for more assets to be

acquired, thus potentially lowering scale efficiency. Since both VRS and scale efficiency are predicted to be negatively impacted by an increasing debt ratio, a negative sign on CRS efficiency is implicitly predicted as well. This hypothesis is largely consistent with the prior literature as stated in section II of this chapter.

Hypothesis 2: A self-managed REIT (SELF-MAN dummy variable) will have higher levels of VRS efficiency but lower levels of scale efficiency.

When a REIT chooses to bring asset and/or property management functions in house, it is normally doing so to lower overall costs. Thus, technical efficiency should be improved; however, since the employment of a management team typically requires a larger amount of assets to justify such costs, it is rational to predict that scale efficiency will be diminished. Since predictions of VRS and scale efficiency are conflicting there is no prior prediction for CRS efficiency. This variable has found mixed results from prior literature.

Hypothesis 3: A self-advised REIT (SELF-ADV dummy variable) will have lower levels of VRS and scale efficiency and thus CRS efficiency.

When a REIT internalizes the advisor function, it internalizes all the costs associated with headquarters functions such as executive salaries, office space, etc. In practice this is likely to lead to higher expenses and thus lower VRS efficiency. The reason externally advised REITs can potentially operate at lower cost levels is that external advisors typically charge a contracted rate based on a percentage of assets; in practice and in the prior literature these preset percentages of assets tend to be cheaper than the internalized cost of the advisor function. Further, since an

internal advisor creates higher fixed costs, growing larger is a normal response and thus scale efficiency is predicted to be lower as well.

Hypothesis 4: A REIT that primarily invests in net leased assets (NET LEASE dummy variable) will have higher levels of VRS efficiency.

Net leases are contractual structures that pass the bulk of the property operating expenses along with their risk of increase to the tenant and away from the REIT shareholders. The net result is lower expenses and easier management thus lower VRS efficiency is expected. There is no direct prediction for scale and thus CRS efficiency implied. This prediction is consistent with findings in prior literature.

Hypothesis 5: A REIT that specializes in a specific property type (represented by a vector of property type dummy variables with Diversified as the omitted category) will have higher VRS efficiency levels.

Industry participants have long postulated that being a single property type focused REIT should lead to lower levels of expenses as only one set of property type experts need be employed and there are more potential means to find economies of scale and other synergies. Prior literature has addressed the property type issue in multiple ways (dummy variables as in this study and/or use of concentration indices) and generally supports this hypothesis. There is no obvious prediction for scale efficiency and thus no prediction for CRS efficiency.

The final two variables tested do not come with corresponding hypotheses as there does not appear any forthcoming prediction and the literature is absent any findings as these variables

have only recently been made available from SNL Real Estate. The first relates to a finite life REIT (FINITE dummy variable) that defines a REIT with a predetermined liquidation time. The second relates to REITs that are publically registered with the Securities and Exchange Commission but whose shares are privately held or sold via private distribution networks and thus not listed on a public exchange (NON-LIST dummy variable). Both of these characteristics relate to items that directly impact firm structure and thus may have an impact on measures of efficiencies but there is no prior prediction to state. This will be the first study to present such findings to my knowledge.

V. Data and Methodology

The data used in this study comes solely from the SNL Real Estate database and is potentially one of the most comprehensive datasets used in a REIT efficiency or scale economy study. The data window runs from 1990 through 2010 and includes all REITs in the SNL Real Estate database that met the minimum criteria to perform the DEA calculations as outlined in section IV of chapter two. This has yielded a total of 4,166 usable firm year observations (or Decision Making Units, DMUs, in DEA terminology) from 504 unique firms. The reason this dataset can be more complete than prior ones used is SNL Real Estate's endeavor to expand their coverage universe and fill missing gaps in their historical data. This included their decision to begin coverage of the non-listed REITs in 2009.

All other variables used to test the stated hypotheses are also from the SNL Real Estate database and include DRATIO, the debt to asset ratio (total debt/total assets); SELF-MAN, SELF-ADV, FINITE, NET LEASE, and NON-LIST are all firm characteristic dummy variables that related to self-management, self-advised, finite life, primarily hold net leased assets, and non-listed respectively that take the value of one if the characteristic is true; the remaining variables are property type specific variables that take the value of one if true for that REIT. A REIT may only have one primary property type code in the SNL Real Estate database and Diversified is used as the omitted dummy variable. The property type dummy variables include retail (RETAIL), office (OFFICE), industrial (INDUST), residential which includes all multi-family (RESIDENT), healthcare (HEALTH), hotel and resort (HOTEL), self-storage (SELFSTORE), and specialty (SPECIAL).

The following models are run year by year to test the aforementioned hypotheses based on the measures of efficiency obtained via the DEA procedures.

A) $CRSEfficiency_i = a + b_1DRATIO_i + b_2SELFMAN_i + b_3SELFADV_i + b_4FINITE_i + b_5NETLEASE_i + b_6NONLIST_i + B_{7\text{-}13}PROPTYPE(s)_i + e.$

B) $VRSEfficiency_i = a + b_1DRATIO_i + b_2SELFMAN_i + b_3SELFADV_i + b_4FINITE_i + b_5NETLEASE_i + b_6NONLIST_i + B_{7\text{-}13}PROPTYPE(s)_i + e.$

C) $ScaleEfficiency_i = a + b_1DRATIO_i + b_2SELFMAN_i + b_3SELFADV_i + b_4FINITE_i + b_5NETLEASE_i + b_6NONLIST_i + B_{7\text{-}13}PROPTYPE(s)_i + e.$

The same models are also used to test the hypotheses using the efficiency measures from the single frontier DEA procedure.

VI. Results of Empirical Analysis

The regressions testing the yearly frontier measures of CRS efficiency are presented in Table 20, VRS efficiency in Table 21, and scale efficiency in Table 22. These results are further summarized in Table 23 for ease of exposition. The results from the regressions on the single frontier DEA measures are presented in Table 24. The following will summarize the results as they related to the hypotheses stated in section IV.

Debt to asset ratio (DRATIO) is predicted to decrease all measures of efficiency per hypothesis one. With regards to VRS efficiency, the coefficient is negative and significant in 19 out of 21 years analyzed with the yearly DEA measures but insignificant in the single frontier DEA measures regression; for scale efficiency, DRATIO is negative and significant only 3 out of 21 years and actually positive and significant in one year, yet is negative and significant in the single run DEA regression; finally for CRS efficiency, DRATIO is once again negative and significant in all 21 years and in the single run DEA regressions. Thus, hypothesis is largely supported with regards to CRS efficiency with the major source coming from lower VRS efficiency.

Using debt efficiently is something all real estate investors, including REITs, must do. Thus, this finding does not give any definitive information as to whether REITs create value by

utilizing debt, however the fact that increased debt ratios is associated with lower technical efficiency does suggest the potential for certain REIT managers to over utilize leverage.

Hypothesis two postulates that self-management (SELF-MAN) is associated with higher levels of VRS efficiency but lower levels of scale efficiency. The results are nuanced but give insight into how this variable affects efficiency. The coefficient on VRS efficiency is positive and significant in the single run DEA regression as well as in 9 out of 21 years in the yearly set; however it is negative and significant in the year 2010. This theme of fairly consistent findings being revered in the years during and after the most recent real estate crash and resulting recession is one that will reappear for several other variables and be addressed below. As for scale efficiency, SELF-MAN is negative and significant 15 out of 21 years and the same in the single frontier DEA measure. Thus it is rational to conclude that self-management is associated with lower levels of scale efficiency and often with higher levels of VRS efficiency as hypothesized; however the latter claim is subject to nuance and circumstance. Self-management is a unique "REIT" feature and thus the findings of significance on its coefficients in this study suggest that the REIT structure can affect shareholder value directly.

Hypothesis three states that being self-advised (SELF-ADV) will be associated with lower levels of VRS, scale, and thus CRS efficiency. When looking at the results of the single frontier DEA measures, SELF-ADV is negative and significant in all three efficiency measures as predicted. Looking at the yearly frontier measures, it is negative and significant 10 out of 21 years for VRS, 4 out of 21 years for scale, and 17 out of 21 years for CRS. Thus hypothesis three

is largely supported and also strongly shows that REITs are more like regular industrial firms and not pure property investments.

Hypothesis four predicts that REITs that primarily own net leased properties (NET LEASE) will have higher levels of VRS efficiency. Indeed the coefficient on NET LEASE is positive and significant 6 out of 21 years in the yearly frontier tests and positive and significant in the single frontier tests. Similar results for CRS efficiency are found with positive significance in the single frontier model and 5 out of 21 years in the year by year set. There are some mixed findings with regards to scale efficiency, but given the overall CRS findings and VRS findings it appears that the hypothesis is largely supported. This variable relates more the type of property the REIT invests in and not directly to the structure of the firm, thus this gives little information about the value of REIT management.

The final hypothesis, five, relates to the various property type measures tested herein. Overall the results from both the single frontier and yearly frontiers support the general premise that being a property type focused REIT is associated with higher VRS efficiency; 5 (retail, office, industrial, healthcare, and self-storage) out of the 8 property types are positive and significant in the single frontier regression results and in the yearly set 31 out of the 168 potential property type and year combinations (8 property types multiplied by 21 years equals 168) the same result is found. It is only negative and significant for Hotel from the years 2006 through 2010 which is likely due to idiosyncratic factors of the hotel industry[7]. Thus the direct implication of hypothesis five is largely supported but not entirely conclusive. However it is

[7] Hotel REITs typically have more characteristics of operating businesses than other property types carry on average.

bolstered by similar findings in the CRS efficiency measures across all property types. Specific properties that showed positive and significant results for VRS efficiency in the year by year regressions include healthcare (9 out of 21 years), office (6 out of 21 years), and retail (4 out of 21 years). With regards to scale efficiency where no prediction is offered, office, healthcare, and specialty have negatively significant coefficients in the single frontier regression; while results are more sporadic and mixed in the year by year regressions, thus it appears few conclusions can be reached regarding property type and scale efficiency.

Many REITs who focus on a particular property type will routinely advertise themselves as experts or specialists in that field to justify the value and superiority of their corporate management team. If REITs are to be success as integrated operating companies, this is one dimension where they have a very plausible chance to be successful. The fact that some property types did show better technical efficiency (VRS) indicates they may in fact be successful in this regard. The fact that some also showed negative, significant coefficients with regards to scale efficiency also suggest that REIT managers who see themselves as superior experts are more willing to grow large to maximize their perceived benefit without regard to economies of scale.

The final variables tested herein were finite life and non-listed which did not have any corresponding hypotheses. Finite was largely insignificant and sporadic in the yearly frontier regressions but did come in negative and significant for VRS efficiency and positive and significant for scale efficiency in the single frontier regression. Still, there does not appear to be enough evidence to warrant any conclusive statements on the roll FINITE plays on REIT efficiency measures. Non-listed, however, does yield some more interesting results; regarding

VRS efficiency, non-listed's coefficient was positive and significant 7 out of 21 years in the regression on the yearly frontiers measures (it was also negative significant in 2009 and 2010, this trend will be discussed in the conclusion section) and positive and significant in the single frontier regression as well. This is nearly identically matched in the regressions regarding CRS efficiency. As for scale efficiency, NON-LIST is negative and significant for a 6 year stretch from 1993 through 1998 as well as in the single frontier test. Thus given the strong VRS finding and supporting CRS efficiency findings, it is reasonable to conclude the being a non-listed REIT was associated with higher levels of technical efficiency. It is inconclusive with regards to scale efficiency. These variables, like NET LEASE, relate to firm characteristics that are determined during formation and thus do not give direct information with regards to the question of how and to what extent REITs create value beyond the real estate they own.

VII. Discussion and Conclusion

This study has reviewed 21 years of data on Real Estate Investment Trusts (REITs) utilizing Data Envelopment Analysis (DEA) to determine measures of overall technical efficiency or Constant Returns to Scale (CRS) efficiency as well as its decomposed measures of pure technical efficiency or Variable Returns to Scale (VRS) efficiency and Scale Efficiency. According to the various tests and measures presented herein, the REIT industry is still operating at decreasing returns to scale over a vast majority of the study window of 1990 through 2010. This has occurred as the size of the average REIT in all returns to scale classifications, including decreasing, have grown quite rapidly. Further, there is only a small degree of evidence that

suggests REITs are becoming more technically efficient on a relative basis as well. In summation, the REIT industry appears relatively the same after 21 years of growth and modernization according to the efficiency measures presented herein.

This finding may seem surprising but is not an unknown phenomena in efficiency studies utilizing Data Envelopment Analysis techniques in financial industries. A study by Isik and Hassan (2003) shows similar behavior in the Turkish banking industry as banks increase level of assets but fail to improve cost efficiency or scale efficiency; they postulate that such behavior is brought upon by competition between the banks for market share. A similar competitive aspect may likely have driven REITs to grow large without regard to impact on efficiency or other performance metrics. Samuel Zell, the famed chairman of the once largest publically traded office REIT, Equity Office Properties, was quoted as saying "If your're the biggest kid on the block, you can throw your weight around." Zell routinely served as an advocate for REITs growing large and becoming dominant owners of real estate (Johnson, 2009). REITs are competing for both investment dollars from the capital markets in the form of equity and debt and for properties to acquire from the real estate markets. Since, REIT managers are likely subject to personal financial gain along with other non-pecuniary benefits based on increasing firm size, it is easy to rationalize and even expect to see rapid growth without direct regard to issues such as technical or scale efficiency. REITs may in fact exhibit a process known as Red Queen Competition, where firms compete fiercely with each other and make individual gains but are quickly met by competitors thus no firm ever takes a consistent competitive lead (Barnett and Hansen, 1996). The varied results of the yearly frontiers support such a notion.

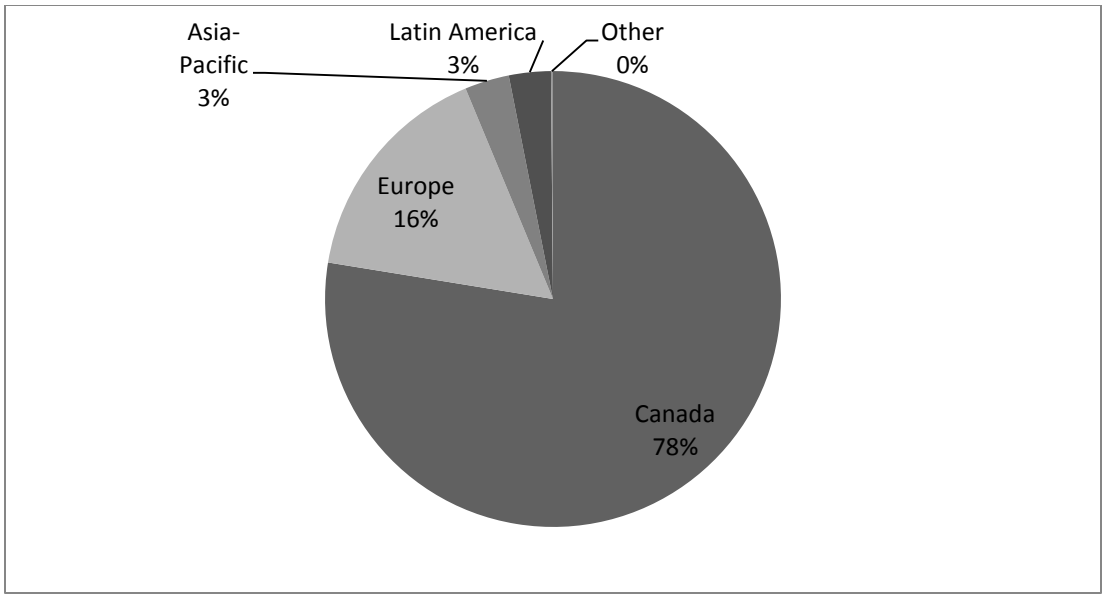
Where do these measures of technical and scale efficiencies along with the results from the secondary regressions leave the state of the debate of the value of REITs presented in the introduction? With regards to the first view of REITs being simple mutual fund-like portfolios that hold properties for investors seeking exposure to direct real estate, there is little to no support that REITs behave as such. If this were the case, one would expect REITs to increasingly operate at constant returns to scale and show improving levels of technical efficiency even if that meant reducing level of total assets. Instead, REITs appear to grow rapidly and as such face decreasing returns to scale a majority of time. When looking at overall technical efficiency which is represented by Constant Returns to Scale (CRS) efficiency, it clear that being self-advised negatively impacted REITs with regards to efficiency. Being a self-advised REIT is analogous to making the REIT operate more like a traditional industrial operating company than just a portfolio of properties. Yet when the REIT takes this characteristic, it does not appear to be doing so successfully[8]. This motivates the question, are REITs in fact the most efficient vehicle to hold investment real estate? It is beyond the scope of this study and not feasible given data constraints, however, it is certainly a question worth considering in future research that can compare REIT investments to other real estate vehicles such as comingled, open-end funds for example.

Finally it is interesting while not surprising to report that the last few years of data, 2007 through 2010, showed some reversals sign and significance for various coefficients on variables used in the secondary regressions. Thus, it appears that the market downturn which greatly

[8] The author fully realizes that being self-advised may provide other benefits to REIT shareholders such as improved incentive alignment that leads to overall, better total returns. This is the argument commonly stated by some industry participants. This question is beyond the scope of this study; however, the results herein do not provide support for such notion.

