CAPITAL STRUCTURE ISSUES IN REAL ESTATE CORPORATE FINANCE

by

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ABSTRACT

BRETT M. BLAZEVICH. Capital Structure Issues in Real Estate Corporate Finance. (Under the direction of KIPLAN S. WOMACK)

Capital structure issues are of great importance within the corporate finance literature. Exploration of these issues within the Real Estate Investment Trust (REIT) industry provides the opportunity to examine these issues within a unique and homogeneous environment. It is a well-known finding within the corporate finance literature that key elements of a firm's financial policy are jointly determined. Controlling for this endogenous relationship, our model explores the relationships between leverage, debt maturity, bond covenants, and secured debt for REITs. We identify relationships unique to the REIT industry and document the importance of secured debt to these relationships. Further exploring sources of capital, we turn our analysis to foreign investment. Foreign investment in REITs has received growing attention recently as important changes in tax legislation have eased restrictions imposed on foreign investors. Following previous literature, we complete an in depth analysis of the determinants of institutional investment in REITs, specifically focusing on foreign investment. We identify key differences specific to foreign investors in REITs. Finally, in an effort to better understand the influence of foreign investment, we test the two-way relationship between foreign investment and REIT returns by examining foreign capital flows. We additionally document the relationship between foreign capital flows and return volatility.

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CHAPTER 1: INTRODUCTION

My dissertation is organized into three separate essays that explore unique but related areas of real estate corporate finance. All three essays utilize the equity REIT industry to explore capital structure issues of great importance within the general finance literature. A brief summary of the main conclusions from each essay follows.

The first essay explores corporate financial policy related to debt. It is well known within the finance literature that key elements of corporate financial policy are jointly determined. However, it is currently unknown how these interrelated policies are affected by secured debt, which potentially creates intercreditor conflicts. For example, how do asset-level covenants (in mortgages) affect firm-level covenants (in bonds)? By examining this issue within the REIT industry, where secured debt represents over 50% of total debt on average (compared to 5% in non-REITs), our analysis provides several new findings. We first document the covenant structure of REIT bond issues, which we find differs substantially from that of non-REITs. We then utilize nonlinear GMM to simultaneously estimate the effects of secured debt on key, but jointly determined, financial policy variables. Results from these models suggest that secured debt substitutes for covenant protection in high growth firms, but substitutes for short-term debt in low growth firms. In contrast to prior studies, we document a positive relationship between bond covenants and leverage, which is attenuated by growth options (preserving financial flexibility). Last, we find some evidence of potential intercreditor conflicts, and that secured debt and bond covenant restrictions both decreased during the financial crisis

(*ceteris paribus*). Overall, we conclude that secured debt plays a central role in REIT corporate financial policy.

The second and third essays explore a specific source of equity capital for REITs, foreign institutional investment. Recent legislation passed into law in December 2015 reduced current restrictions imposed on foreign investors in REITs with the goal of increasing foreign investment in the industry. This recent attention on foreign investment legislation raises the question, what does foreign investment in REITs look like?

The second essay utilizes ownership information contained in 13f filings, by institutional investors, to help answer this question. Our analysis examines both traditional OLS and quantile regression models to identify the drivers of foreign investment in REITs. We document that foreign investors in REITs prefer larger more liquid REITs with lower levels of volatility. Foreign investors additionally tend to invest in firms that are included in the S&P 500, and exhibit some evidence that they follow a momentum strategy. Finally in examining foreign investment across REITs with varying levels of foreign investment we observe heterogeneity in investor preference.

The third essay builds upon previous research, within the REIT industry, on the relationship between capital flows and returns. This essay utilizes vector auto-regression to document the relationships between foreign institutional ownership flows and both REIT returns and return volatilities. We find that previous flows from one quarter previous negatively predict future flows for foreign investors. We also find evidence that

foreign institutional investors follow a negative feedback strategy; with previous returns negatively predicting future foreign ownership flows. Furthermore, we document that these effects are short lived and persist for no more than 3 quarters after their initial impact. Finally, we document that foreign institutional ownership flow over the previous two quarters predicts future REIT return volatility, suggesting that foreign investors may create rather than seek volatility. Unlike our results related to returns, the impact of foreign ownership flows on volatility persists throughout the 8 quarters of our short-term analysis.

Overall, these three essays make a significant contribution to the body of literature addressing capital structure issues in corporate finance. Specifically, they provide a unique analysis of issues specific to the REIT industry, while utilizing tested theory from the general corporate finance literature.

CHAPTER 2: THE ROLE OF SECURED DEBT IN THE DETERMINATION OF CORPORATE FINANCIAL POLICY

Introduction

The Real Estate Investment Trust (REIT) industry is often considered to be unique, due to the asset, income, ownership, and payout requirements that have to be met on an ongoing basis in order to maintain tax-exempt status. However, less known is that REITs are also unique in terms of their capital structure. More specifically, on average greater than 50% of all REIT debt is financed with secured debt (most commonly first mortgage debt secured by a lien or deed of trust on a specific property). Outside of REITs, the average is less than 5%.[1]

The prominent use of secured debt is directly related to the specific regulations under which REITs operate. For instance, due to the asset and income requirements, equity REITs primarily own a large portfolio of commercial real estate properties. These assets have long economic lives, are immobile, are highly redeployable, and produce stable income streams. Accordingly, they are ideal collateral for long term, low cost, fixed rate, secured mortgage debt. Moreover, due to the payout requirement, REITs need to access the capital markets more frequently in order to maintain adequate cash reserves, pursue new investments, and provide financial flexibility. Consistent with pecking order theory,

[1] Summary statistics from Table 5 show 51% of all debt in our sample of 104 bond-issuing equity REITs from 1993-2013 is secured debt. Excluding REITs (as well as banks and utilities, as this variable is unavailable for these industries in Compustat), secured debt represents less than 5% of total debt on average.

REITs often turn to secured debt to obtain this new capital.[2]

While we have an intuitive understanding of why REITs utilize secured debt, it is currently unknown how substantial levels of secured debt affect the firm's other financial policies. For example, how does the presence of asset-level covenants (in mortgages) affect firm-level covenants (in bonds)? This question has not been previously explored because most prior studies of corporate financial policy have excluded different types of debt from their analysis. However, this omission is reasonable, given that outside of REITs most industries do not utilize secured debt in significant amounts.

This question is non-trivial, as the different types of debt potentially create not only principal-agent conflicts (per traditional agency cost of debt arguments), but also intercreditor conflicts (since different types of debt will be associated with different levels of collateral, seniority, and rights).

For example, when a firm obtains debt secured by one of its assets, the debt holder of this obligation is given a higher priority claim on that pledged asset. In this way, secured debt may act as a potential solution to the agency cost of debt for this particular lender.[3] However, at the same time as a secured debt issuance creates a solution for one creditor, it potentially creates a problem for other creditors, namely the unsecured creditors (i.e. bondholders). Since specific assets are pledged as collateral for secured debt, this reduces the pool of collateral that could be liquidated on behalf of the unsecured creditors should the firm become financially distressed.

[2] REITs also use secured debt to retire existing short-term revolving lines of credit and other forms of unsecured debt.
[3] This is the suggested interpretation in Smith and Warner (1979).

Accordingly, the primary goal of this study utilize the REIT industry to examine the effect of secured debt on the key financial policies of leverage (how much to borrow), debt maturity (how long to borrow), and covenant structure (restrictions that accompany different types of debt).[4] To conduct our analysis, we obtain a sample of public equity 625 REIT bond issues and relevant bond covenant restrictions from the Mergent Fixed Incomes Security Database (FISD) from the years 1993-2013.

A key challenge in conducting this investigation is that the financial policy variables are endogenous, in that they are jointly determined. As a case in point, consider that firms attempt to strike a balance between the use of leverage and the imposition of restrictions placed on the firm, in an effort to minimize the agency cost of debt.[5] This balancing of financial policy variables naturally leads to simultaneous decisions with regard to financial policy. Billett et al. (2007) provide strong empirical evidence of this view.

To control for this endogeneity, we model a system of simultaneous equations consisting of four jointly determined financial policy variables: leverage, short-term debt, covenant restrictions, and secured debt. Establishing one equation for each of the four variables, we utilize a non-linear system generalized method of moments (GMM) model to evaluate the effect of each of these policy variables on one another. Non-linear GMM is better suited for this analysis than linear instrumental variable models (such as 2SLS) because we utilize a

[4] Another reason to focus on REITs is provided by MacKay and Phillips (2005), which provides evidence that studying capital structure by industry may be most appropriate, suggesting more research into capital structure focused at the

[5] Jensen and Meckling (1976), Myers (1977), and Smith and Warner (1979) collectively show that costs related to potential principal-agent conflicts (*e.g.* underinvestment and asset substitution) and the common solutions to those conflicts (short-term debt and restrictive debt covenants) both contribute to the overall agency cost of debt.

specification with nonlinear endogenous variables and because the results are robust to heteroskedasticity of the error term.

An additional consideration to note is that since high growth firms are most influenced by the agency cost of debt (both in terms of equity vs. debt holder conflicts and in the costs of financial restrictions on the firm), controlling for growth options will be important to our analysis.[6] To do so, we follow prior literature by utilizing interaction variables between the financial policy variables and growth options. We refine this analysis further by partitioning the sample into above median and below median growth option firms, and repeat the above analysis on each sample separately without the interaction variables.