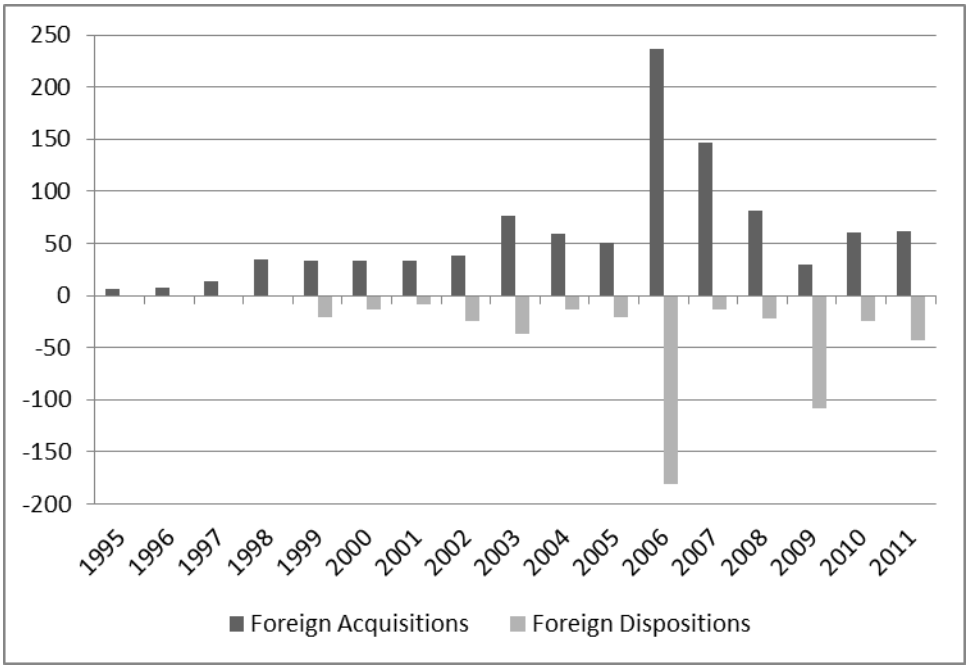
affected real estate market fundamentals and asset pricing also affected technical and operating efficiency of REITs. This point should be kept in mind when analyzing the results presented herein, specifically the role of property type specialization upon the various efficiency measures. A simple view of Table 23 that summarizes the results of all yearly regressions shows that the vast majority of negative and significant entries against the various property types occur in the years 2007 through 2010. Thus, but for the market crash, the findings of increased technical efficiency due to property type specialization may have been stronger. This is similar to a finding in Anderson, et. al. (2012) that shows that diversified REITs can exhibit advantages in poorly performing markets.

APPENDIX A: FIGURES



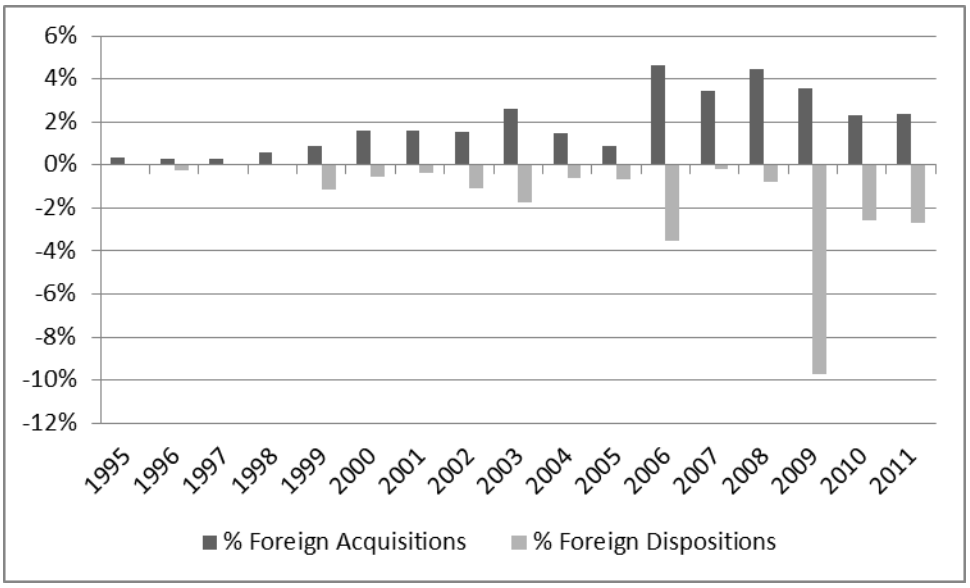
Source: SNL Property Database, Other accounts for 0.14% of regions.

Figure 1: Location of Foreign Held Properties



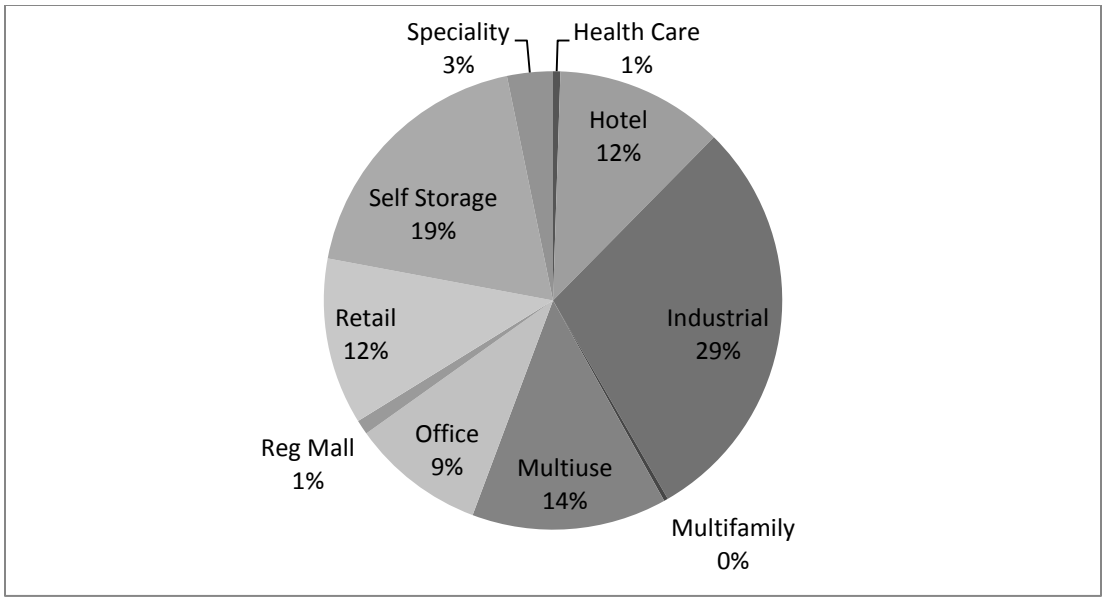
Source: SNL Property Database

Figure 2: Foreign Acquisitions & Dispositions by Year



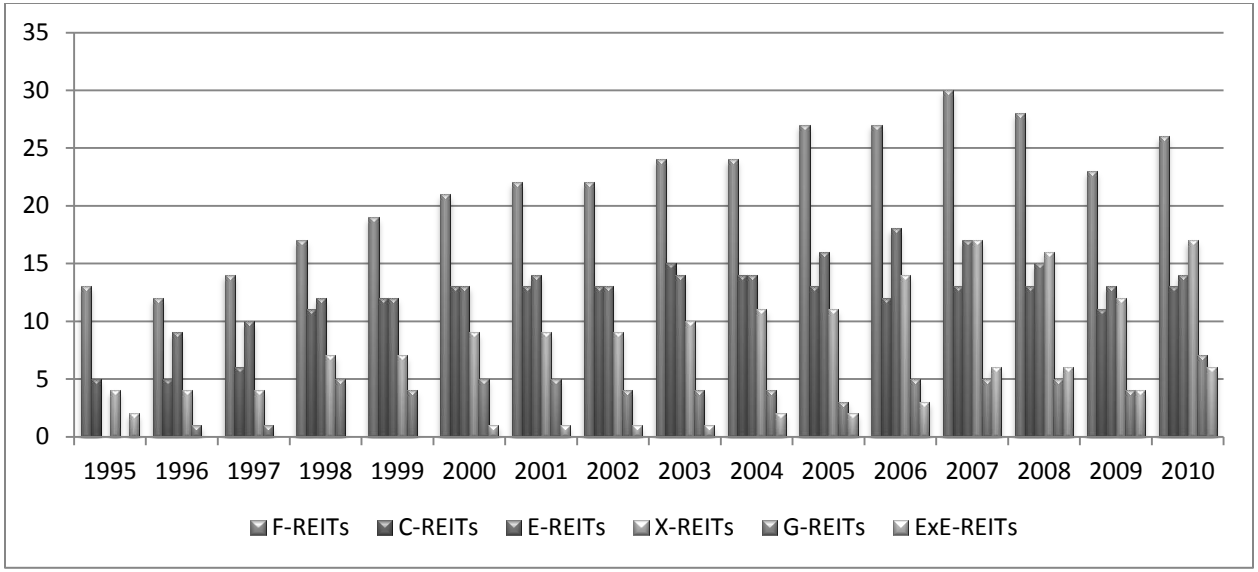
Source: SNL Property Database

Figure 3: Percentage of Total Acquisitions/Dispositions



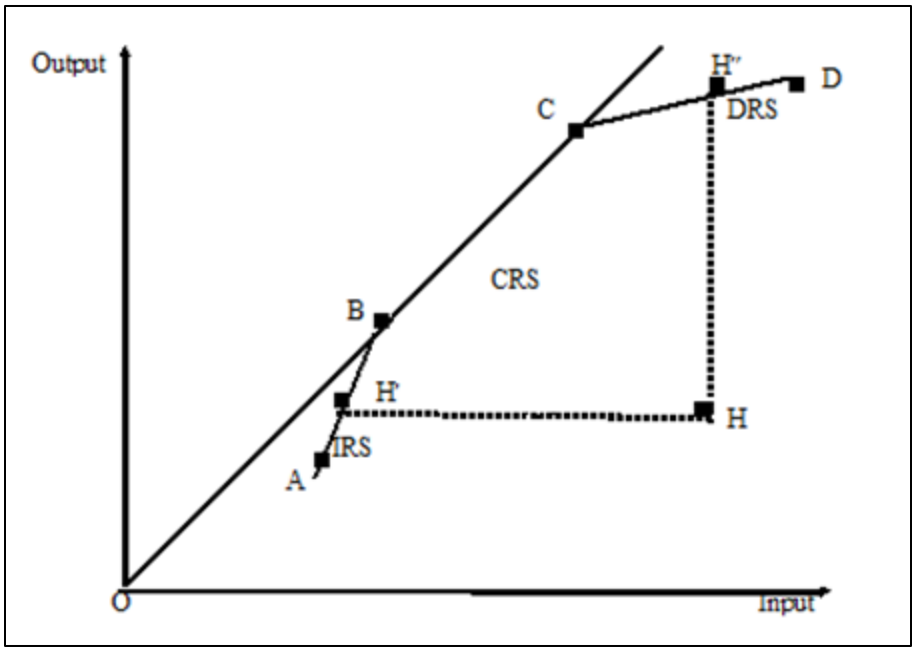
Source: SNL Property Database, Multifamily accounts for 0.29% of all properties.

Figure 4: Foreign Holdings by Property Type



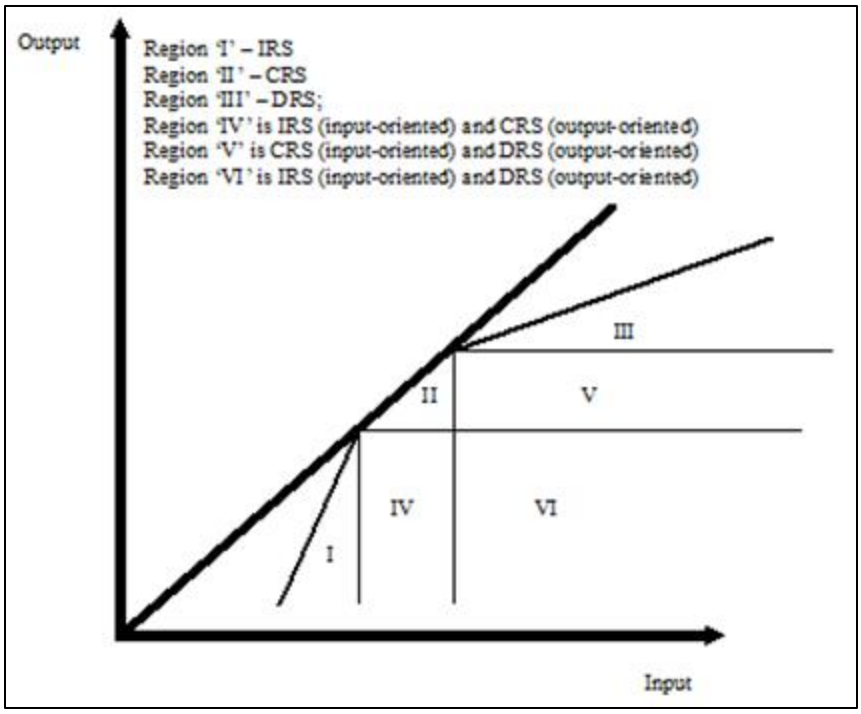
Source: SNL Property Database

Figure 5: Growth of Foreign REITs



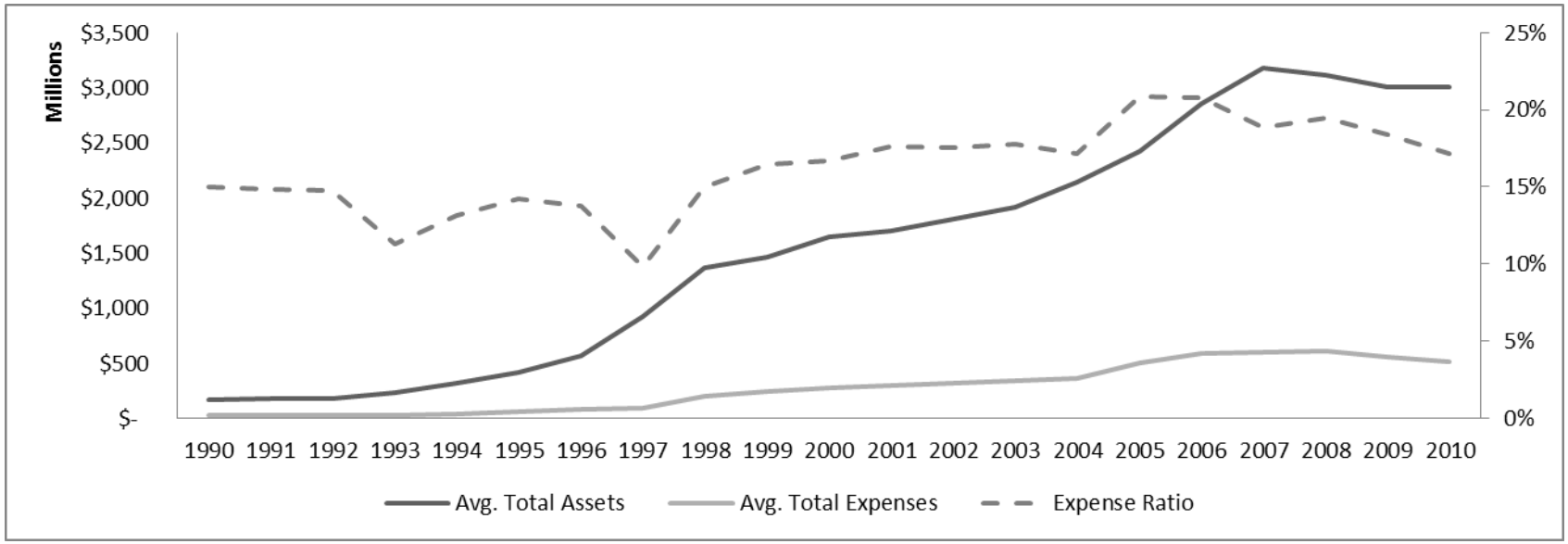
This figure depicts how data envelopment analysis (DEA) creates frontiers using the inputs and outputs of decision making units (DMUs). Assume there are five DMUs, A, B, C, D, and H as shown above. The constant returns to scale (CRS) frontier is defined by the ray OBC. The variable returns to scale frontier is defined by segments AB, BC, and CD collectively. DMUs operating on segment AB display increasing returns to scale (IRS), those on BC exhibit constant returns to scale (CRS), and finally those on CD are displaying decreasing returns to scale (DRS). The classification of an inefficient DMU, such as H depicted above, is contingent on the use of either an output or input oriented model. (Zhu, 2009)

Figure 6: Data Envelopment Analysis Frontiers



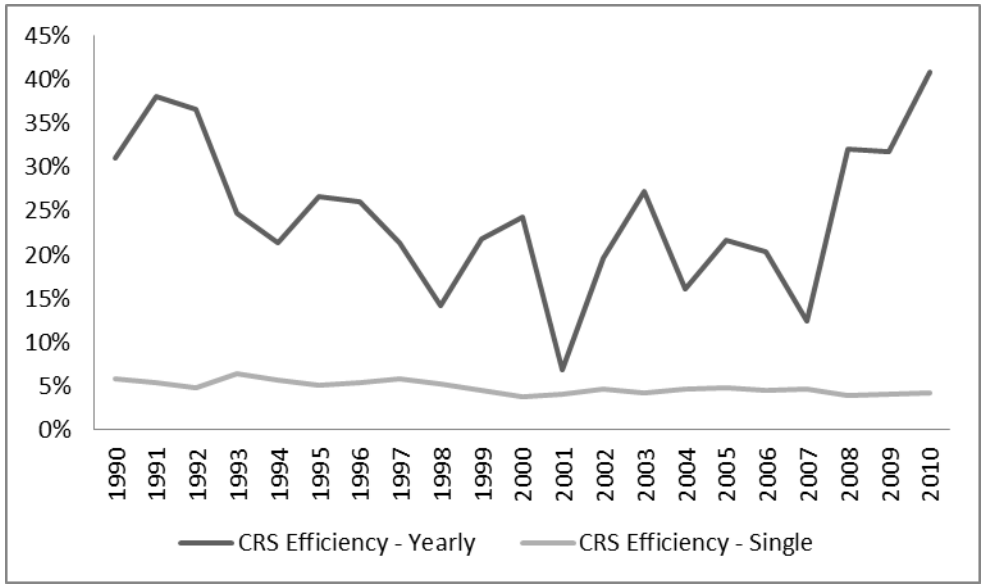
This figure depicts the six different regions inefficient decision making units (DMUs) can fall within via data envelopment analysis (DEA). DMUs in Region I are classified as operating at increasing returns to scale (IRS), those in Region II as operating at constant returns to scale (CRS), and those in Region III as operating at decreasing returns to scale (DRS). The determination of whether a DMU is operating at IRS, CRS, and DRS within Regions IV, V, and VI is determined by whether an input or output oriented model is selected. An input-oriented model would classify DMUs in Regions IV, V, and VI as IRS, CRS, and IRS respectively. An output-oriented model would classify DMUs in Regions IV, V, and VI as CRS, DRS, and DRS respectively. (Zhu, 2009).