A second goal of our study is to document the specific composition of covenants used by REITs in pubic bond issues and to compare these results to that of non-REIT bond issues. This is an important contribution, because a detailed analysis of the specific covenants has not yet been conducted for the REIT industry. Additionally, this will allow us to more closely examine a common assertion from prior studies that REIT bonds include a standardized package of bond covenants related to leverage restrictions and that these covenants provide a uniform influence across all bond issues.[7] Furthermore, understanding what types of covenant protection exist will be important to the interpretation of the relationships with the other financial policy variables examined in

[6] See Barclay and Smith (1998), Barclay *et al.* (2003); Billett *et al.* (2007), Johnson (2003), Kahan and Yermack (1998), and Nash *et al.* (2003).

[7] Riddiough and Steiner (2016) suggest that standard bond covenants limit leverage for REITs causing leverage to be decreasing in unsecured debt. Oazabal and Arora (2012) suggest that a standardized REIT covenant package exists for investment grade REIT bond offerings, with leverage based restrictions similar to requirements imposed by insurance companies when they invest in commercial real estate loans.

this study.

A brief preview of the primary results from our study follows. We find that the covenant structure of REIT bond issues differs substantially from that of non-REITs in that the covenant structure is uniquely adapted to the REIT industry and its various regulations. Notably, only approximately half of the covenants common in non-REIT bond issues are also common in REIT bond issues. Several covenants that are ubiquitous in the non-REIT sample (such as those restricting secured debt, asset sales, dividends, stock issuance, mergers, and poison puts) are sparsely represented within the REIT sample.

In focusing specifically on leverage restrictions, we do not find convincing evidence of a standard REIT covenant package within our full sample. Rather, we do observe leverage restrictions in more than half of all investment grade bond issues and find their use has increased in recent years. In contrast, below investment grade bond issues exhibit leverage restrictions very infrequently. Based on this evidence, we conclude that while REITs do exhibit a high occurrence of leverage related restrictions in a specific subset of issuances, the influences of covenant structure are much more complex than that single influence, and should be modeled in a way that accounts for this diversity.

Having previewed the results regarding covenant structure, we now focus on the results from the primary question posed by this study – how does secured debt affect the firm's other financial policy variables?

Results from the GMM models suggest that secured debt and leverage are complementary

in nature, with both having a positive effect on the other.[8] Additionally, we find that secured debt is more attractive to high growth firms, as secured debt is increasing in firm growth options. Furthermore, we observe that the proportion of secured debt issued by a firm is negatively related to the strength of covenant protection provided for high growth firms. However, this same effect is not observed for low growth firms.

Additionally, the results suggest a negative relationship between secured debt and covenant protection. This result is likely driven by intercreditor conflicts. Specifically, we argue that firms which issue high levels of secured debt are less likely to issue new debt with secured debt restrictions. Likewise, unsecured creditors will not issue debt when the threat of excessive secured debt issuance exists, unless a covenant to restrict the issuance of high proportions of secured debt to total debt is included. The existence of such covenants reduces the use of secured debt by firms subject to these restrictions.

The above negative relationship is not observed among lower growth firms, likely because many of these firms carry higher leverage ratios. Higher leverage ratios reduce a firm's access (due to lower credit ratings) to the investment grade public debt market, where bond covenant usage is most prevalent, therefore covenant protection is not influential without access to this market.[9]

In regards to our analysis of growth options, we find that unlike previous results in the

[8] This is consistent with the Riddiough and Steiner (2016) result that leverage is decreasing in unsecured debt.

[9] Deng et al. (2016) demonstrates that investment grade firms issue debt with more covenants than below investment grade firms in the syndicated loan market. This result is also consistent with observations in our sample of public bond-issuing REITs

corporate finance literature, leverage is increasing in the use of bond covenants.[10] This effect however is diminished for high growth option firms. High growth option firms face greater concern over the loss of future financial flexibility due to covenant restrictions, and this concern makes these firms less likely, as opposed to lower growth option firms, to deplete debt capacity through higher leverage (even if covenant protections in their bond issues incentivize bondholders to allow it).

Last, we examine the effect of the financial crisis on the financial policy variables. To test this effect, we include a crisis dummy variable in all four equations and re-estimate our models. The crisis variable is statistically significant in each equation. More specifically, we find that (*ceteris paribus*) the financial crisis is associated with an increase in leverage and short-term debt, a decrease in secured debt, and (somewhat surprisingly) a loosening of covenant restrictions. We provide plausible explanations for these findings within the study.

The remainder of this article proceeds as follows. The next section explores the hypotheses we test related to leverage, maturity, covenant restrictions, secured debt, and growth options. The third section describes our sample as well as the endogenous and exogenous variables used in this study. Results from our analysis of the covenant structure of public REIT bonds and various univariate analyses presented in the fourth and fifth sections. The sixth section discusses the GMM models and their results. Conclusions are drawn and key findings are reviewed in the final section.

[10] Billett et al. (2007) finds leverage is decreasing in covenants, but that the negative effect of growth options on leverage is attenuated by covenant use for high growth firms only.

Hypotheses

In an effort to minimize the agency cost of debt, firms attempt to strike a balance between the use of leverage and the imposition of restrictions placed on the firm by that leverage. Accordingly, this study examines financial policy decisions in a manner that addresses this balancing act, while recognizing the simultaneous nature of the decisions. The following are five hypotheses that we empirically test regarding leverage (how much to borrow), debt maturity (how long to borrow), covenant structure (restrictions that accompany different types of debt), and secured debt (what type of debt to borrow).

Hypothesis 1: Leverage and Maturity are Substitutes

Barclay et al. (2003) provides evidence that leverage and maturity are substitutes. In contrast, Johnson (2003) finds that leverage and maturity are complements.[11] As a potential explanation for both, Childs et al. (2005) argues that the relationship between leverage and maturity will trade off liquidity risk from the issuance of short-term debt against the potential benefit of reducing equity holder versus debt holder conflicts. This leads to the result that lower quality firms, which face greater liquidity risk, will increase leverage in response to shorter maturity.

[11] Debt maturity is decreasing in leverage, but leverage is increasing in debt maturity. Barclay et al. (2003) argues for the former substitutive relationship, and suggest a possible misspecification of the leverage equation is driving the latter result.

Billett et al. (2007) examines the joint determination of leverage, maturity, and covenants for non-financial bond issuing firms, while Giambona et al. (2008) examines the joint determination of leverage and maturity specifically for REITs. Both studies find a substitutive effect between leverage and maturity. Billett et al. (2007) argues this is due to the higher quality of their bond-issuing (predominantly rated) firms, while Giambona et al. (2008) argues their result of low liquidity risk is due to the quality of the underlying real estate assets.

Given that the majority of our sample is rated (similar to Billett et al., 2007) and due to the quality of the underlying real estate assets (similar to Giambona et al., 2008), liquidity risk is unlikely to be the dominant factor. Therefore, we expect that shorter debt maturity will not increase liquidity risk sufficiently to lead to a corresponding reduction in leverage. Rather, we expect firms to treat leverage and maturity as substitutes, increasing leverage while decreasing maturity.

Hypothesis 2: Covenants Increase Leverage

Billett et al. (2007) assert that the effect of covenants on leverage is largely an empirical question, since covenants restrict future financing options (reducing financial flexibility) while at the same time decreasing the agency cost of debt to the bondholders. Therefore, in the presence of covenants bondholders will allow the firm to increase leverage. The primary question is whether the desire to preserve financial flexibility prevents firms from doing so. The study finds a negative relationship between leverage and covenants, but also finds that leverage is increasing in growth options interacted with covenants.

This is an example of where analysis of capital structure at the industry level is particularly helpful. Due to the requirement that REITs pay out 90% or more of their taxable income in the form of a dividend, it is likely that high growth firms access debt market more frequently in order to fund new investment. Unlike most high growth non-REITs, who can access extensive retained earnings, REITs are largely dependent on the capital markets to fund new growth.

Therefore, we expect high growth REITs to avoid taking on additional leverage when their bond issues contain leverage covenants in order to preserve the ability to borrow more in the future. In contrast, low growth REITs would have less incentive to preserve financial flexibility and would be more likely to increase leverage in the presence of covenants.

By accounting for the interaction between growth options and covenants, we expect that covenants should have a positive effect on leverage. However, for reasons discussed above, we do not expect this relationship to hold for high growth REITs.

Hypothesis 3: Intercreditor Conflicts Cause Secured Debt and Bond Covenants to be Negatively Related

There is a potential for bond covenants present in unsecured bond issues to directly conflict with the issuance of future secured debt. Specifically, a commonly observed covenant within the REIT covenant structure limits secured debt to 40% of total assets. When such a covenant is present, this creates the potential for future financial policy to avoid the issuance of secured debt. Similarly, firms with high levels of secured debt have

incentives to avoid such a covenant in their bond issuances.

Ayotte and Morrison (2009) addresses potential intercreditor conflicts between unsecured and secured creditors in the presence of bankruptcy for a sample of large corporate firms. They discover that secured creditors dramatically influence the outcome in bankruptcy proceedings (liquidation vs. reorganization) and that often times their interests are contrary to unsecured creditors, particularly in the case of liquidation. For this reason it seems reasonable that unsecured creditors would want to limit the issuance of secured debt.

Accordingly, we expect that secured debt and covenants will be negatively related. Such a negative relationship would provide some evidence of potential intercreditor conflicts between unsecured and secured creditors that is being resolved through the use of influential covenant restrictions.

Hypothesis 4: Secured Debt Increases with Growth Options

Riddiough and Steiner (2016) suggests that secured debt provides liquidity to REITs which otherwise are required to payout 90% of taxable income in cash dividends. The authors find that REITs access needed capital to fund future investment options by increasing secured debt. This liquid resource allows firms additional financial flexibility to fund future investment shocks. As an additional benefit to high growth firms, the

liquidity provided by secured debt is not burdened by the same firm-level restrictions via covenant restrictions that may exist in public bonds.[12]

Because REITs with the highest growth options are more likely to need access to capital quickly to fund new investment opportunities, we expect that secured debt will be increasing in growth options.