Figure 7: Data Envelopment Analysis Regions



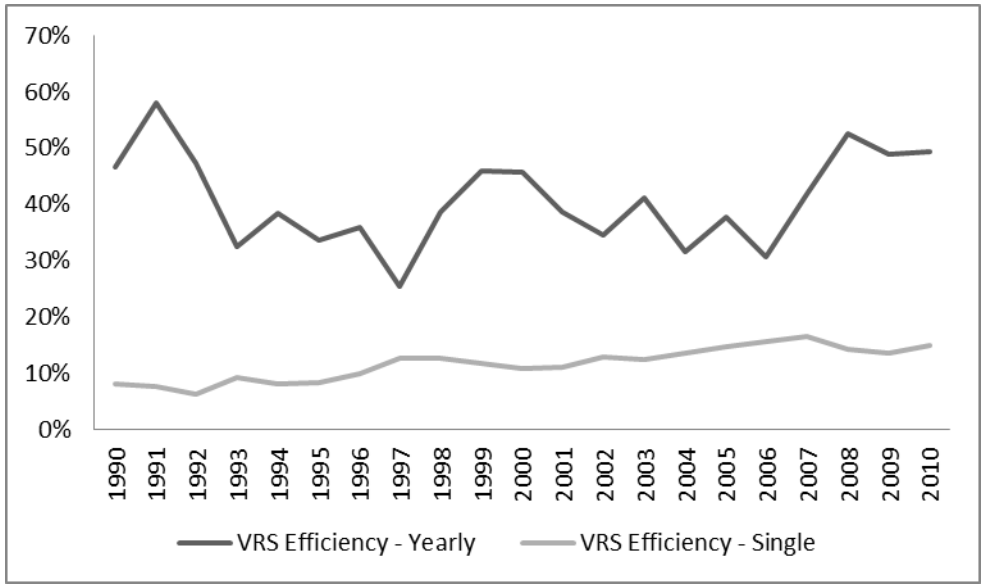
Source: SNL Real Estate

Figure 8: Average Total Assets vs. Total Expenses



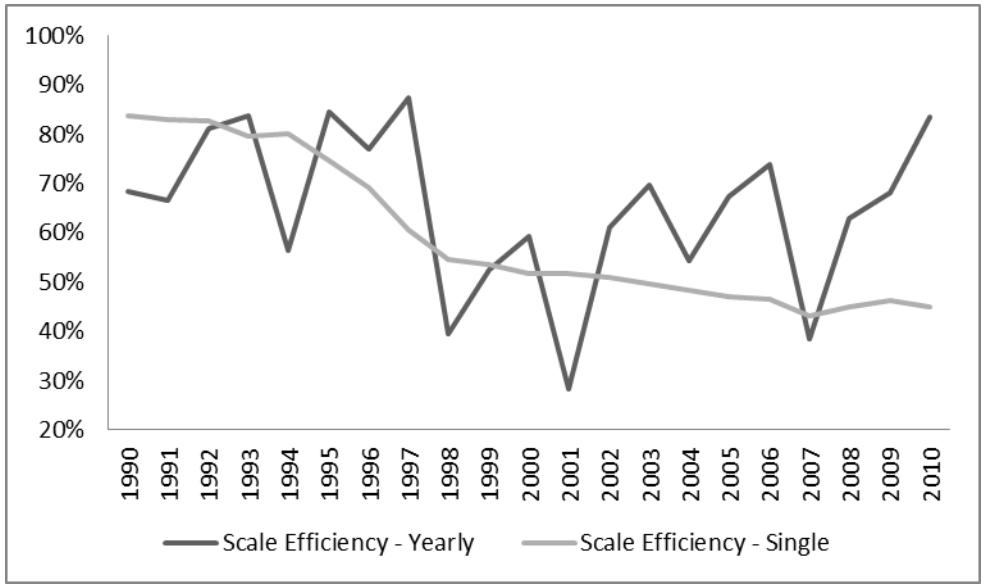
Source: SNL Real Estate

Figure 9: CRS Efficiency Measures



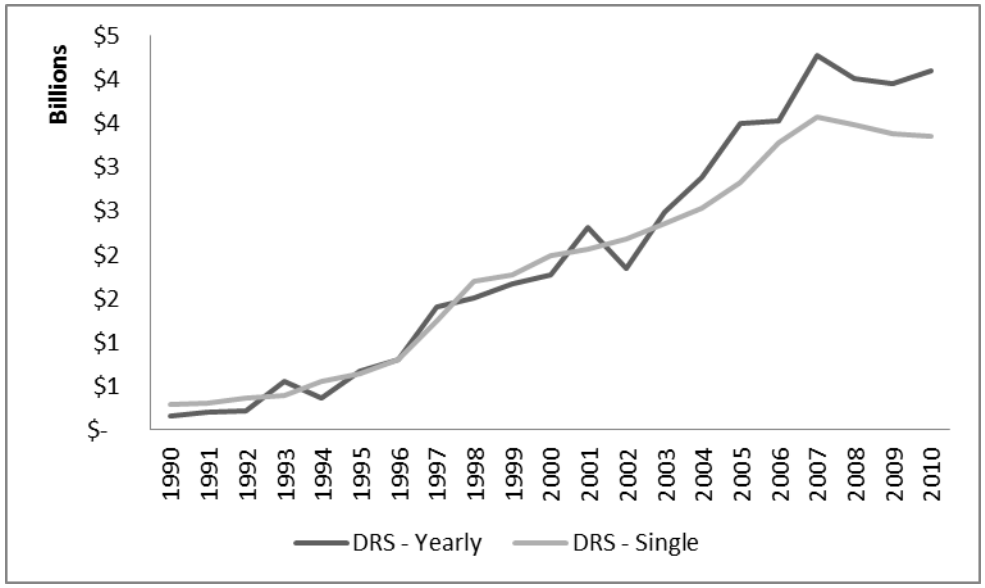
Source: SNL Real Estate

Figure 10: VRS Efficiency Measures



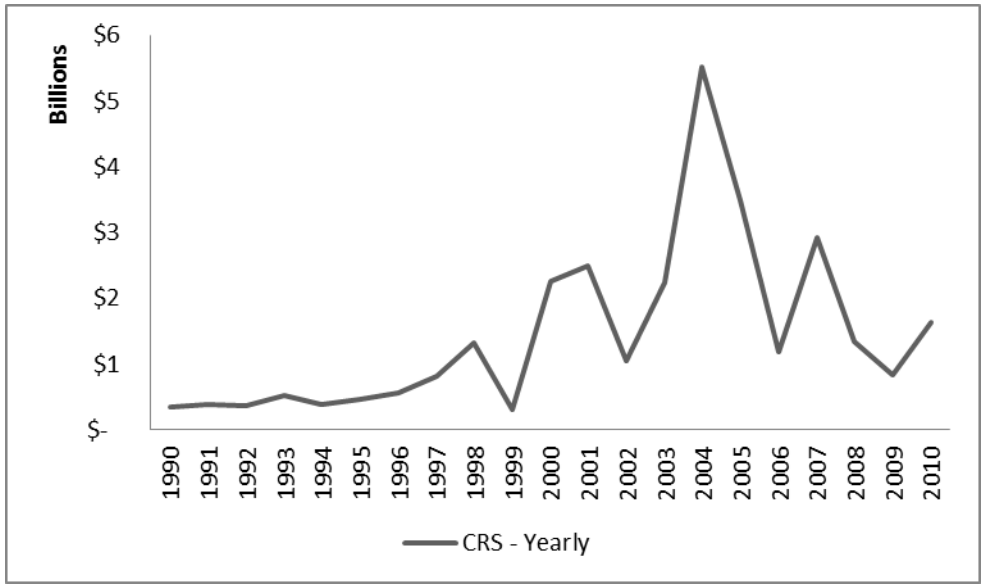
Source: SNL Real Estate

Figure 11: Scale Efficiency Measures



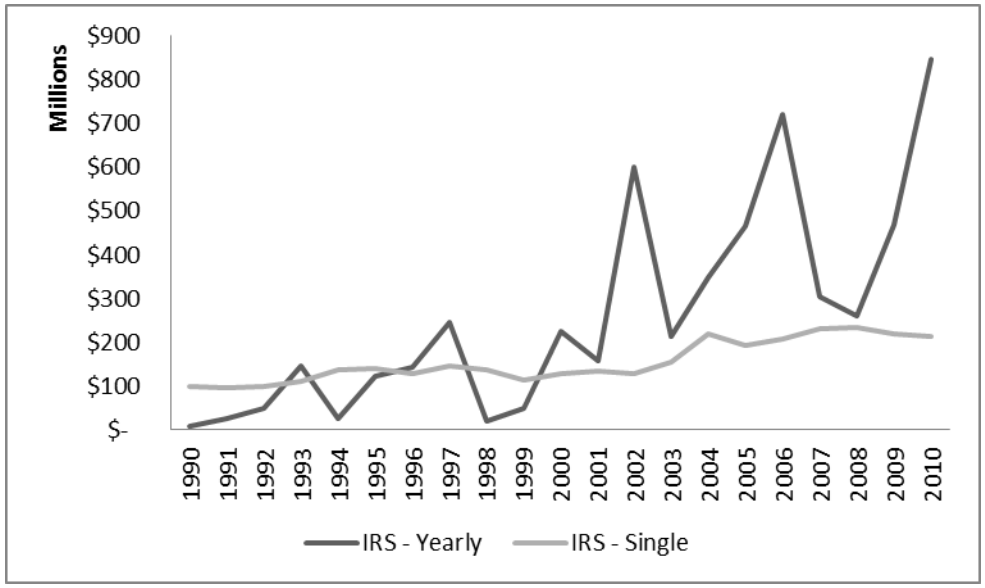
Source: SNL Real Estate

Figure 12: Average Total Assets for DRS REITs



Source: SNL Real Estate

Figure 13: Average Total Assets for CRS REITs



Source: SNL Real Estate

Figure 14: Average Total Assets for IRS REITs

APPENDIX B: TABLES

Table 1: Summary of Foreign Acquisitions and Dispositions by REITs

	Domestic		Foreign (ex. Can)		Europe		Latin America		Asia-Pacific		Foreign % of Total	
Year	Acq.	Dsp.	Acq.	Dsp.	Acq.	Dsp.	Acq.	Dsp.	Acq.	Dsp.	Acq.	Dsp.
1995	1,622	(244)	6	-	5	(1)	1	-	-	-	0.37%	0.00%
1996	2,514	(446)	7	(1)	5	-	2	-	-	-	0.28%	0.22%
1997	5,094	(364)	14	-	8	-	6	-	-	-	0.27%	0.00%
1998	6,181	(416)	35	-	31	-	4	-	-	-	0.56%	0.00%
1999	3,653	(1,796)	33	(21)	28	(20)	5	-	-	-	0.90%	1.16%
2000	2,083	(2,495)	34	(13)	27	(13)	5	-	2	-	1.61%	0.52%
2001	2,043	(2,306)	33	(9)	30	(9)	2	-	1	-	1.59%	0.39%
2002	2,458	(2,197)	38	(24)	33	(22)	4	-	-	(2)	1.52%	1.08%
2003	2,899	(2,104)	77	(37)	73	(31)	1	(6)	3	-	2.59%	1.73%
2004	3,941	(2,204)	59	(13)	43	(11)	8	(2)	8	-	1.48%	0.59%
2005	5,818	(3,181)	51	(21)	32	(15)	15	(3)	4	(1)	0.87%	0.66%
2006	4,869	(4,937)	236	(181)	200	(170)	25	(8)	11	(2)	4.62%	3.54%
2007	4,118	(6,490)	147	(14)	80	(11)	55	(1)	12	(2)	3.45%	0.22%
2008	1,761	(2,782)	82	(22)	41	(16)	29	(3)	12	(3)	4.45%	0.78%
2009	818	(1,000)	30	(108)	14	(8)	8	(2)	8	(98)	3.54%	9.75%
2010	2,514	(919)	60	(24)	23	(12)	6	(8)	31	(4)	2.33%	2.55%
2011	2,548	(1,565)	62	(43)	28	(20)	10	(7)	24	(16)	2.38%	2.67%
Total	54,934	(35,446)	1,004	(531)	701	(359)	186	(40)	116	(128)	1.79%	1.48%

Acquisitions (Acq.) and Dispositions (Dsp.) are based on stated dates from the SNL Property Database. Transactions as a result of a corporate level event, such as a merger or acquisition with other REIT/fund, or buyout by other non-REIT entity, generally do not result in an entry in the SNL Property Database. Domestic refers to all U.S. properties, foreign all non-U.S. excluding Canada, and other regions respectively.

Source: SNL Property Database

Table 2: Summary Statistics – Foreign Holding REITs

Year	Total # of REITs	D-REITs	F-REITs	C-REITs	E-REITs	X-REITs	G-REITs	ExE-REITs	% of total F-REIT	% of total X-REIT
1995	180	167	13	5	-	4	-	2	7.22%	2.22%
1996	175	163	12	5	9	4	1	-	6.86%	2.29%
1997	176	162	14	6	10	4	1	-	7.95%	2.27%
1998	187	170	17	11	12	7	5	-	9.09%	3.74%
1999	201	182	19	12	12	7	4	-	9.45%	3.48%
2000	189	168	21	13	13	9	5	1	11.11%	4.76%
2001	178	156	22	13	14	9	5	1	12.36%	5.06%
2002	173	151	22	13	13	9	4	1	12.72%	5.20%
2003	168	144	24	15	14	10	4	1	14.29%	5.95%
2004	162	138	24	14	14	11	4	2	14.81%	6.79%
2005	165	138	27	13	16	11	3	2	16.36%	6.67%
2006	146	119	27	12	18	14	5	3	18.49%	9.59%
2007	135	105	30	13	17	17	5	6	22.22%	12.59%
2008	133	105	28	13	15	16	5	6	21.05%	12.03%
2009	130	107	23	11	13	12	4	4	17.69%	9.23%
2010	132	106	26	13	14	17	7	6	19.70%	12.88%
Average	164	143	22	11	13	10	4	2	13.84%	6.55%
Std Dev.	23	27	6	3	4	4	2	2	5.04%	3.68%
Min	130	105	12	5	-	4	-	-	6.86%	2.22%
Max	201	182	30	15	18	17	7	6	22.22%	12.88%

This table presents the counts of the number of REITs used in tests. D-REITs counts all REITs with strictly domestic (U.S.) holdings. F-REITs counts all REITs with at least one foreign holding, C-REITs refers to at least one holding in Canada, E-REIT refers to at least one holding in Europe, X-REIT refers to at least one foreign holding not in Canada or Europe, G-REIT refers to a REIT with at least one holding in Canada and Europe and at least one other region (Asia/Latin America/Africa/Middle East), and ExE-REIT refers to a REIT with a foreign holding and zero in Canada or Europe.

Source: SNL Property Database

Table 3: Summary Statistics – Size and Performance

REIT Classification	Average Size (Millions)	Average Monthly Return	Std. Deviation Monthly Return	Risk Adjusted Monthly Return
All REITs	2,294	0.94%	9.88%	0.0953
Domestic Only REITs *(D-REIT)*	1,730	0.98%	9.82%	0.0995
Foreign Holding REITs *(F-REIT)*	5,330	0.62%	10.25%	0.0602
Canadian Holding REITs *(C-REIT)*	4,963	0.53%	10.89%	0.0489
European Holding REITs *(E-REIT)*	6,940	0.88%	9.81%	0.0898
Ex. CAN/EURO REITs *(X-REIT)*	7,700	0.40%	10.24%	0.0387
Global REITs *(G-REIT)*	9,120	0.08%	10.57%	0.0078
Exotic Only REITs *(ExE-REIT)*	3,963	-2.07%	11.70%	(0.1772)

Average size (in Millions of dollars) represents the total assets of REITs in each category as reported by SNL Real Estate. Average monthly return is from CRSP from which standard deviation is calculated. Risk adjusted monthly return is calculated as average monthly return divided by standard deviation of monthly return. Ex. CAN/EURO REITs refer to a REIT with at least one foreign holding outside of Canada or Europe, Global REITs are those with at least one foreign holding in Canada, Europe, and at least one other global region, Exotic Only REITs are those with at least one foreign holding none in Canada or Europe.