Hypothesis 5: Leverage and Secured Debt are Complements

Riddiough and Steiner (2016) provide empirical evidence that leverage is decreasing in unsecured debt and relate this negative relationship to the presence of bond covenants restricting leverage. In additional to this empirical support, we would offer that, independent of the influence of covenant protection, leverage should be increasing in secured debt. Because secured debt is backed by a specific property as collateral, the debt holder's claim priority in the event of default is increased, allowing for higher leverage use by the borrower.

Reversing the direction of causality, we expect that secured debt should be increasing in leverage. Unsecured debt requires access to the public bond market, which is greatly impacted by a firm's credit rating. Because firms with higher leverage also carry a higher risk of default, it is likely that increasing leverage too high will impact a firm's credit rating and reduce access to the bond market, or at minimum make access to public bonds

[12] Riddiough and Steiner (2016) suggest that secured debt holders, who hold mortgage debt, are concerned with the underlying collateral and not focused on firm financial characteristics.

less attractive, increasing secured debt use instead.[13]

Data

Sample Formation

The sample in this study consists of a total of 625 firm-year observations for 104 equity REITs that issued public bonds from 1993-2014. Because of the fundamental differences in equity REITs pre and post 1993, we focus our analysis on the more relevant modern REIT era.[14]

To obtain this sample, we first gathered data on outstanding public bond issuances by equity REITs from the Mergent Fixed Income Security database (Mergent FISD). During the 21 years of our sample, there are 729 issues outstanding by equity REITs. We track all outstanding bond issues during the sample period and record the relevant covenant information at the firm level for each year.

Relevant to our study, information on the covenant structure for each issue is documented in Mergent FISD. In fact, the database provides information on over 50 possible types of covenants for each issue. However, as in prior studies, we combine all of these into 15

[13] In conversations with REIT investment bankers, too much leverage is consistently mentioned as one of the most prominent risk factors for this industry.

[14] The Taubman Center IPO, which first utilized the UPREIT structure, precipitated the modern REIT era, and that structure, along with several legislative changes that occurred early on in the era, allowed REITs access to an expanded investor base, and allowed for an active management style which did not exist prior to 1993 (Feng et al. 2011).

more relevant and manageable categories.[15] Covenant restrictions are present in 58% of the observed issuances and among bond issues there is a median of four covenants present per issue.

We then merge all firm-year observations of covenant protections with relevant financial data from Compustat, removing any firm-year observations that do not contain the required dependent or independent variables necessary for our analysis. We also add property type dummy variables that we construct from data obtained from SNL Financial.

Endogenous Financial Policy Variables

Table 2.1 provides a formal definition of each of the endogenous financial policy variables examined in this study: *Leverage*, *Maturity*, *Covenant Index*, and *Secured Debt*. These variables make up the four dependent variables in our system of four simultaneous equations, and each will also be included as endogenous right hand side variables in the equations for the other variables. A brief discussion of each follows.

Leverage is calculated as the ratio of total debt to market value. Consistent with Johnson (2003) and Billett et al. (2007), we calculate *Maturity* as the proportion of total debt that matures in 3 years or less.[16] Note that if short-term debt is positively related to leverage in our analysis, the previous literature would identify this relationship as leverage and

[15] Following Billet et al. (2007), the categories are: 1) dividend restrictions, 2) share repurchase restrictions, 3) funded debt restrictions, 4) subordinated debt restrictions, 5) senior debt restrictions, 6) secured debt (negative pledge) restrictions, 7) total leverage tests, 8) sale leaseback restrictions, 9) stock issuance restrictions, 10) ratings net worth minimums, 11) cross default provisions, 12) poison put provisions, 13) asset sale restrictions, 14) investment restrictions, and 15) merger restrictions.

[16] The literature is mixed however on how to calculate maturity. As noted by Alcock et al. (2014), which calculates the choice of maturity as the proportion of debt maturing after 3 years, the choice of how to calculate maturity does not seem to matter empirically.

maturity being substitutes for one another.

Covenant Index represents the combined strength of existing covenant protection for all outstanding bond issues within a given firm-year. Following Billett et al. (2007), this is accomplished by assigning each of the 15 covenant categories a value of 1 if a particular covenant is present in any of the outstanding bond issues for a given firm-year, otherwise the category is assigned a value of 0. These 15 covenant categories are then added together and divided by 15 to give a value ranging from 0 to 1, with 0 indicating no covenants and 1 indicating all covenant categories are present. In our sample, the maximum number of covenant types recorded in any one firm year is 11, which translates to a covenant index value of .73. Note that this treatment implicitly assumes that a covenant in one bond issue protects all outstanding issues. The rationale for this assumption is intuitive, since a firm will avoid violating any covenant, regardless of the issue or frequently, in order to avoid any potential loss of control rights over the firm.

Figure 2.1 presents a time series graph of the mean number of covenants in our sample by firm year. When considering the covenant index for all firms (dashed line), it appears that the covenant index has decreased in the later time period of the sample from approximately four to two. However, when considering only firms that issued covenants (solid line), the average number seems to hover fairly consistently around four per year. This demonstrates that the observed drop in covenant protection is due to an increase in the number of firms issuing bond debt without any covenants at all. Surprisingly, we find that the average does not seem to change much during the financial crisis. However, this subject merits a more rigorous examination within the GMM models.

Secured Debt is measured as the proportion of secured debt to total debt. Riddiough and Steiner (2016) identifies that (in the case of REITs) secured debt is composed of private, property level debt (mortgages), and that the holders of the private level debt are not concerned about firm-level restrictions but rather on the financial strength of the underlying collateral. Accordingly, asset-level covenants are focused thereon. In contrast, public bondholders require a package of covenant restrictions at the firm level. This introduces the possibility of intercreditor conflicts, since different types of debt will be associated with different levels of collateral, seniority, and rights. Accordingly, the REIT industry is an ideal setting to conduct this analysis.

By matter of preview, our identification strategy for each of these variables is discussed in the *GMM Results* section.

Exogenous Explanatory Variables

Table 2.1 also provides a formal definition of the exogenous explanatory variables utilized in this study. These variables are motivated by the previous literature (Barclay et al., 2003; Johnson, 2003; Billett et al., 2007; Alcock et al., 2014). Consistent with these studies, we calculate all exogenous variables one year prior to the year we calculate our endogenous capital structure variables. This eliminates any issues of endogeneity between the exogenous explanatory variables and the dependent endogenous variables that may exist if analyzed contemporaneously.

A brief discussion of each of the exogenous variables is provided below.

Market-to-Book is a proxy for growth options, which as discussed previously, is an especially important consideration in this study. *Profitability* reflects earnings strength of a firm and can directly reduce the capital needs of a firm. *Sales* are a proxy for firm size, with larger firms having more access to capital markets (*ceteris paribus*). *Volatility and Modified Z-Score* [17]are proxies for credit risk. *Earnings Growth* is a forward-looking measure that tests whether firms posses future earnings knowledge and therefore select shorter-term debt. *Asset Maturity* provides the average maturity of assets for a REIT. Myers (1977) argues that firms can match maturity between assets and liabilities to reduce underinvestment problems, therefore asset maturity should be negatively related to short-term debt. *Term Premium* accounts for the slope of the yield curve, which directly affects maturity choice. *Convertible* identifies convertible debt issues, as these typically do not contain covenants. The property type dummy variables used in this study are as follows: industrial/office, retail, lodging, healthcare, self-storage facilities, diversified (multiple property types), and unclassified (specialized or unique), with residential being the excluded category.[18]

[17] This version of an Altman's Z-Score drops the effect of (market value / book value, as this variable is already included as a dependent variable in the regression specifications. See Mackie-Mason (1990) and Giacomini et al. (2015).
[18] Property types are mutually exclusive.

Covenant Structure

Table 2.2 provides a comparison of covenant usage in REITs to non-REITs. The former represents the sample in this study, the latter are results from Billett et al. (2007) which examines all corporate firms (but excluding financials, and therefore REITs) from 1960-2003. The table is sorted in descending order of the differences. Immediately noticeable is that 8 out of the 15 categories have double-digit percentage differences, with the largest difference being the secured debt category. The REIT sample exceeds the non-REIT sample in only one category of covenants - total leverage. Therefore, our first finding is that the covenant structure in REITs seems to be quite different from non-REITs, in that they are uniquely tailored for this industry.[19]

Many of the covenant types that are underrepresented in the REIT sample are related to the regulations inherit with the REIT industry. Other differences are attributable to the real estate nature of the underlying assets.

The REIT sample includes issues utilizing far fewer covenant restrictions on the use of dividend distributions. Because REITs are required to distribute 90% of taxable income in the form of a dividend, a restriction on such distributions would likely not carry much value. Because stock repurchases are often considered to be non-taxable distributions to investors, the same effect is observed for those covenants.

Additionally, Because REITs are required to distribute much of their income in the form

[19] This of course assumes that the differences aren't being driven by the difference in time periods studies.

of dividends, retained earnings are low, and REITs are forced into the capital markets more frequently than a typical corporate firm. Therefore, a low representation of restrictions on the issuance of new debt or equity is also unsurprising. Observe the low representation of covenants restricting secured debt (negative pledge) and stock issuance as compared to the non-REIT sample.

Finally, asset sale and leaseback restrictions are also relatively uncommon in the REIT sample. Given that REITs are in the business of owning income producing commercial property, the low incidence of this particular covenant restriction is also unsurprising.

Previous literature has suggested that bond covenants of REIT bond issues consist of a standard package of leverage-based restrictions (Oazabal and Arora, 2012; Riddiough and Steiner, 2016; Deng et al., 2016). Specifically, Riddiough and Steiner (2016) list out the following restrictions as common occurrences in REIT bond covenants: 1) total leverage < 60%, 2) Secured debt to total assets < 40%, 3) EBITDA to interest expense > 1.50, 4) unencumbered assets to total unsecured debt outstanding > 1.50.