Source: SNL Real Estate

Table 4: ROAE Explained by Firm Characteristics

Panel A: Holdings in Foreign Markets

Variable	Coef.	Std. Error	t-value	P-Value
Constant	-0.08	0.13	-0.58	0.56
FREIT	-0.12**	0.06	-2.10	0.04
SIZE	0.01	0.02	0.98	0.33
DTA	-0.55***	0.09	-6.01	0.00
EXPR	0.05***	0.01	5.38	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.92%	16.62	0.00

Panel B: Holdings in Canada

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.16	0.19	0.84	0.40
CREIT	-0.06	0.07	-0.84	0.40
SIZE	0.01	0.01	0.72	0.47
DTA	-0.54***	0.09	-5.96	0.00
EXPR	0.05***	0.01	5.39	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.87%	15.85	0.00

Panel C: Holdings in Europe

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.19	0.19	1.00	0.32
EREIT	0.06	0.07	0.77	0.44
SIZE	0.01	0.02	0.49	0.62
DTA	-0.54***	0.09	-5.87	0.00
EXPR	0.05***	0.01	5.38	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.80%	15.83	0.00

Panel D: Holdings in FX Markets, Ex. CAN/EURO

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.09	0.19	0.47	0.64
XREIT	-0.30***	0.09	-3.46	0.00
SIZE	0.02	0.01	1.11	0.27
DTA	-0.54***	0.09	-5.89	0.00
EXPR	0.05***	0.01	5.37	0.00
PM	0.09***	0.02	5.87	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.77%	18.18	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Panel E: Holdings in CAN/EURO and 1 other FX Market				
Variable	**Coef.**	**Std. Error**	**t-value**	**P-Value**
Constant	0.17	0.19	0.88	0.38
GREIT	-0.02	0.11	-0.17	0.86
SIZE	0.01	0.01	0.66	0.51
DTA	-0.54***	0.09	-5.92	0.00
EXPR	0.05***	0.01	5.38	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.83%	15.72	0.00

Panel F: Holdings in FX Markets, and zero CAN/EURO				
Variable	**Coef.**	**Std. Error**	**t-value**	**P-Value**
Constant	0.14	0.19	0.72	0.47
EXEREIT	-0.45***	0.11	-3.97	0.00
SIZE	0.01	0.01	0.83	0.41
DTA	-0.53***	0.09	-5.88	0.00
EXPR	0.05***	0.01	5.36	0.00
PM	0.09***	0.02	5.87	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	3.25%	18.97	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Return on Average Equity (ROAE) is regressed with firm fixed effects on dummy variables for holding foreign property, FREIT; holding Canadian property, CREIT; holding European property, EREIT; holding foreign property not in Canada or Europe, XREIT; holding property in Canada, Europe, and at least one other global region, GREIT; and holding foreign property with zero holdings in either Canada or Europe, EXEREIT. Firm controls are added to check for potential endogeneity. These include natural log of total assets, SIZE; debt-to-assets ration, DTA; expense ratio, EXPR, and a profitability measure, revenue/net income, PM. For each regression there were 2575 usable observations (firm years) covering 338 unique firms. Analysis window is from 1995 to 2010 and includes firms that came into existence, ceased trading, or survived beyond the analysis window.

Source: SNL Property Database & SNL Real Estate

Table 5: ROAE Explained by Foreign Holding Percentages

Panel A: % of Properties Held in Foreign Markets

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.13	0.19	0.71	0.48
FPERC	-1.73***	0.39	-4.43	0.00
SIZE	0.01	0.01	0.90	0.37
DTA	-0.53***	0.09	-5.86	0.00
EXPR	0.05***	0.01	5.39	0.00
PM	0.10***	0.02	5.90	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.71%	19.77	0.00

Panel B: % of Properties Held in Canada

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.17	0.19	0.88	0.38
CPERC	-0.38	0.62	-0.61	0.54
SIZE	0.01	0.01	0.66	0.51
DTA	-0.54***	0.09	-5.92	0.00
EXPR	0.05***	0.01	5.38	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.85%	15.79	0.00

Panel C: % of Properties Held in Europe

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.13	0.19	0.91	0.37
EPERC	0.28	0.95	0.30	0.76
SIZE	0.01	0.01	0.62	0.54
DTA	-0.54***	0.09	-5.92	0.00
EXPR	0.05***	0.01	5.38	0.00
PM	0.10***	0.02	5.89	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.81%	21.53	0.00

Panel D: % of Properties Held in FX Markets, Ex. CAN/EURO

Variable	Coef.	Std. Error	t-value	P-Value
Constant	0.16	0.19	0.85	0.39
XPERC	-4.14***	0.62	-6.67	0.00
SIZE	0.01	0.01	0.74	0.46
DTA	-0.52***	0.09	-5.77	0.00
EXPR	0.05***	0.01	5.40	0.00
PM	0.09***	0.02	5.91	0.00
	# of Obs	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	2575	2.96%	24.93	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Return on Average Equity (ROAE) is regressed with firm fixed effects on the percentage of properties held in foreign markets, FPERC; properties held in Canada, CPERC; properties held in Europe, EPERC; and foreign properties outside of Canada and Europe, XPERC. Firm controls are added to check for potential endogeneity. These include natural log of total assets, SIZE; debt-to-assets ration, DTA; expense ratio, EXPR, and a profitability measure, revenue/net income, PM. For each regression there were 2575 usable observations (firm years) covering 338 unique firms. Analysis window is from 1995 to 2010 and includes firms that came into existence, ceased trading, or survived beyond the analysis window.

Table 6: Total Return Explained by Market Characteristics and Foreign Holding Status

	1. Results for FREIT			2. Results for CREIT			3. Results for EREIT			4. Results for XREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.001	0.001	1.00	0.000	0.001	-0.03	0.000	0.001	-0.25	0.000	0.001	0.85
FREIT	-0.009***	0.003	-2.71									
CREIT				-0.007*	0.004	-1.76						
EREIT							-0.05	0.05	-0.97			
XREIT										-0.020***	0.006	-3.49
EMR (Rm-Rf)	0.080***	0.017	4.8	0.080***	0.017	4.82	0.080***	0.017	4.81	0.079***	0.017	4.80
SMB	0.174***	0.016	10.88	0.174***	0.016	10.87	0.174***	0.016	10.87	0.174***	0.016	10.89
HML	0.091***	0.021	4.33	0.091***	0.021	4.33	0.091***	0.021	4.33	0.091***	0.021	4.33
MOM	-0.094***	0.010	-9.68	-0.094***	0.010	-9.65	-0.094***	0.010	-9.65	-0.094***	0.010	-9.67
ZIMAN	0.767***	0.015	51.02	0.767***	0.015	51.01	0.767***	0.015	51.01	0.767***	0.015	51.02
EPRA	0.094***	0.013	7.41	0.095***	0.013	7.45	0.095***	0.013	7.46	0.095***	0.013	7.42
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	26.01%	1587.59	0.00	26.04%	1586.77	0.00	26.01%	1586.68	0.00	25.95%	1588.53	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

	5. Results for GREIT			6. Results for EXEREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.000	0.001	0.46	0.000	0.001	0.48
GREIT	-0.019**	0.008	-2.42			
EXEREIT				-0.013**	0.006	-2.38
EMR (Rm-Rf)	0.104***	0.016	6.50	0.104***	0.016	6.49
SMB	0.189***	0.015	12.23	0.189***	0.015	12.23
HML	0.100***	0.021	4.88	0.100***	0.021	4.89
MOM	-0.098***	0.009	-10.35	-0.098***	0.009	-10.38
ZIMAN	0.766***	0.015	51.01	0.729***	0.015	49.88
EPRA	0.093***	0.012	7.44	0.092***	0.012	7.41
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	23.62%	1561.67	0.00	23.64%	1561.64	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Excess total returns (monthly return minus the risk free rate) is regressed with firm fixed effects on dummy variables for holding foreign property, FREIT; holding Canadian property, CREIT; holding European property, EREIT; holding foreign property not in Canada or Europe, XREIT; holding property in Canada, Europe, and at least one other global region, GREIT; and holding foreign property with zero holdings in either Canada or Europe, EXEREIT. EMR is the return on the market minus the 1 month treasury return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor. Each includes the monthly total return on the Ziman Equity REIT Index to control for a U.S. real estate factor and the monthly return on the EPRA Equity REIT index to control for a European real estate factor. For each regression there were 31,632 usable observations (firm months) covering 329 unique firms. Analysis window is from 1995 to 2010 and includes firms that came into existence, ceased trading, or survived beyond the analysis window.

Source: SNL Property Database & SNL Real Estate

Table 7: Total Return Explained by Market Characteristics and Foreign Holding Percentages

	1. Results for FPREC			2. Results for CPERC			3. Results for EPERC			4. Results for XPERC		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.000	0.001	0.82	0.000	0.001	-0.58	0.000	0.001	-0.51	0.000	0.001	0.23
FPERC	-0.100***	0.026	-3.87									
CPERC				-0.064	0.039	-1.66						
EPERC							-0.28	0.06	-0.48			
XPERC										-0.199***	0.045	-4.42
EMR (Rm-Rf)	0.080***	0.017	4.82	0.080***	0.017	4.83	0.080***	0.017	4.82	0.079***	0.017	4.79
SMB	0.174***	0.016	10.88	0.174***	0.016	10.85	0.174***	0.016	10.87	0.175***	0.016	10.79
HML	0.091***	0.021	4.33	0.091***	0.021	4.32	0.091***	0.021	4.33	0.092***	0.021	4.36
MOM	-0.094***	0.010	-9.65	-0.093***	0.010	-9.62	-0.094***	0.010	-9.64	-0.094***	0.010	-9.64
ZIMAN	0.766***	0.015	51.01	0.766***	0.015	51.00	0.767***	0.015	51.01	0.767***	0.015	51.04
EPRA	0.095***	0.013	7.46	0.095***	0.013	7.48	0.095***	0.013	7.46	0.095***	0.013	7.46
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	25.90%	1589.07	0.00	26.05%	1586.70	0.00	26.03%	1586.21	0.00	25.91%	1589.94	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Excess total returns (monthly return minus the risk free rate) is regressed with firm fixed effects on the percentage of properties held in foreign markets, FPERC; properties held in Canada, CPREC; properties held in Europe, EPERC; and foreign properties outside of Canada and Europe, XPERC. respectively. EMR is the return on the market minus the 1 month treasury return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor. Each includes the monthly total return on the Ziman Equity REIT Index to control for a U.S. real estate factor and the monthly return on the EPRA Equity REIT index to control for a European real estate factor. For each regression there were 31,632 usable observations (firm months) covering 329 unique firms. Analysis window is from 1995 to 2010 and includes firms that came into existence, ceased trading, or survived beyond the analysis window.

Source: SNL Property Database & SNL Real Estate

Table 8: Summary Statistics - REIT Expenses and DEA Measures

Firm Variables - Averages	DREITs	FREITs	CREITs	EREITs	XREITs	GREITs	ExEREITs
Number of Firms in Category	99	25	13	13	17	7	6
% of Portfolio Foreign	N/A	12.17%	13.09%	16.49%	15.74%	20.70%	10.77%
Total Assets ($000)	$ 2,747,158	$ 7,848,453	$ 7,232,520	$ 9,851,603	$ 9,476,181	$ 9,257,591	$ 6,486,809
Total Liabilities ($000)	$ 1,647,889	$ 4,273,011	$ 3,834,961	$ 5,473,716	$ 5,405,991	$ 4,893,044	$ 3,343,965
Debt to Asset Ratio	57.92%	52.54%	55.03%	52.41%	53.75%	53.08%	48.07%
Interest Expense ($000)	$ 76,346	$ 207,659	$ 181,010	$ 265,924	$ 263,036	$ 228,953	$ 163,999
General & Admin Expense ($000)	$ 35,456	$ 115,773	$ 111,870	$ 132,897	$ 151,431	$ 169,982	$ 150,374
Other Expense ($000)	$ 383,586	$ 1,257,251	$ 1,296,924	$ 1,636,246	$ 1,674,008	$ 2,115,149	$ 1,351,020
Total Expense ($000)	$ 495,389	$ 1,580,683	$ 1,589,803	$ 2,035,067	$ 2,088,476	$ 2,514,084	$ 1,665,393
DEA Measures - Averages	**DREITs**	**FREITs**	**CREITs**	**EREITs**	**XREITs**	**GREITs**	**ExEREITs**
CRS Efficiency (OTE)	35.10%	33.10%	28.98%	29.09%	30.80%	24.38%	40.52%
VRS Efficiency (TE)	43.78%	51.30%	47.40%	50.11%	50.67%	44.50%	54.39%
Scale Efficiency	80.90%	66.40%	63.99%	60.30%	62.64%	55.96%	72.68%
Decreasing RTS (Dummy)	77.78%	96.00%	100.00%	100.00%	94.12%	100.00%	83.33%
Constant RTS (Dummy)	4.04%	4.00%	0.00%	0.00%	5.88%	0.00%	16.67%
Increasing RTS (Dummy)	18.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

This table presents summary statistics of for 124 REITs analyzed with 2010 data from the SNL REIT databases. Averages of key firm variables and DEA measures are calculated based upon the various REIT classifications used. DREIT refers to those with only domestic (U.S) holdings; FREIT to those with any foreign holdings; CREIT for Canadian holdings; EREIT for European holdings; XREIT for foreign holdings not in Canada or Europe; GREIT for holdings in Canada, Europe, and at least one other global region; and ExEREIT for foreign holdings but none in Canada or Europe. Any item with "dummy" noted below is a dummy variable coded "1" if yes and "0" if no, thus the average would represent the % of properties in each subset with that characteristics. CRS (OTE) and VRS (TE) refers to Constant (Overall Technical Efficiency) and Variable (Technical Efficiency) returns to scale models used to calculate efficiency scores. RTS stands for returns to scale and each REIT is coded as either decreasing, constant, or increasing based on the input-oriented DEA model.

Source: SNL Property Database & SNL Real Estate

Table 9: DEA T-Tests - FREITs Vs. DREITs

	Mean Efficiency		Standard Deviation		T-Test Results	
	FREITs	DREITs	FREITs	DREITs	T-Stat	Significance
CRS Efficiency (OTE)	33.10%	35.10%	20.51%	21.33%	0.4230	N/A
VRS Efficiency (TE)	51.30%	43.78%	25.45%	23.18%	-1.4199	10%
Scale Efficiency	66.40%	80.90%	19.21%	18.27%	3.5075	1%

To test the difference in mean efficiency measures for constant returns to scale (CRS) efficiency (Overall Technical Efficiency or OTE), variable returns to scale (VRS) efficiency (Technical Efficiency or TE), and scale efficiency parametric T-Tests are used with results shown below. Wilcoxon rank-sum (Mann-Whitney) tests are also used and find same results, only T-Test results are presented below. There where 99 observations coded as DREIT, or domestic only REIT and 25 observations coded as FREIT, or foreign REIT, indicating that REIT had at least one property held overseas.

Source: SNL Property Database & SNL Real Estate

Table 10: DEA T-Tests - Alternative REIT Classifications

Canadian REITs	Mean Efficiency		Standard Deviation		T-Test Results	
	CREITs	Non-CREITs	CREITs	Non-CREITs	T-Stat	Significance
CRS Efficiency (OTE)	28.98%	35.37%	11.96%	21.86%	1.0327	N/A
VRS Efficiency (TE)	47.40%	45.05%	21.53%	24.06%	-0.3363	N/A
Scale Efficiency	63.99%	79.61%	14.74%	19.15%	2.8404	1%
European REITs	**Mean Efficiency**		**Standard Deviation**		**T-Test Results**	
	EREITs	Non-EREITs	EREITs	Non-EREITs	T-Stat	Significance
CRS Efficiency (OTE)	29.09%	35.36%	16.92%	21.51%	1.0106	N/A
VRS Efficiency (TE)	50.11%	44.73%	23.52%	23.81%	-0.7706	N/A
Scale Efficiency	60.30%	80.04%	16.34%	18.59%	3.6643	1%
Foreign Ex. CAN/EURO REITs	**Mean Efficiency**		**Standard Deviation**		**T-Test Results**	
	XREITs	Non-XREITs	XREITs	Non-XREITs	T-Stat	Significance
CRS Efficiency (OTE)	30.80%	35.32%	20.36%	21.24%	0.8187	N/A
VRS Efficiency (TE)	50.67%	44.44%	23.95%	23.71%	-1.0038	N/A
Scale Efficiency	62.64%	80.41%	21.00%	17.93%	3.7075	1%
Global REITs	**Mean Efficiency**		**Standard Deviation**		**T-Test Results**	
	GREITs	Non-GREITs	GREITs	Non-GREITs	T-Stat	Significance
CRS Efficiency (OTE)	24.38%	35.32%	7.91%	21.50%	1.3368	10%
VRS Efficiency (TE)	44.50%	45.34%	15.75%	24.18%	0.0913	N/A
Scale Efficiency	55.96%	79.29%	8.61%	18.97%	3.2241	1%
Exotic Only REITs	**Mean Efficiency**		**Standard Deviation**		**T-Test Results**	
	ExEREITs	Non-ExEREITs	ExEREITs	Non-ExEREITs	T-Stat	Significance
CRS Efficiency (OTE)	40.52%	34.40%	31.92%	20.56%	-0.6913	N/A
VRS Efficiency (TE)	54.39%	44.83%	31.25%	23.37%	-0.9612	N/A
Scale Efficiency	72.68%	78.24%	26.28%	18.98%	0.6879	N/A

To test the difference in mean efficiency measures for constant returns to scale (CRS) efficiency (Overall Technical Efficiency or OTE), variable returns to scale (VRS) efficiency (Technical Efficiency or TE), and scale efficiency parametric T-Tests are used with results shown below. Wilcoxon rank-sum (Mann-Whitney) tests are also used and find same results, only T-Test results are presented below. There where 99 observations coded as DREIT, or domestic only REIT and 25 observations coded as FREIT.