In comparing the language in the prospectuses for several bond issuances to the covenant flags in the Mergent FISD, the above restrictions specifically address restrictions on indebtedness. These restrictions further are classified under total leverage restrictions following the convention followed in Billett et al. (2007) for combining covenant types into broader covenant categories.

Since only 37% of issuances, in our sample of bond-issuing REITs, contain the total leverage restrictions, this conflicts directly with claims of a standard set of indebtedness covenants influencing the majority of REITs. If issuances are further divided into two groups, investment grade or below investment grade credit rating at issuance, the majority of investment grade bond issues (58% on average) place covenant restrictions on firm total leverage. Below investment grade issuances, however, infrequently (6% on average) include a total leverage restriction.

In Figure 2.2, you see that the incidence of leverage restrictions being included in bond issues by REITs is consistently higher for investment grade issuances over time, with the gap growing even larger after 2009. In 2013 for example, 80% of investment grade bond issues included a total leverage restriction, compared to non-investment grade issues, which had none. These results tend to support the common inclusion, within investment-grade REIT bond issues, of a restriction on leverage. However, given the common inclusion of other covenant restrictions, the combined impact of all covenants should be considered.

To further explore the relationship between covenants within a given issue by REITs, Table 2.3 gives the Pearson correlations between the issuance of each of the 15 covenant types. A high degree of correlation between covenants may suggest a packaging of covenants together. Notice almost all correlations are positive, with the few negative correlations being of low magnitude and mostly statistically insignificant. Our bond issue sample has the highest degree of correlation between 4 particular covenants, leverage restrictions, cross default provisions, asset sales clauses, and merger restrictions, with a

relatively low correlation among all other covenants. There is some evidence of correlation between dividend restrictions, share repurchase restrictions, subordinated debt restrictions and stock issuance restrictions, however.

Table 2.4, takes a similar look at the relationship between covenants but instead calculates the conditional probability of observing a specific covenant given that another covenant is present. This analysis reaches the same conclusion regarding the main grouping of covenants. Furthermore it demonstrates some extremely strong relationships between and the 4 most common bond covenants in our sample. For example, merger restricting covenants and asset sale restricting covenants are almost always present together with a .99 probability of observing a merger restriction given an asset sale covenant, and a probability of 1 of observing an asset sale covenant if a merger covenant exists.

Additionally, examining the conditional probability of observing either a merger restriction, asset sale restriction, or a cross default provision, given the existence of any of the other 14 covenants, is in all cases greater than .6. Leverage limitations are also conditionally highly likely given the presence of most of the other covenants, with notable exceptions being sale/leaseback restrictions (.47), poison puts (.29), and senior debt restrictions (.00).

The above analyses suggests that there are fewer covenant restrictions overall in REIT bonds compared to non-financial corporate bonds. Also, it appears that for investment grade REIT bonds there is some evidence that the inclusion of a total leverage restriction is commonplace. Additionally, certain covenant restrictions inconsistent with the

regulatory environment faced by REITs, such as payout restrictions, are almost always non-existent. However many of the other common covenant restrictions that exist in non-financial corporate bonds are also present in REIT bonds. It appears that covenant structure is diverse with strong correlations among covenants but with a significant degree of covenant protection variation between issues. Examining covenants at the bond issue level suggests that more influences than just a standardized leverage restriction are present and influencing REIT bond issues, and that controlling for this variation, with a measure of the overall strength of covenant protection, is important when examining REIT capital structure decisions.

Univariate Results

A summary of descriptive statistics for our 625-firm sample of bond issuing firms is presented in Table 2.5. Noteworthy, with this sample, is the high relative mean leverage ratio of 43%, which although not significantly different than the non-bond issuing sample of REITs, is high relative to typical corporate firms that issue public debt. Billett et al. (2007) finds a mean leverage ratio of 29%, for example, for all non-financial bond-issuing firms.

Short-term maturity and market-to-book ratio are similar between issuing and non-issuing REITs, but secured debt is significantly lower by a significant magnitude for public bond issuing firms. Lower secured debt is unsurprising given that property level financing is an alternative to public bond issuance, and it has been shown that REITs use public bonds to reconfigure debt by paying off existing debt, which can also have the effect of lowering secured debt (Riddiough and Brown, 2003).

Note that in general it is assumed that public debt for REITs is unsecured, and that our sample is consistent with this assumption in that all observed bond issuances are unsecured. Devos et al. (2016) examines secured debt and finds that covenant protections are greatly reduced in the presence of secured debt. Similar to the way that convertible debt reduces the need for covenant protection in Billett et al. (2007), secured debt likely has a similar relationship with covenant protection. This is consistent with the suggestion of Riddiough and Steiner (2016) that secured debt holders are concerned with the

underlying asset and less with the financial strength of the firm as a whole.