Source: SNL Property Database & SNL Real Estate

Table 11: CRS Efficiency Explained by Foreign Holding Status

	1. Results for FREIT			2. Results for CREIT			3. Results for EREIT			4. Results for XREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.978***	0.072	13.57	0.975***	0.071	13.71	0.978***	0.072	13.64	0.980***	0.072	13.63
FREIT	-0.007	0.035	-0.20									
CREIT				-0.031	0.045	-0.68						
EREIT							-0.016	0.045	-0.35			
XREIT										-0.019	0.040	-0.47
DRATIO	-0.686***	0.081	-8.45	-0.685***	0.080	-8.53	-0.687***	0.081	-8.49	-0.688***	0.081	-8.50
SELF-MAN	-0.058	0.043	-1.35	-0.058	0.043	-1.36	-0.058	0.043	-1.35	-0.057	0.043	-1.34
SELF-ADV	-0.261***	0.058	-4.51	-0.261***	0.058	-4.52	-0.260***	0.058	-4.50	-0.263***	0.058	-4.53
NET LEASE	0.057*	0.034	1.67	0.059*	0.034	1.71	0.057	0.034	1.65	0.056	0.034	1.62
RETAIL	0.078*	0.046	1.72	0.0814	0.045	1.79	0.077*	0.046	1.69	0.079	0.045	1.74
OFFICE	0.068	0.047	1.43	0.070	0.047	1.49	0.066	0.048	1.38	0.067	0.047	1.43
INDUSTRIAL	-0.017	0.071	-0.24	-0.005	0.072	-0.07	-0.017	0.069	-0.25	-0.012	0.071	-0.17
RESIDENTIAL	0.105	0.055	1.92	0.108*	0.054	1.99	0.103	0.055	1.87	0.103*	0.054	1.90
HEALTH	0.056	0.056	0.99	0.058	0.056	1.02	0.053	0.057	0.94	0.056	0.056	1.00
HOTEL	-0.074	0.051	-1.46	-0.069	0.051	-1.34	-0.073	0.051	-1.44	-0.072	0.051	-1.40
SELFSTORE	0.003	0.083	0.03	0.003	0.082	0.03	0.003	0.083	0.04	0.000	0.083	0.00
SPECIALTY	-0.028	0.060	-0.46	-0.023	0.060	-0.37	-0.030	0.060	-0.51	-0.025	0.060	-0.41
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	54.13%	12.17	0.00	54.31%	12.25	0.00	54.17%	12.18	0.00	54.21%	12.2	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

	5. Results for GREIT			6. Results for EXEREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.979***	0.071	13.79	0.976***	0.072	13.51
GREIT	-0.064	0.060	-1.06			
EXEREIT				-0.002	0.063	-0.03
DRATIO	-0.690***	0.080	-8.59	-0.684***	0.081	-8.43
SELF-MAN	-0.059	0.042	-1.39	-0.059	0.043	-1.39
SELF-ADV	-0.262***	0.058	-4.54	-0.261***	0.058	-4.49
NET LEASE	0.057*	0.034	1.67	0.057*	0.034	1.66
RETAIL	0.081*	0.045	1.80	0.079*	0.046	1.74
OFFICE	0.068	0.047	1.46	0.069	0.047	1.46
INDUSTRIAL	0.001	0.071	0.01	-0.020	0.069	-0.28
RESIDENTIAL	0.106	0.054	1.96	0.106*	0.054	1.94
HEALTH	0.056	0.056	0.99	0.056	0.056	1.00
HOTEL	-0.063	0.052	-1.22	-0.075	0.051	-1.47
SELFSTORE	0.002	0.082	0.02	0.003	0.083	0.04
SPECIALTY	-0.022	0.060	-0.37	-0.029	0.061	-0.47
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	54.58%	12.37	0.00	54.12%	12.16	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Constant Returns to Scale Efficiency (Overall Technical Efficiency) is regressed on dummy variables for holding foreign property, FREIT; holding Canadian property, CREIT; holding European property, EREIT; holding foreign property not in Canada or Europe, XREIT; holding property in Canada, Europe, and at least one other global region, GREIT; and holding foreign property with zero holdings in either Canada or Europe, EXEREIT. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 12: CRS Efficiency Explained by Foreign Holding Percentages

	1. Results for FPREC			2. Results for CPERC			3. Results for EPERC			4. Results for XPERC		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.977***	0.071	13.71	0.975***	0.071	13.70	0.976***	0.071	13.68	0.977***	0.071	13.72
FPERC	-0.087	0.184	-0.47									
CPERC				-0.522	1.443	-0.36						
EPERC							-0.022	0.391	-0.06			
XPERC										-0.172	0.281	-0.61
DRATIO	-0.686***	0.081	-8.52	-0.685***	0.081	-8.51	-0.684***	0.081	-8.49	-0.685***	0.080	-8.52
SELF-MAN	-0.056	0.043	-1.31	-0.059	0.043	-1.38	-0.059	0.043	-1.36	-0.057	0.043	-1.34
SELF-ADV	-0.262***	0.058	-4.53	-0.261***	0.058	-4.51	-0.261***	0.058	-4.50	-0.262***	0.058	-4.53
NET LEASE	0.056	0.034	1.64	0.059*	0.035	1.70	0.057*	0.034	1.67	0.055	0.034	1.60
RETAIL	0.078***	0.045	1.72	0.081*	0.046	1.77	0.079*	0.046	1.73	0.078*	0.045	1.72
OFFICE	0.067	0.047	1.42	0.069	0.047	1.47	0.068	0.047	1.45	0.067	0.047	1.43
INDUSTRIAL	-0.015	0.070	-0.21	-0.017	0.069	-0.24	-0.020	0.069	-0.28	-0.015	0.069	-0.22
RESIDENTIAL	0.103***	0.054	1.90	0.106*	0.054	1.96	0.105*	0.055	1.93	0.103*	0.054	1.90
HEALTH	0.055	0.056	0.98	0.056	0.056	1.00	0.056	0.056	0.99	0.056	0.056	1.00
HOTEL	-0.069	0.052	-1.34	-0.072	0.051	-1.39	-0.074	0.052	-1.43	-0.070	0.051	-1.36
SELFSTORE	0.002	0.083	0.03	0.003	0.083	0.04	0.003	0.083	0.04	0.001	0.083	0.01
SPECIALTY	-0.025	0.060	-0.41	-0.025	0.060	-0.42	-0.029	0.060	-0.48	-0.022	0.060	-0.37
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	54.21%	12.20	0.00	54.17%	12.18	0.00	54.12%	12.16	0.00	54.27%	12.23	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Constant Returns to Scale Efficiency (Overall Technical Efficiency) is regressed on the percentage of properties held in foreign markets, FPERC; properties held in Canada, CPREC; properties held in Europe, EPERC; and foreign properties outside of Canada and Europe, XPERC. respectively. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 13: VRS Efficiency Explained by Foreign Holding Status

	1. Results for FREIT			2. Results for CREIT			3. Results for EREIT			4. Results for XREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.946***	0.093	10.20	0.979***	0.093	10.48	0.954***	0.093	10.28	0.948***	0.093	10.22
FREIT	0.106**	0.045	2.36									
CREIT				0.069	0.059	1.17						
EREIT							0.122**	0.058	2.09			
XREIT										0.118**	0.052	2.28
DRATIO	-0.602***	0.104	-5.76	-0.632***	0.106	-5.98	-0.611***	0.105	-5.83	-0.607***	0.104	-5.81
SELF-MAN	-0.054	0.055	-0.98	-0.039	0.056	-0.69	-0.047	0.055	-0.84	-0.048	0.055	-0.87
SELF-ADV	-0.181**	0.075	-2.43	-0.186**	0.076	-2.45	-0.191**	0.075	-2.55	-0.177***	0.075	-2.36
NET LEASE	0.084*	0.044	1.90	0.080*	0.045	1.77	0.087*	0.044	1.96	0.093**	0.044	2.09
RETAIL	0.080	0.059	1.36	0.062	0.060	1.04	0.081	0.059	1.36	0.067	0.059	1.14
OFFICE	0.085	0.061	1.40	0.068	0.062	1.10	0.093	0.062	1.51	0.079	0.061	1.30
INDUSTRIAL	-0.078	0.091	-0.86	-0.062	0.095	-0.66	-0.049	0.089	-0.55	-0.080	0.091	-0.87
RESIDENTIAL	0.114	0.070	1.62	0.092	0.071	1.30	0.121*	0.071	1.70	0.112	0.070	1.59
HEALTH	0.042	0.073	0.58	0.029	0.074	0.40	0.055	0.074	0.74	0.033	0.073	0.45
HOTEL	-0.134**	0.065	-2.04	-0.140**	0.068	-2.07	-0.136**	0.066	-2.07	-0.146**	0.066	-2.21
SELFSTORE	-0.013	0.106	-0.12	-0.019	0.108	-0.17	-0.020	0.107	-0.19	0.002	0.107	0.02
SPECIALTY	-0.104	0.077	-1.35	-0.099	0.079	-1.25	-0.073	0.077	-0.95	-0.109	0.078	-1.41
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	40.03%	7.31	0.00	37.75%	6.74	0.00	39.39%	6.74	0.00	39.82%	7.26	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

	5. Results for GREIT			6. Results for EXEREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.973***	0.094	10.38	0.968***	0.095	10.18
GREIT	0.072	0.079	0.91			
EXEREIT				0.052	0.083	0.63
DRATIO	-0.628***	0.106	-5.92	-0.626***	0.107	-5.86
SELF-MAN	-0.036	0.056	-0.64	-0.038	0.056	-0.67
SELF-ADV	-0.186**	0.076	-2.45	-0.182**	0.077	-2.37
NET LEASE	0.084*	0.045	1.86	0.085*	0.045	1.88
RETAIL	0.064	0.060	1.08	0.070	0.060	1.16
OFFICE	0.072	0.062	1.16	0.071	0.062	1.15
INDUSTRIAL	-0.052	0.094	-0.56	-0.036	0.091	-0.40
RESIDENTIAL	0.098	0.071	1.37	0.100	0.071	1.39
HEALTH	0.033	0.074	0.44	0.030	0.074	0.40
HOTEL	-0.140**	0.068	-2.05	-0.126*	0.067	-1.88
SELFSTORE	-0.018	0.109	-0.17	-0.015	0.109	-0.14
SPECIALTY	-0.092	0.079	-1.17	-0.094	0.080	-1.17
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	37.44%	6.66	0.00	37.20%	6.61	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Variable Returns to Scale Efficiency (Technical Efficiency) is regressed on dummy variables for holding foreign property, FREIT; holding Canadian property, CREIT; holding European property, EREIT; holding foreign property not in Canada or Europe, XREIT; holding property in Canada, Europe, and at least one other global region, GREIT; and holding foreign property with zero holdings in either Canada or Europe, EXEREIT. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 14: VRS Efficiency Explained by Foreign Holding Percentages

	1. Results for FPREC			2. Results for CPERC			3. Results for EPERC			4. Results for XPERC		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	0.972***	0.093	10.40	0.978***	0.093	10.51	0.973***	0.093	10.40	0.975***	0.094	10.39
FPERC	0.297	0.241	1.23									
CPERC				2.821	1.885	1.50						
EPERC							0.603	0.512	1.18			
XPERC										0.272	0.370	0.73
DRATIO	-0.629***	0.106	-5.95	-0.628***	0.105	-5.97	-0.628***	0.106	-5.95	-0.633***	0.106	-5.97
SELF-MAN	-0.045	0.056	-0.80	-0.039	0.056	-0.70	-0.047	0.057	-0.83	-0.039	0.056	-0.69
SELF-ADV	-0.183**	0.076	-2.41	-0.185**	0.076	-2.45	-0.182**	0.076	-2.40	-0.185**	0.076	-2.43
NET LEASE	0.086*	0.045	1.91	0.073	0.045	1.60	0.084*	0.045	1.87	0.086*	0.045	1.91
RETAIL	0.070	0.060	1.18	0.058	0.060	0.98	0.072	0.060	1.20	0.069	0.060	1.15
OFFICE	0.077	0.062	1.24	0.068	0.061	1.11	0.078	0.062	1.27	0.073	0.062	1.18
INDUSTRIAL	-0.046	0.091	-0.51	-0.047	0.091	-0.52	-0.043	0.091	-0.47	-0.037	0.091	-0.40
RESIDENTIAL	0.105	0.071	1.47	0.095	0.071	1.34	0.106	0.071	1.48	0.101	0.072	1.42
HEALTH	0.036	0.074	0.49	0.034	0.073	0.46	0.039	0.074	0.53	0.033	0.074	0.44
HOTEL	-0.145**	0.068	-2.12	-0.143**	0.067	-2.12	-0.142**	0.068	-2.10	-0.135**	0.068	-1.99
SELFSTORE	-0.016	0.108	-0.15	-0.020	0.108	-0.19	-0.021	0.108	-0.20	-0.016	0.109	-0.14
SPECIALTY	-0.098	0.079	-1.25	-0.103	0.079	-1.31	-0.085	0.078	-1.09	-0.095	0.080	-1.19
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	37.83%	6.76	0.00	38.23%	6.86	0.00	37.76%	6.74	0.00	37.29%	6.63	0.00

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Variable Returns to Scale Efficiency (Technical Efficiency) is regressed on the percentage of properties held in foreign markets, FPERC; properties held in Canada, CPREC; properties held in Europe, EPERC; and foreign properties outside of Canada and Europe, XPERC. respectively. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 15: Scale Efficiency Explained by Foreign Holding Status

	1. Results for FREIT			2. Results for CREIT			3. Results for EREIT			4. Results for XREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	1.085***	0.092	11.84	1.034***	0.093	11.13	1.074***	0.092	11.68	1.086***	0.091	11.95
FREIT	-0.163***	0.044	-3.68									
CREIT				-0.165***	0.059	-2.80						
EREIT							-0.200***	0.058	-3.47			
XREIT										-0.201***	0.051	-3.94
DRATIO	-0.271***	0.103	-2.63	-0.229**	0.105	-2.18	-0.261**	0.104	-2.51	-0.268***	0.102	-2.62
SELF-MAN	-0.027	0.055	-0.50	-0.049	0.056	-0.87	-0.038	0.055	-0.70	-0.036	0.054	-0.66
SELF-ADV	-0.131*	0.074	-1.78	-0.124	0.076	-1.64	-0.115	0.074	-1.55	-0.140*	0.073	-1.91
NET LEASE	-0.009	0.044	-0.20	0.000	0.045	0.01	-0.014	0.044	-0.33	-0.024	0.043	-0.56
RETAIL	0.023	0.058	0.40	0.055	0.059	0.92	0.020	0.059	0.35	0.043	0.057	0.75
OFFICE	0.008	0.060	0.13	0.036	0.061	0.59	-0.008	0.061	-0.13	0.016	0.059	0.27
INDUSTRIAL	0.090	0.090	1.01	0.094	0.094	1.00	0.048	0.089	0.54	0.101	0.090	1.13
RESIDENTIAL	0.041	0.069	0.59	0.078	0.071	1.10	0.027	0.070	0.39	0.042	0.069	0.60
HEALTH	0.039	0.072	0.54	0.061	0.073	0.83	0.017	0.073	0.24	0.053	0.071	0.75
HOTEL	-0.004	0.065	-0.07	0.016	0.067	0.23	0.001	0.065	0.01	0.017	0.065	0.27
SELFSTORE	0.024	0.105	0.23	0.032	0.108	0.30	0.035	0.106	0.33	-0.003	0.105	-0.02
SPECIALTY	0.091	0.076	1.19	0.095	0.079	1.20	0.042	0.076	0.55	0.103	0.076	1.35
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	11.09%	2.18	0.01	6.76%	1.69	0.07	9.98%	2.05	0.02	12.49%	2.35	0.01

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

	5. Results for GREIT			6. Results for EXEREIT		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	1.052***	0.092	11.450	1.055***	0.097	10.89
GREIT	-0.256***	0.078	-3.300			
EXEREIT				-0.102	0.085	-1.20
DRATIO	-0.246**	0.104	-2.370	-0.238**	0.109	-2.19
SELF-MAN	-0.055	0.055	-1.000	-0.052	0.057	-0.91
SELF-ADV	-0.125*	0.075	-1.670	-0.132	0.078	-1.69
NET LEASE	-0.010	0.044	-0.220	-0.012	0.046	-0.25
RETAIL	0.052	0.059	0.890	0.038	0.061	0.62
OFFICE	0.027	0.061	0.450	0.029	0.063	0.46
INDUSTRIAL	0.099	0.092	1.070	0.029	0.093	0.31
RESIDENTIAL	0.066	0.070	0.950	0.062	0.073	0.85
HEALTH	0.051	0.072	0.710	0.058	0.076	0.77
HOTEL	0.031	0.067	0.460	-0.017	0.068	-0.25
SELFSTORE	0.028	0.106	0.260	0.026	0.111	0.23
SPECIALTY	0.088	0.077	1.140	0.079	0.081	0.97
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	9.09%	1.95	0.03	1.41%	1.14	0.34

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Scale Efficiency (CRS Efficiency/VRS Efficiency) is regressed on dummy variables for holding foreign property, FREIT; holding Canadian property, CREIT; holding European property, EREIT; holding foreign property not in Canada or Europe, XREIT; holding property in Canada, Europe, and at least one other global region, GREIT; and holding foreign property with zero holdings in either Canada or Europe, EXEREIT. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 16: Scale Efficiency Explained by Foreign Holding Percentages

	1. Results for FPREC			2. Results for CPERC			3. Results for EPERC			4. Results for XPERC		
Variable	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**	**Coef.**	**Std. Error**	**t-value**
Constant	1.049***	0.093	11.28	1.035***	0.093	11.09	1.043***	0.095	10.99	1.045***	0.094	11.18
FPERC	-0.680***	0.240	-2.83									
CPERC				-4.835**	1.893	-2.55						
EPERC							-0.902*	0.520	-1.74			
XPERC										-0.933**	0.369	-2.53
DRATIO	-0.235**	0.105	-2.24	-0.233**	0.106	-2.21	-0.23064	0.107	-2.15	-0.229**	0.106	-2.17
SELF-MAN	-0.034	0.056	-0.61	-0.051	0.056	-0.91	-0.039	0.058	-0.68	0.037	0.060	0.62
SELF-ADV	-0.132*	0.076	-1.75	-0.125	0.076	-1.65	-0.130*	0.077	-1.68	0.021	0.062	0.35
NET LEASE	-0.015	0.045	-0.33	0.010	0.045	0.22	-0.010	0.046	-0.21	0.042	0.091	0.46
RETAIL	0.035	0.059	0.60	0.057	0.060	0.96	0.035	0.061	0.58	0.054	0.071	0.75
OFFICE	0.016	0.061	0.26	0.034	0.062	0.55	0.018	0.063	0.28	0.052	0.074	0.70
INDUSTRIAL	0.055	0.091	0.61	0.046	0.091	0.50	0.035	0.092	0.38	0.011	0.067	0.16
RESIDENTIAL	0.049	0.071	0.68	0.071	0.071	1.00	0.053	0.073	0.74	0.020	0.109	0.18
HEALTH	0.044	0.073	0.60	0.051	0.074	0.69	0.044	0.075	0.58	0.097	0.079	1.22
HOTEL	0.025	0.068	0.37	0.012	0.067	0.18	0.008	0.069	0.12	-0.045	0.056	-0.80
SELFSTORE	0.026	0.108	0.24	0.035	0.108	0.32	0.036	0.110	0.33	-0.128	0.076	-1.68
SPECIALTY	0.092	0.078	1.18	0.092	0.079	1.17	0.062	0.079	0.78	-0.019	0.045	-0.43
	Adj. R-Sq	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**	**Adj. R-Sq**	**F-Stat**	**P-Value**
Model	6.90%	1.70	0.07	5.71%	1.57	0.10	2.78%	1.27	0.24	5.60%	1.56	0.11

***Significant at the 1% Level **Significant at the 5% Level *Significant at the 10% Level

Each firm's measure of Scale Efficiency (CRS Efficiency/VRS Efficiency) is regressed on the percentage of properties held in foreign markets, FPERC; properties held in Canada, CPREC; properties held in Europe, EPERC; and foreign properties outside of Canada and Europe, XPERC. respectively. DRATIO is the ratio of debt to total assets; SELF-MAN is a dummy variable of one if the REIT is self managed; SELF-ADV is a dummy variable of one if the REIT is self advised; and NET LEASE is a dummy variable of one if the REIT focus on net leased properties. The remaining variables, RETAIL, OFFICE, INDUSTRIAL, RESIDENTIAL, HEALTH, HOTEL, SELFSTORE, and SPECIALITY refer to dummy variables for the specific property type designations as reported by SNL. The omitted property type dummy is DIVERSIFED. There were 124 firms in the sample with data from 2010.

Source: SNL Property Database & SNL Real Estate

Table 17: Summary of DEA Secondary Regressions on Int'l Variables

REIT Classification and Measure	CRS Efficiency	VRS Efficiency	Scale Efficiency
Foreign Holding REITs *(F-REIT)*		+ *(5%)*	- (1%)
% of Holdings Foreign *(F-PERC)*			- (1%)
Canadian Holding REITs *(C-REIT)*			- (1%)
% of Holdings Canadian *(C-PERC)*			- (1%)
European Holding REITs *(E-REIT)*		+ *(5%)*	- (1%)
% of Holdings European *(E-PERC)*			- (1%)
Ex. CAN/EURO REITs *(X-REIT)*		+ *(5%)*	- (1%)
% of Holdings EX C/E *(X-PERC)*			- (1%)
Global REITs *(G-REIT)*			- (1%)
Exotic Only REITs *(ExE-REIT)*			

This table summarizes the results of the various second stage regressions designed to detect the impact of the various measures of foreign REIT classification and measure of holdings. The table shows if each regression returned a statistically significant finding and if so the sign and level of significance is reported. A plus (+) is used to denote a positive coefficient and a minus (-) a negative coefficient. The bottom number in parentheses indicates the significance level.

Table 18: Summary Statistics - REIT Efficiency

Panel A - 1990 to 2000											
Firm Variables - Averages	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Number of REITs	73	79	93	140	208	220	221	216	234	227	214
Total Assets ($000,000)	$ 172	$ 175	$ 182	$ 234	$ 315	$ 414	$ 563	$ 926	$1,369	$1,465	$ 1,645
Total Expense ($000,000)	$ 26	$ 26	$ 27	$ 26	$ 41	$ 59	$ 77	$ 91	$ 205	$ 241	$ 274
Debt to Asset Ratio (%)	46.47%	46.50%	44.89%	44.78%	49.54%	52.83%	51.91%	48.82%	53.28%	55.23%	57.63%
Return on Avg. Assets (%)	1.89%	1.21%	1.16%	2.29%	3.12%	3.45%	3.84%	4.13%	3.52%	3.22%	3.07%
DEA Measures - Averages - Yearly	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
CRS Efficiency (OTE)	30.94%	38.01%	36.52%	24.68%	21.34%	26.63%	26.05%	21.29%	14.11%	21.77%	24.32%
VRS Efficiency (TE)	46.63%	57.89%	47.27%	32.50%	38.41%	33.58%	35.95%	25.45%	38.57%	45.87%	45.72%
Scale Efficiency	68.37%	66.60%	81.13%	83.74%	56.27%	84.54%	76.97%	87.30%	39.49%	52.41%	59.19%
Decreasing RTS (Dummy)	89.04%	75.95%	64.52%	18.57%	81.73%	50.91%	61.54%	57.87%	90.17%	87.67%	89.72%
Constant RTS (Dummy)	6.85%	5.06%	6.45%	2.86%	3.85%	4.55%	4.07%	2.31%	1.28%	1.76%	1.87%
Increasing RTS (Dummy)	4.11%	18.99%	29.03%	78.57%	14.42%	44.55%	34.39%	39.81%	8.55%	10.57%	8.41%
DEA Measures - Averages - Single	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
CRS Efficiency (OTE)	5.82%	5.41%	4.76%	6.47%	5.61%	5.12%	5.32%	5.79%	5.17%	4.56%	3.79%
VRS Efficiency (TE)	8.09%	7.58%	6.44%	9.22%	8.18%	8.37%	9.86%	12.61%	12.61%	11.78%	10.93%
Scale Efficiency	83.73%	83.00%	82.74%	79.51%	80.04%	74.63%	69.05%	60.39%	54.54%	53.53%	51.73%
Decreasing RTS (Dummy)	38.36%	37.97%	32.26%	43.57%	42.31%	54.55%	64.25%	71.76%	79.06%	81.94%	81.78%
Constant RTS (Dummy)	1.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%
Increasing RTS (Dummy)	60.27%	62.03%	67.74%	56.43%	57.69%	45.45%	35.75%	28.24%	20.51%	18.06%	18.22%

Panel B - 2001 to 2010											
Firm Variables - Averages	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**AVG**
Number of REITs	226	223	229	238	242	224	207	208	214	230	*198*
Total Assets ($000,000)	$1,705	$1,811	$1,920	$2,143	$2,420	$2,860	$3,177	$3,118	$3,003	$3,006	*$ 1,553*
Total Expense ($000,000)	$ 301	$ 318	$ 341	$ 368	$ 505	$ 594	$ 600	$ 607	$ 553	$ 516	*$ 276*
Debt to Asset Ratio (%)	59.08%	59.40%	56.98%	57.97%	60.85%	59.62%	62.42%	64.07%	60.84%	58.33%	*54.83%*
Return on Avg. Assets (%)	2.12%	1.91%	4.01%	3.17%	0.21%	3.08%	2.49%	0.92%	-0.08%	1.20%	*2.38%*
DEA Measures - Averages - Yearly	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	***AVG***
CRS Efficiency (OTE)	6.86%	19.57%	27.11%	16.11%	21.56%	20.25%	12.48%	32.06%	31.78%	40.81%	*24.49%*
VRS Efficiency (TE)	38.74%	34.45%	41.23%	31.68%	37.82%	30.72%	41.85%	52.51%	48.84%	49.39%	*40.72%*
Scale Efficiency	28.26%	61.06%	69.57%	54.23%	67.16%	73.82%	38.50%	62.77%	68.06%	83.39%	*64.90%*
Decreasing RTS (Dummy)	70.80%	97.31%	72.05%	65.97%	59.92%	75.89%	71.98%	75.48%	72.43%	65.22%	*71.18%*
Constant RTS (Dummy)	0.88%	1.79%	3.49%	2.52%	4.55%	3.13%	0.97%	3.37%	3.74%	5.22%	*3.36%*
Increasing RTS (Dummy)	28.32%	0.90%	24.45%	31.51%	35.54%	20.98%	27.05%	21.15%	23.83%	29.57%	*25.46%*
DEA Measures - Averages - Single	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	***AVG***
CRS Efficiency (OTE)	4.13%	4.64%	4.18%	4.66%	4.78%	4.53%	4.60%	3.99%	4.11%	4.22%	*4.84%*
VRS Efficiency (TE)	11.05%	13.00%	12.47%	13.57%	14.83%	15.65%	16.67%	14.33%	13.65%	14.96%	*11.71%*
Scale Efficiency	51.64%	50.81%	49.60%	48.39%	46.86%	46.47%	43.05%	44.89%	46.29%	44.79%	*59.32%*
Decreasing RTS (Dummy)	81.42%	82.06%	80.35%	83.61%	84.71%	86.61%	88.41%	88.94%	88.32%	89.13%	*70.54%*
Constant RTS (Dummy)	0.44%	0.45%	0.00%	0.00%	0.41%	0.00%	0.48%	0.00%	0.00%	0.00%	*0.17%*
Increasing RTS (Dummy)	18.14%	17.49%	19.65%	16.39%	14.88%	13.39%	11.11%	11.06%	11.68%	10.87%	*29.29%*

This table presents summary statistics of the REIT data analyzed from 1990 through 2010 via the SNL REIT databases. Averages of key firm variables and DEA measures are calculated year by year and then averaged over the 21 year time span (shown as AVG). Any item with "dummy" noted below is a dummy variable coded "1" if yes and "0" if no, thus the average would represent the % of properties in each subset with that characteristics. CRS (OTE) and VRS (TE) refers to Constant Returns to Scale (Overall Technical Efficiency) and Variable (Technical Efficiency) returns to scale models used to calculate efficiency scores. RTS stands for returns to scale and each REIT is coded as either decreasing, constant, or increasing based on the input-oriented DEA model. DEA Measures - Averages - Yearly, refers to the DEA frontiers constructed year by year, DEA Measures - Averages - Single, refers to the single DEA frontier constructed using all 4166 Decision Making Units (DMUs) and then results are averaged by year.

Source: SNL Real Estate

Table 19: Total Assets by RTS Classification

Panel A - 1990 to 2000											
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Decreasing RTS - Yearly Frontier	89.04%	75.95%	64.52%	18.57%	81.73%	50.91%	61.54%	57.87%	90.17%	87.67%	89.72%
Average Total Assets	$ 165	$ 198	$ 223	$ 558	$ 362	$ 666	$ 799	$1,398	$1,498	$1,659	$ 1,765
Decreasing RTS - Single Frontier	38.36%	37.97%	32.26%	43.57%	42.31%	54.55%	64.25%	71.76%	79.06%	81.94%	81.78%
Average Total Assets	$ 293	$ 306	$ 358	$ 392	$ 557	$ 644	$ 805	$1,233	$1,696	$1,763	$ 1,983
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Constant RTS - Yearly Frontier	6.85%	5.06%	6.45%	2.86%	3.85%	4.55%	4.07%	2.31%	1.28%	1.76%	1.87%
Average Total Assets	$ 356	$ 392	$ 372	$ 524	$ 394	$ 460	$ 553	$ 825	$1,324	$ 307	$ 2,255
Constant RTS - Single Frontier	1.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%
Average Total Assets	$ 12	NA	NA	NA	NA	NA	NA	NA	$ 43	NA	NA
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Increasing RTS - Yearly Frontier	4.11%	18.99%	29.03%	78.57%	14.42%	44.55%	34.39%	39.81%	8.55%	10.57%	8.41%
Average Total Assets	$ 7	$ 26	$ 49	$ 147	$ 27	$ 122	$ 143	$ 246	$ 19	$ 48	$ 226
Increasing RTS - Single Frontier	60.27%	62.03%	67.74%	56.43%	57.69%	45.45%	35.75%	28.24%	20.51%	18.06%	18.22%
Average Total Assets	$ 98	$ 95	$ 98	$ 112	$ 137	$ 138	$ 129	$ 146	$ 138	$ 112	$ 129

Panel B - 2001 to 2010											
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**AVG**
Decreasing RTS - Yearly Frontier	70.80%	97.31%	72.05%	65.97%	59.92%	75.89%	71.98%	75.48%	72.43%	65.22%	*71.18%*
Average Total Assets	$2,313	$1,836	$2,483	$2,873	$3,500	$3,520	$4,261	$3,998	$3,950	$4,096	*$ 2,006*
Decreasing RTS - Single Frontier	81.42%	82.06%	80.35%	83.61%	84.71%	86.61%	88.41%	88.94%	88.32%	89.13%	*70.54%*
Average Total Assets	$2,062	$2,179	$2,352	$2,520	$2,819	$3,270	$3,562	$3,477	$3,371	$3,347	*$ 1,857*
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	***AVG***
Constant RTS - Yearly Frontier	0.88%	1.79%	3.49%	2.52%	4.55%	3.13%	0.97%	3.37%	3.74%	5.22%	*3.36%*
Average Total Assets	$2,502	$1,047	$2,231	$5,507	$3,482	$1,188	$2,921	$1,341	$ 826	$1,630	*$ 1,449*
Constant RTS - Single Frontier	0.44%	0.45%	0.00%	0.00%	0.41%	0.00%	0.48%	0.00%	0.00%	0.00%	*0.17%*
Average Total Assets	$ 378	$ 7	NA	NA	$ 887	NA	$ 671	NA	NA	NA	*$ 333*
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	***AVG***
Increasing RTS - Yearly Frontier	28.32%	0.90%	24.45%	31.51%	35.54%	20.98%	27.05%	21.15%	23.83%	29.57%	*25.46%*
Average Total Assets	$ 158	$ 599	$ 214	$ 346	$ 463	$ 720	$ 304	$ 260	$ 467	$ 845	*$ 259*
Increasing RTS - Single Frontier	18.14%	17.49%	19.65%	16.39%	14.88%	13.39%	11.11%	11.06%	11.68%	10.87%	*29.29%*
Average Total Assets	$ 135	$ 128	$ 154	$ 219	$ 191	$ 207	$ 230	$ 234	$ 220	$ 212	*$ 155*

This table presents the percentage REITs based on returns to scale classification by year as determined by both yearly constructed DEA frontiers and a single frontier using all 4166 Decision Making Units (DMUs) over the 21 year analysis window. RTS stands for returns to scale and each REIT is coded as either decreasing, constant, or increasing based on the input-oriented DEA model. Average Total Assets refers to the average of total assets for each category by year as specified. AVG refers to the average of all measures over the 21 year horizon. All Average Total Asset numbers are in millions (000,000).

Source: SNL Real Estate

Table 20: Yearly DEA - CRS Efficiency Explained

Panel A - 1990 to 1996																				
	1990			**1991**			**1992**			**1993**			**1994**			**1995**			**1996**		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.33	-3.61	1%	-0.20	-2.53	5%	-0.29	-2.67	1%	-0.23	-2.74	1%	-0.32	-6.38	1%	-0.29	-6.28	1%	-0.39	-7.21	1%
SELF-MAN	0.088	1.25	-	0.19	2.79	1%	0.02	0.22	-	0.13	2.42	5%	0.05	1.32	-	0.09	2.27	5%	0.09	2.03	5%
SELF-ADV	-0.11	-1.05	-	-0.30	-3.37	1%	-0.02	-0.25	-	-0.12	-1.58	-	-0.10	-2.02	5%	-0.13	-2.49	5%	-0.25	-4.6	1%
FINITE	-0.02	-0.23	-	0.15	1.95	10%	0.04	0.46	-	0.11	1.66	10%	0.01	0.13	-	0.03	0.47	-	0.03	0.46	-
NET LEASE	-0.16	-1.55	-	0.00	-0.01	-	0.02	0.17	-	0.09	1.26	-	0.03	0.6	-	0.09	1.91	10%	0.02	0.53	-
NON-LIST	0.451	3.73	1%	0.25	2.33	5%	-0.01	-0.05	-	0.07	0.95	-	0.07	1	-	0.11	1.67	10%	0.13	2.04	5%
RETAIL	-0.03	-0.33	-	0.07	1.00	-	0.06	0.76	-	0.07	1.13	-	0.06	1.32	-	0.03	0.72	-	0.10	2.2	5%
OFFICE	0.172	1.78	10%	0.11	1.12	-	0.13	1.33	-	0.12	1.59	-	0.12	2.32	5%	0.03	0.51	-	0.17	3.27	5%
INDUST	0.115	1.16	-	0.12	1.32	-	-0.09	-0.73	-	0.02	0.26	-	0.12	2.08	5%	0.02	0.28	-	0.09	1.4	-
RESIDENT	-0.08	-0.9	-	0.06	0.78	-	0.02	0.22	-	0.02	0.30	-	0.08	1.66	10%	-0.03	-0.57	-	0.07	1.42	-
HEALTH	0.306	1.8	10%	0.19	1.19	-	0.13	0.75	-	0.32	2.73	1%	0.08	0.89	-	0.13	1.54	-	0.26	3.25	1%
HOTEL	-0.06	-0.38	-	0.11	0.65	-	-0.03	-0.13	-	0.08	0.48	-	0.37	5.48	1%	0.23	3.29	1%	0.23	3.59	1%
SELFSTORE	-0.04	-0.15	-	0.19	1.49	-	0.11	0.93	-	0.04	0.33	-	0.21	3.39	1%	0.07	0.98	-	0.04	0.58	-
SPECIAL	omitted			omitted			omitted			0.21	1.21	-	-0.01	-0.08	-	-0.08	-0.78	-	0.24	2.56	5%
Constant	0.472	5.25	1%	0.50	5.98	1%	0.46	4.50	1%	0.27	3.36	1%	0.32	5.61	1%	0.41	7.4	1%	0.50	8.31	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	73	0.25	2.89	79	0.26	3.14	92	0.07	1.51	139	0.16	2.87	208	0.31	7.65	220	0.30	7.55	221	0.33	8.80

Panel B - 1997 to 2003																				
	1997			**1998**			**1999**			**2000**			**2001**			**2002**			**2003**	
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.29	-4.80	1%	-0.17	-3.06	1%	-0.26	-4.00	1%	-0.41	-6.79	1%	-0.21	-5.49	1%	-0.29	-4.47	1%	-0.01	-2.58	5%
SELF-MAN	0.05	1.24	-	0.00	0.13	-	0.02	0.44	-	0.05	1.77	10%	-0.01	-0.37	-	-0.03	-0.74	-	-0.05	-1.14	-
SELF-ADV	-0.10	-2.04	5%	-0.09	-2.04	5%	-0.09	-1.85	10%	-0.12	-2.70	1%	-0.01	-0.31	-	-0.19	-3.42	1%	-0.13	-2.05	5%
FINITE	0.02	0.31	-	-0.05	-0.86	-	0.02	0.29	-	0.05	0.72	-	-0.01	-0.15	-	-0.01	-0.07	-	0.06	0.49	-
NET LEASE	0.16	4.15	1%	0.00	-0.02	-	0.01	0.42	-	0.10	3.30	1%	-0.02	-0.82	-	-0.01	-0.43	-	0.02	0.44	-
NON-LIST	0.00	-0.07	-	0.02	0.44	-	0.17	3.34	1%	0.18	4.14	1%	0.05	1.48	-	-0.01	-0.15	-	0.06	0.85	-
RETAIL	0.07	1.64	-	0.04	1.12	-	0.04	0.99	-	0.05	1.37	-	0.00	-0.05	-	0.15	3.27	1%	0.15	2.84	1%
OFFICE	0.09	1.97	5%	0.05	1.29	-	0.04	0.85	-	0.03	0.71	-	0.03	1.00	-	0.16	3.48	1%	0.16	2.92	1%
INDUST	0.05	0.92	-	0.03	0.59	-	0.01	0.19	-	-0.04	-0.70	-	0.00	-0.10	-	0.07	1.07	-	0.14	1.77	10%
RESIDENT	0.00	-0.02	-	0.05	1.11	-	0.02	0.42	-	0.03	0.69	-	-0.01	-0.25	-	0.15	2.99	1%	0.09	1.53	-
HEALTH	0.14	2.15	5%	0.06	1.04	-	0.13	2.09	5%	-0.01	-0.21	-	0.05	1.32	-	0.11	1.92	10%	0.17	2.43	5%
HOTEL	0.01	0.20	-	0.07	1.56	-	0.07	1.45	-	-0.02	-0.43	-	-0.01	-0.22	-	0.05	1.10	-	-0.01	-0.19	-
SELFSTORE	-0.04	-0.48	-	0.00	0.04	-	0.20	2.33	5%	0.13	1.77	-	0.15	2.83	1%	0.08	0.84	-	0.21	1.83	10%
SPECIAL	0.03	0.33	-	-0.01	-0.12	-	0.08	1.18	-	0.05	0.88	-	0.03	0.78	-	0.06	0.75	-	0.01	0.12	-
Constant	0.34	5.56	1%	0.27	4.91	1%	0.37	6.22	1%	0.48	8.87	1%	0.20	5.39	1%	0.45	7.63	1%	0.33	6.16	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	216	0.27	6.56	234	0.03	1.49	227	0.14	3.59	214	0.34	8.92	226	0.16	4.10	223	0.17	4.15	229	0.17	3.06

Panel C - 2004 to 2010																				
	2004			**2005**			**2006**			**2007**			**2008**			**2009**			**2010**		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.34	-5.28	1%	-0.13	-4.07	1%	-0.37	-5.58	1%	-0.11	-2.11	5%	-0.37	-6.52	1%	-0.41	-6.35	1%	-0.64	-10.6	1%
SELF-MAN	-0.02	-0.52	-	-0.01	-0.19	-	-0.02	-0.51	-	-0.02	-0.63	-	-0.04	-1.03	-	-0.07	-1.69	10%	-0.10	-2.62	1%
SELF-ADV	-0.16	-3.09	1%	-0.25	-4.69	1%	-0.08	-1.68	10%	-0.17	-4.57	1%	-0.18	-3.87	1%	-0.19	-3.77	1%	-0.21	-4.39	1%
FINITE	-0.02	-0.18	-	-0.09	-0.69	-	-0.01	-0.07	-	0.02	0.15	-	omitted			-0.11	-0.61	-	0.05	0.29	-
NET LEASE	-0.03	-0.92	-	0.00	0.10	-	0.01	0.42	-	-0.03	-1.18	-	0.07	2.56	5%	0.05	1.73	10%	0.04	1.44	-
NON-LIST	0.03	0.63	-	0.07	1.26	-	0.20	4.31	1%	0.00	0.10	-	0.02	0.50	-	-0.10	-2.10	5%	-0.14	-2.96	1%
RETAIL	0.04	0.91	-	0.01	0.15	-	0.00	-0.01	-	0.04	1.55	-	0.07	1.91	10%	0.06	1.56	-	0.04	1.09	-
OFFICE	-0.01	-0.14	-	0.00	-0.06	-	0.02	0.6	-	0.07	2.19	5%	0.02	0.63	-	0.00	-0.08	-	0.00	-0.02	-
INDUST	-0.02	-0.29	-	0.04	0.51	-	0.00	0.03	-	0.00	0.02	-	-0.11	-1.90	10%	-0.11	-1.69	10%	-0.02	-0.35	-
RESIDENT	-0.02	-0.41	-	-0.05	-1.03	-	0.02	0.39	-	0.01	0.16	-	0.01	0.25	-	0.03	0.68	-	0.01	0.27	-
HEALTH	0.02	0.35	-	-0.02	-0.30	-	0.01	0.17	-	0.02	0.58	-	0.03	0.56	-	-0.01	-0.22	-	-0.03	-0.56	-
HOTEL	-0.01	-0.26	-	-0.08	-1.68	10%	-0.08	-2.14	5%	-0.01	-0.20	-	-0.07	-1.66	10%	-0.10	-2.38	5%	-0.13	-3.08	1%
SELFSTORE	0.12	1.51	-	-0.01	-0.09	-	0.03	0.32	-	0.00	-0.08	-	0.00	0.01	-	-0.04	-0.46	-	-0.13	-1.51	-
SPECIAL	0.02	0.37	-	-0.09	-1.38	-	-0.08	-1.28	-	-0.03	-0.62	-	-0.08	-1.39	-	-0.12	-1.85	10%	-0.04	-0.65	-
Constant	0.51	8.21	1%	0.53	10.24	1%	0.49	8.31	1%	0.33	6.98	1%	0.70	12.29	1%	0.77	12.30	1%	1.04	17.27	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	237	0.19	4.88	241	0.26	7.01	223	0.36	9.84	207	0.25	5.92	208	0.46	14.8	214	0.36	9.40	230	0.47	15.6

This table presents the results of the secondary regressions ran on the yearly DEA measures of Constant Returns to Scale (CRS) Efficiency (Overall Technical Efficiency). DRATIO refers to the debt to total assets ratio. SELF-MAN, SELF-ADV, FINITE, NET LEASE, and NON-LIST are all firm characteristic dummy variables taking the value of 1 if true. All others are property type dummy variables taking the value of 1 if the property type is true. Diversifed is the omitted property type variable. ARS refers to Adjusted R-Square.

Source: SNL Real Estate

Table 21: Yearly DEA - VRS Efficiency Explained

Panel A - 1990 to 1996

	1990			1991			1992			1993			1994			1995			1996		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.33	-3.00	1%	-0.33	-3.72	1%	-0.37	-3.14	1%	-0.47	-4.56	1%	-0.40	-6.06	1%	-0.30	-5.20	1%	-0.45	-6.93	1%
SELF-MAN	0.08	0.98	-	0.16	2.21	5%	0.02	0.26	-	0.14	2.08	5%	0.19	3.54	1%	0.14	2.77	1%	0.17	3.19	1%
SELF-ADV	-0.08	-0.64	-	-0.12	-1.26	-	0.09	0.85	-	-0.08	-0.88	-	-0.15	-2.26	5%	-0.10	-1.59	-	-0.23	-3.45	1%
FINITE	-0.06	-0.57	-	0.10	1.17	-	0.01	0.11	-	0.03	0.42	-	-0.01	-0.18	-	0.05	0.65	-	0.08	1.08	-
NET LEASE	-0.01	-0.10	-	0.06	0.55	-	0.19	1.62	-	-0.04	-0.40	-	0.14	2.21	5%	0.05	0.87	-	0.01	0.19	-
NON-LIST	0.35	2.39	5%	0.27	2.34	5%	0.03	0.26	-	0.28	2.96	1%	0.14	1.69	10%	0.21	2.47	5%	0.23	2.88	1%
RETAIL	-0.01	-0.13	-	0.05	0.63	-	0.08	0.97	-	0.03	0.40	-	0.10	1.64	10%	0.02	0.34	-	0.10	1.77	10%
OFFICE	0.25	2.16	5%	0.15	1.44	-	0.17	1.56	-	0.18	1.91	10%	0.11	1.60	-	0.04	0.69	-	0.22	3.52	1%
INDUST	0.06	0.50	-	0.04	0.40	-	-0.12	-0.92	-	0.09	0.85	-	0.16	2.10	5%	-0.01	-0.13	-	0.05	0.67	-
RESIDENT	-0.05	-0.52	-	0.02	0.22	-	0.08	0.81	-	0.00	0.06	-	0.14	2.30	5%	-0.03	-0.56	-	0.06	1.04	-
HEALTH	0.45	2.20	5%	0.21	1.20	-	0.18	0.99	-	0.34	2.40	5%	0.32	2.71	1%	0.11	1.03	-	0.34	3.56	1%
HOTEL	0.07	0.38	-	0.03	0.14	-	0.15	0.68	-	0.40	1.88	10%	0.39	4.45	1%	0.27	3.09	1%	0.31	4.05	1%
SELFSTORE	-0.01	-0.05	-	0.19	1.36	-	0.25	1.87	10%	0.10	0.78	-	0.20	2.46	5%	0.05	0.55	-	0.06	0.63	-
SPECIAL	omitted			omitted			omitted			0.49	2.30	5%	0.00	0.04	-	-0.04	-0.32	-	0.25	2.16	5%
Constant	0.58	5.39	1%	0.64	6.91	1%	0.45	4.04	1%	0.42	4.15	1%	0.43	5.72	1%	0.43	6.14	1%	0.53	7.32	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	73	0.21	2.48	79	0.27	3.25	92	0.19	2.65	139	0.21	3.62	208	0.28	6.65	220	0.20	4.83	221	0.32	8.44

Panel B - 1997 to 2003

	1997			1998			1999			2000			2001			2002			2003		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.28	-3.77	1%	-0.46	-5.13	1%	-0.41	-4.04	1%	-0.51	-4.84	1%	-0.53	-5.70	1%	-0.55	-5.72	1%	0.00	0.85	-
SELF-MAN	0.07	1.54	-	0.03	0.48	-	0.11	2.00	5%	0.13	2.34	5%	0.09	1.69	10%	0.08	1.45	-	0.02	0.42	-
SELF-ADV	-0.14	-2.34	1%	0.02	0.22	-	0.00	0.03	-	-0.10	-1.34	-	-0.05	-0.70	-	-0.19	-2.38	5%	-0.10	-1.24	-
FINITE	0.08	1.06	-	-0.10	-1.03	-	-0.15	-1.25	-	-0.01	-0.04	-	0.00	0.00	-	-0.17	-1.09	-	0.17	1.03	-
NET LEASE	0.12	2.63	1%	-0.01	-0.21	-	0.02	0.35	-	0.13	2.46	5%	-0.01	-0.17	-	-0.05	-0.98	-	0.01	0.20	-
NON-LIST	0.11	1.73	10%	0.08	1.10	-	0.24	3.13	1%	0.15	2.04	-	0.07	0.93	-	0.00	-0.01	-	0.13	1.38	-
RETAIL	0.08	1.57	-	-0.04	-0.59	-	-0.03	-0.43	-	0.09	1.40	-	0.06	0.86	-	0.15	2.22	5%	0.15	2.33	5%
OFFICE	0.13	2.33	5%	0.07	1.13	-	0.05	0.77	-	0.13	1.77	10%	0.11	1.60	-	0.15	2.19	5%	0.11	1.57	-
INDUST	0.08	1.22	-	0.03	0.31	-	0.07	0.73	-	0.14	1.51	-	0.15	1.47	-	0.12	1.22	-	0.21	2.12	5%
RESIDENT	0.02	0.40	-	-0.02	-0.31	-	-0.01	-0.17	-	0.09	1.25	-	0.04	0.52	-	0.11	1.49	-	0.03	0.40	-
HEALTH	0.25	3.18	1%	0.23	2.66	1%	0.24	2.62	1%	0.10	1.13	-	0.15	1.77	10%	0.14	1.60	-	0.19	2.16	5%
HOTEL	0.08	1.26	-	0.09	1.30	-	0.06	0.81	-	0.01	0.13	-	-0.09	-1.26	-	0.04	0.58	-	-0.06	-0.85	-
SELFSTORE	0.09	0.96	-	0.01	0.08	-	0.18	1.37	-	0.05	0.38	-	0.01	0.04	-	0.05	0.35	-	0.10	0.71	-
SPECIAL	0.08	0.78	-	0.22	1.99	5%	0.10	0.89	-	0.09	0.86	-	0.06	0.57	-	-0.02	-0.14	-	0.00	0.00	-
Constant	0.36	4.88	1%	0.56	6.44	1%	0.55	5.91	1%	0.62	6.55	1%	0.64	7.18	1%	0.70	7.90	1%	0.40	5.89	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	216	0.20	8.44	234	0.17	4.47	227	0.15	3.92	214	0.18	4.23	226	0.18	4.54	223	0.16	3.94	229	0.09	2.66

Panel C - 2004 to 2010																				
	2004			**2005**			**2006**			**2007**			**2008**			**2009**			**2010**		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.41	-4.81	1%	-0.01	-0.14	-	-0.39	-3.78	1%	-0.41	-3.67	1%	-0.55	-6.72	1%	-0.52	-6.13	1%	-0.66	-9.87	1%
SELF-MAN	0.06	1.34	-	0.11	2.27	5%	0.06	1.14	-	0.08	1.24	-	0.01	0.15	-	-0.02	-0.31	-	-0.07	-1.70	10%
SELF-ADV	-0.19	-2.73	1%	-0.25	-3.42	1%	-0.14	-1.96	10%	-0.12	-1.45	-	-0.16	-2.43	5%	-0.18	-2.82	1%	-0.23	-4.12	1%
FINITE	-0.10	-0.59	-	-0.23	-1.23	-	0.10	0.39	-	-0.19	-0.68	-	omitted			0.18	0.74	-	0.02	0.07	-
NET LEASE	-0.01	-0.16	-	0.07	1.74	10%	0.02	0.53	-	0.06	1.28	-	0.08	2.04	5%	0.08	2.01	5%	0.05	1.53	-
NON-LIST	0.07	0.93	-	0.17	2.33	5%	0.18	2.54	5%	0.05	0.65	-	-0.03	-0.49	-	-0.13	-2.06	5%	-0.15	-2.88	1%
RETAIL	0.03	0.60	-	0.07	1.12	-	-0.05	-0.79	-	-0.01	-0.12	-	0.06	1.12	-	0.07	1.44	-	0.06	1.38	-
OFFICE	-0.04	-0.73	-	0.04	0.59	-	-0.05	-0.83	-	0.07	0.99	-	0.06	1.10	-	0.02	0.32	-	0.02	0.46	-
INDUST	-0.01	-0.16	-	0.15	1.48	-	0.01	0.06	-	0.04	0.34	-	-0.01	-0.12	-	0.00	0.00	-	0.00	-0.03	-
RESIDENT	-0.02	-0.34	-	-0.04	-0.64	-	-0.05	-0.79	-	-0.11	-1.48	-	-0.03	-0.43	-	0.02	0.26	-	0.02	0.48	-
HEALTH	0.00	0.07	-	0.04	0.58	-	-0.02	-0.22	-	-0.12	-1.39	-	-0.04	-0.54	-	0.02	0.28	-	-0.03	-0.58	-
HOTEL	-0.06	-0.93	-	-0.10	-1.56	-	-0.13	-2.18	5%	-0.17	-2.51	5%	-0.19	-3.31	1%	-0.15	-2.64	1%	-0.15	-3.08	1%
SELFSTORE	0.15	1.40	-	0.01	0.11	-	0.00	-0.03	-	-0.07	-0.52	-	0.03	0.25	-	-0.04	-0.36	-	-0.14	-1.42	-
SPECIAL	0.07	0.81	-	0.00	-0.05	-	-0.10	-1.11	-	-0.06	-0.63	-	-0.07	-0.83	-	-0.12	-1.45	-	-0.07	-1.02	-
Constant	0.68	8.26	1%	0.47	6.67	1%	0.64	7.03	1%	0.74	7.13	1%	0.99	12.28	1%	0.96	11.71	1%	1.12	16.73	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	237	0.16	4.3	241	0.19	5.05	223	0.19	4.69	207	0.17	3.92	208	0.36	9.77	214	0.29	7.29	230	0.42	13.0

This table presents the results of the secondary regressions ran on the yearly DEA measures of Variable Returns to Scale (VRS) Efficiency (Technical Efficiency). DRATIO refers to the debt to total assets ratio. SELF-MAN, SELF-ADV, FINITE, NET LEASE, and NON-LIST are all firm characteristic dummy variables taking the value of 1 if true. All others are property type dummy variables taking the value of 1 if the property type is true. Diversifed is the omitted property type variable. ARS refers to Adjusted R-Square.

Source: SNL Real Estate

Table 22: Yearly DEA - Scale Efficiency Explained

Panel A - 1990 to 1996

	1990			1991			1992			1993			1994			1995			1996		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.23	-2.33	5%	0.05	0.57	-	-0.03	-0.32	-	0.22	2.79	1%	-0.17	-3.22	1%	-0.04	-0.77	-	-0.01	-0.12	-
SELF-MAN	0.02	0.23	-	0.09	1.20	-	-0.02	-0.38	-	0.05	0.87	-	-0.16	-3.99	1%	-0.08	-1.82	10%	-0.13	-2.65	1%
SELF-ADV	-0.06	-0.58	-	-0.23	-2.45	5%	-0.14	-1.70	10%	-0.09	-1.21	-	0.03	0.54	-	-0.06	-1.20	-	-0.06	-0.97	-
FINITE	0.03	0.35	-	0.10	1.20	-	0.03	0.41	-	0.07	1.03	-	0.06	1.20	-	-0.07	-1.33	-	-0.13	-1.86	10%
NET LEASE	-0.14	-1.26	-	-0.01	-0.08	-	-0.20	-2.24	5%	0.13	1.83	-	-0.12	-2.33	5%	0.05	1.08	-	0.02	0.43	-
NON-LIST	0.18	1.37	-	0.06	0.52	-	0.00	0.01	-	-0.17	-2.34	1%	-0.15	-2.27	5%	-0.17	-2.55	5%	-0.18	-2.36	5%
RETAIL	-0.03	-0.33	-	0.06	0.79	-	0.02	0.24	-	0.04	0.72	-	-0.07	-1.41	-	0.01	0.11	-	0.00	0.07	-
OFFICE	0.01	0.10	-	-0.01	-0.07	-	-0.02	-0.24	-	-0.07	-0.96	-	0.07	1.24	-	-0.04	-0.70	-	-0.03	-0.48	-
INDUST	0.11	1.09	-	0.10	0.98	-	0.07	0.68	-	0.01	0.07	-	-0.02	-0.38	-	0.02	0.33	-	0.01	0.18	-
RESIDENT	0.03	0.31	-	0.01	0.12	-	0.00	0.03	-	0.01	0.09	-	-0.04	-0.78	-	-0.03	-0.61	-	0.02	0.28	-
HEALTH	-0.01	-0.03	-	0.02	0.12	-	-0.03	-0.23	-	0.06	0.54	-	-0.12	-1.34	-	0.05	0.61	-	-0.06	-0.69	-
HOTEL	-0.03	-0.22	-	0.01	0.06	-	-0.05	-0.31	-	-0.29	-1.76	10%	0.14	2.04	5%	-0.05	-0.69	-	-0.11	-1.56	-
SELFSTORE	-0.04	-0.14	-	0.09	0.66	-	-0.09	-0.83	-	-0.16	-1.60	-	0.08	1.26	-	0.02	0.36	-	-0.02	-0.26	-
SPECIAL	omitted			omitted			omitted			-0.19	-1.14	-	0.03	0.32	-	-0.05	-0.51	-	0.01	0.11	-
Constant	0.82	8.65	1%	0.74	8.23	1%	0.98	11.26	1%	0.78	9.88	1%	0.76	13.00	1%	0.99	17.90	1%	0.95	14.01	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	73	-0.01	0.93	79	-0.04	0.79	92	0.03	1.15	139	0.08	1.86	208	0.32	7.94	220	0.04	1.63	221	0.04	1.59

Panel B - 1997 to 2003

	1997			1998			1999			2000			2001			2002			2003		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.09	-1.40	-	0.10	1.35	-	-0.02	-0.23	-	-0.14	-1.58	-	-0.08	-0.81	-	0.07	0.79	-	-0.01	-2.77	1%
SELF-MAN	-0.04	-1.13	-	-0.08	-1.79	10%	-0.15	-3.30	1%	-0.09	-1.92	10%	-0.07	-1.29	-	-0.18	-3.40	1%	-0.14	-2.68	1%
SELF-ADV	0.02	0.48	-	-0.15	-2.42	5%	-0.14	-2.21	5%	-0.03	-0.54	-	-0.01	-0.06	-	0.03	0.35	-	0.06	0.78	-
FINITE	-0.15	-2.27	5%	0.09	1.10	-	0.25	2.54	5%	0.06	0.58	-	-0.11	-0.66	-	0.18	1.19	-	-0.12	-0.77	-
NET LEASE	0.07	1.67	10%	0.01	0.31	-	-0.02	-0.35	-	0.00	0.05	-	-0.04	-0.67	-	0.07	1.48	-	0.03	0.74	-
NON-LIST	-0.21	-3.72	1%	-0.12	-2.01	5%	-0.03	-0.46	-	0.09	1.45	-	0.05	0.54	-	0.02	0.29	-	0.02	0.22	-
RETAIL	-0.03	-0.65	-	0.09	1.63	-	0.05	0.88	-	-0.06	-1.04	-	-0.01	-0.08	-	0.07	1.12	-	0.08	1.19	-
OFFICE	-0.10	-2.13	5%	0.04	0.66	-	-0.04	-0.71	-	-0.13	-2.18	5%	-0.08	-1.09	-	0.07	0.97	-	0.13	2.01	5%
INDUST	-0.09	-1.66	10%	0.05	0.75	-	-0.09	-1.16	-	-0.20	-2.54	5%	-0.12	-1.07	-	0.01	0.10	-	-0.01	-0.14	-
RESIDENT	-0.07	-1.44	-	0.16	2.73	1%	0.02	0.42	-	-0.08	-1.35	-	-0.08	-0.98	-	0.14	2.00	5%	0.18	2.64	1%
HEALTH	-0.11	-1.61	-	-0.07	-0.92	-	-0.03	-0.36	-	-0.13	-1.77	10%	0.01	0.08	-	0.06	0.70	-	0.08	0.95	-
HOTEL	-0.14	-2.48	5%	0.00	-0.04	-	-0.04	-0.64	-	-0.06	-1.06	-	0.15	2.03	5%	-0.09	-1.23	-	0.04	0.65	-
SELFSTORE	-0.24	-3.01	1%	0.01	0.09	-	0.04	0.37	-	0.09	0.87	-	0.05	0.34	-	0.12	0.89	-	0.12	0.84	-
SPECIAL	-0.06	-0.70	-	-0.14	-1.52	-	0.05	0.56	-	-0.02	-0.23	-	0.07	0.63	-	0.00	0.01	-	-0.03	-0.33	-
Constant	1.00	15.99	1%	0.49	6.55	1%	0.78	10.06	1%	0.83	10.62	1%	0.40	4.05	1%	0.62	7.18	1%	0.67	10.18	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	216	0.11	2.9	234	0.12	3.36	227	0.15	3.86	214	0.09	2.55	226	0.05	1.82	223	0.06	1.94	229	0.12	2.12

Panel C - 2004 to 2010																					
	2004			**2005**			**2006**			**2007**			**2008**			**2009**			**2010**		
	Coef	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**	**Coef**	**t-stat**	**Sig Lvl**
DRATIO	-0.12	-1.17	-	-0.15	-2.92	1%	-0.11	-1.21	-	0.07	0.61	-	-0.03	-0.45	-	0.00	-0.02	-	-0.06	-0.99	-
SELF-MAN	-0.11	-2.12	5%	-0.18	-2.95	1%	-0.16	-3.54	1%	-0.12	-1.90	10%	-0.09	-1.86	10%	-0.10	-2.05	5%	-0.06	-1.65	10%
SELF-ADV	-0.01	-0.15	-	-0.07	-0.85	-	0.09	1.49	-	-0.11	-1.29	-	-0.09	-1.56	-	-0.05	-0.83	-	0.00	0.01	-
FINITE	-0.08	-0.39	-	0.18	0.78	-	-0.38	-1.74	10%	0.11	0.39	-	omitted			-0.34	-1.46	-	0.06	0.30	-
NET LEASE	0.00	-0.07	-	-0.08	-1.65	10%	-0.04	-0.98	-	-0.03	-0.61	-	0.04	1.20	-	-0.01	-0.35	-	-0.01	-0.20	-
NON-LIST	0.00	-0.01	-	-0.09	-1.05	-	0.04	0.74	-	0.01	0.07	-	0.04	0.68	-	0.02	0.37	-	0.03	0.53	-
RETAIL	0.00	0.02	-	-0.05	-0.75	-	0.05	0.93	-	0.04	0.67	-	0.02	0.40	-	-0.03	-0.65	-	-0.01	-0.14	-
OFFICE	-0.01	-0.16	-	-0.05	-0.69	-	0.10	1.80	10%	-0.03	-0.36	-	-0.05	-1.02	-	-0.05	-0.84	-	-0.01	-0.28	-
INDUST	-0.10	-0.95	-	-0.07	-0.59	-	-0.04	-0.51	-	-0.10	-0.97	-	-0.19	-2.47	5%	-0.20	-2.38	5%	-0.04	-0.69	-
RESIDENT	-0.04	-0.48	-	-0.03	-0.35	-	0.12	2.21	5%	0.11	1.50	-	0.03	0.49	-	-0.02	-0.33	-	0.02	0.45	-
HEALTH	0.00	0.03	-	-0.04	-0.42	-	0.05	0.69	-	0.06	0.72	-	0.02	0.37	-	-0.07	-1.01	-	0.02	0.49	-
HOTEL	-0.01	-0.14	-	0.02	0.28	-	-0.02	-0.39	-	0.01	0.16	-	0.02	0.33	-	-0.12	-2.17	5%	-0.05	-1.15	-
SELFSTORE	0.00	-0.04	-	-0.16	-1.17	-	0.00	0.00	-	0.00	0.03	-	-0.08	-0.86	-	-0.07	-0.66	-	-0.01	-0.12	-
SPECIAL	-0.03	-0.30	-	-0.11	-1.00	-	-0.01	-0.13	-	-0.11	-1.15	-	-0.12	-1.63	-	-0.10	-1.26	-	0.01	0.25	-
Constant	0.72	7.30	1%	1.01	12.00	1%	0.81	10.26	1%	0.51	4.78	1%	0.77	10.59	1%	0.84	10.66	1%	0.91	15.11	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	237	-0.01	0.87	241	0.08	2.52	223	0.07	2.23	207	0.07	2.05	208	0.16	4.12	214	0.08	2.34	230	-0.01	0.92

This table presents the results of the secondary regressions ran on the yearly DEA measures of Scale Efficiency (CRS Efficiency/VRS Efficiency). DRATIO refers to the debt to total assets ratio. SELF-MAN, SELF-ADV, FINITE, NET LEASE, and NON-LIST are all firm characteristic dummy variables taking the value of 1 if true. All others are property type dummy variables taking the value of 1 if the property type is true. Diversifed is the omitted property type variable. ARS refers to Adjusted R-Square.

Source: SNL Real Estate

Table 23: Yearly DEA - Summary of Findings

Panel A - CRS Efficiency																					
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
DRATIO	-1%	-5%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-5%	-1%	-1%	-1%	-5%	-1%	-1%	-1%
SELF-MAN		+1%		+5%		+5%	+5%				+10%									-10%	-1%
SELF-ADV		-1%			-5%	-1%	-1%	-5%	-5%	-10%	-1%		-1%	-5%	-1%	-1%	-10%	-1%	-1%	-1%	-1%
FINITE		+10%		+10%																	
NET LEASE						+10%		+1%			+1%								+5%	+10%	
NON-LIST	+1%	+5%				+10%	+5%			+1%	+1%						+1%			-5%	-1%
RETAIL							+5%						+1%	+1%					+10%		
OFFICE	+10%				+5%		+5%	+5%					+1%	+1%				+5%			
INDUST					+5%									+10%					-10%	-10%	
RESIDENT					+10%								+1%								
HEALTH	+10%			+1%			+1%	+5%		+5%			+10%	+5%							
HOTEL					+1%	+1%	+1%								+10%		-5%		-10%	-5%	-1%
SELFSTORE					+1%					+5%		+1%		+10%							
SPECIAL							+5%													-10%	

Panel B - VRS Efficiency																					
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
DRATIO	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%		-1%		-1%	-1%	-1%	-1%	-1%
SELF-MAN		+5%		+5%	+1%	+1%	+1%			+5%	+5%	+10%				+5%					-10%
SELF-ADV					-5%		-1%	-1%					-5%		-1%	-1%	-10%		-5%	-1%	-1%
FINITE																					
NET LEASE					+5%			+1%			+5%					+10%			+5%	+5%	
NON-LIST	+5%	+5%		+1%	+10%	+5%	+1%	+10%		+1%						+5%	+5%			-5%	-1%
RETAIL					+10%		+10%						+5%	+5%							
OFFICE	+5%			+10%			+1%	+5%			+10%		+5%								
INDUST					+5%									+5%							
RESIDENT					+5%																
HEALTH	+5%			+5%	+1%		+1%	+1%	+1%	+1%		+10%		+5%							
HOTEL				+10%	+1%	+1%	+1%										-5%	-5%	-1%	-1%	-1%
SELFSTORE			+10%		+5%																
SPECIAL				+5%			+5%		+5%												

Panel C - Scale Efficiency																					
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
DRATIO	-5%			+1%	-1%									-1%		-1%					
SELF-MAN					-1%	-10%	-1%		-10%	-1%	-10%		-1%	-1%	-5%	-1%	-1%	-10%	-10%	-5%	-10%
SELF-ADV		-5%	-10%						-5%	-5%											
FINITE							-10%	-5%		+5%							-10%				
NET LEASE			-5%		-5%			+10%								-10%					
NON-LIST				-1%	-5%	-5%	-5%	-1%	-5%												
RETAIL																					
OFFICE								-5%			-5%			+5%			+10%				
INDUST								-10%			-5%								-5%	-5%	
RESIDENT									+1%				+5%	+1%			+5%				
HEALTH											-10%										
HOTEL				-10%	+5%			-5%				+5%								-5%	
SELFSTORE								-1%													
SPECIAL																					

This table summarizes the findings with significance of all yearly DEA secondary regressions. The sign and level of significance is shown only when applicable.

Table 24: Single Frontier DEA - Efficiency Measures Explained

	CRS Efficiency			VRS Efficiency			Scale Efficiency		
	Coef	t-stat	Sig Lvl	Coef	t-stat	Sig Lvl	Coef	t-stat	Sig Lvl
DRATIO	0.00	-3.67	1%	0.00	-1.20	-	-0.01	-2.67	1%
SELF-MAN	0.00	0.41	-	0.03	5.04	1%	-0.11	-8.28	1%
SELF-ADV	-0.02	-6.68	1%	-0.05	-6.12	1%	-0.05	-2.77	1%
FINITE	0.01	1.34	-	-0.04	-3.16	1%	0.19	8.04	1%
NET LEASE	0.01	4.60	1%	0.03	5.49	1%	-0.03	-2.55	5%
NON-LIST	0.02	5.63	1%	0.03	3.77	1%	-0.05	-2.78	1%
RETAIL	0.01	2.47	5%	0.01	2.00	5%	0.00	0.22	-
OFFICE	0.03	7.91	1%	0.06	7.46	1%	-0.07	-4.39	1%
INDUST	0.01	1.88	-	0.03	2.50	5%	-0.01	-0.43	-
RESIDENT	0.01	2.23	5%	-0.01	-0.64	-	0.05	2.94	1%
HEALTH	0.02	3.66	1%	0.04	3.97	1%	-0.06	-2.85	1%
HOTEL	0.01	2.09	5%	-0.01	-0.59	-	0.04	2.23	5%
SELFSTORE	0.04	6.11	1%	0.10	7.07	1%	-0.01	-0.48	-
SPECIAL	0.00	0.68	-	0.02	1.51	-	-0.07	-2.40	5%
Constant	0.05	15.32	1%	0.12	14.80	1%	0.70	41.45	1%
	N	ARS	F-stat	N	ARS	F-stat	N	ARS	F-stat
Model	4161	0.07	22.4	4161	0.07	22.5	4161	0.08	27.9

This table presents the results of the secondary regressions ran on the single frontier DEA measures of Constant Returns to Scale (CRS) Efficiency (Overall Technical Efficiency), Variable Returns to Scale (VRS) Efficiency (Technical Efficiency), and Scale Efficiency. DRATIO refers to the debt to total assets ratio. SELF-MAN, SELF-ADV, FINITE, NET LEASE, and NON-LIST are all firm characteristic dummy variables taking the value of 1 if true. All others are property type dummy variables taking the value of 1 if the property type is true. Diversifed is the omitted property type variable. ARS refers to Adjusted R-Square.

Source: SNL Real Estate

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