To better understand the influence of growth options on financial policy decisions, we first look at the descriptive statistics in Table 2.6, which splits the sample into above median and below median growth options. Interestingly, above median growth opportunity firms utilize lower median leverage (36% vs. 47%), less short-term debt (27% vs. 32%), lower secured debt (38% vs. 57%), and more restrictive covenants (covenant index of .20 vs. .07). In fact many of the other explanatory variables also vary significantly between the two samples. This speaks to the importance of controlling for growth options when examining firm capital structure decisions.

Focusing specifically on the difference between leverage for below vs. above median growth options, one key decision facing REITs, with regards to financial policy, will be the choice whether to finance with public or private debt. Public bonds require a good credit rating to issue at attractive rates, and presumably firms target an investment grade credit rating. Given this information, and understanding that credit ratings are partly a function of total firm leverage, it is likely that many below median growth option firms have limited access to the public bond markets, particularly in the investment grade market with the best rates, because of their higher total firm leverage. We will observe in our results, what effect this might have on the use of the three different mechanisms to reduce agency cost of debt.

Further Table 2.7, looks at the correlation between growth options and the 4 endogenous capital structure variables and leads to some preliminary observations on the relationships

between variables. First, Leverage and short-term debt [Maturity (≤ 3 years)] are positively and significantly correlated. Suggesting short-term debt may be used to reduce the over and under investment problems as discussed in Myers (1977) and Jensen and Meckling (1976). Second, leverage and growth opportunities are negatively and significantly correlated while growth opportunities and covenants are positively correlated, suggesting that growth options reduce the use of leverage but increase the use of covenants. Note that for the non-financial firm sample utilized in Billett et al. (2007), that growth options were negatively correlated with the covenant index. This suggests a potential difference in the characteristics of our REIT sample. Third, secured debt is negatively correlated with growth options but positively related to leverage, suggesting that secured debt increases leverage, but also that high growth firms utilize less secured debt.

The latter correlation is contrary to our Hypothesis 4, and suggests that if our hypothesis is correct, controlling for the endogenous relationship among financial policy variables will be important. Finally it is interesting that despite the additional financial constraints imposed by the use of covenants, that leverage has no significant relationship to the use of bond covenants. A more rigorous analysis of the relationships between these variables, controlling for the endogenous relationships among them, will follow next.

GMM Results

Model Selection

Consistent with prior literature, we solve a system of simultaneous equations representing each of the capital structure variables in question. To control for endogeneity, we utilize a nonlinear generalized method of moments (GMM) estimator with all exogenous variables from the system of equations acting as instruments to the moment conditions for the endogenous variables. GMM estimation is appropriate for this analysis because GMM is consistent with the results from other IV techniques such as 2SLS but is robust to heteroskedasticity of the error term (Greene, 2012).

Similar to Billett et al. (2007), because we utilize a specification with nonlinear endogenous variables, the use of a non-linear GMM estimator is better suited than a linear instrumental variable model such as 2SLS.

Identification Strategy

The specific exogenous variables used to model *Leverage*, *Maturity*, and *Covenant Index* are motivated by the previous literature (Barclay et al., 2003; Johnson, 2003; Billett et al., 2007; Alcock et al., 2014). For *Leverage*, market-to-book ratio, profitability, log of sales, and volatility are included. For *Maturity* market-to-book, log of sales, log of sales squared, volatility, earnings growth, asset maturity, and term premium are included. For *Covenant Index* market-to-book, log of sales, volatility, convertible, and z-score are

included.

In regards to *Secured Debt* (particularly when interpreted as in this study as a measure of private debt with asset-level covenants), there is limited previous literature from which to motivate explanatory variables. Therefore, we searched the literature for additional variables. Particularly, Giambona et al. (2008) argues that property types are proxies for liquidation value in REITs, and Smith and Warner (1979) suggests that secured debt will be higher where liquidity risk is greatest. Therefore, we argue that property type variables should offer significant explanatory power for secured debt. We also include market-to-book, and z-score, as additional explanatory variables.

Joint Determination of Capital Structure with Growth Options Interaction Variables

Identifying that financial flexibility will be a key motivation in capital structure decisions for our sample, it will be important to control for growth options in our analysis beyond controlling for the linear relationship between the capital structure variables and growth options. A high degree of growth options within the firm will likely lead to a greater desire to preserve financial flexibility, and therefore it will be important to model this effect. Johnson (2003) incorporates growth options by interacting the market-to-book ratio with short-term debt in the leverage equation to test whether high growth options attenuate liquidity risk. Billett et.al. (2007) further incorporate growth options into their analysis by including interactions between the covenant index and the market-to-book ratio in both the leverage and short-term debt equation. In or analysis, we also include interaction variables consistent with Billett et al. (2007) and Johnson (2003) above, and

also add an interaction variable between the covenant index and the market-to-book ratio in the secured debt equation.

Note that we interact short-term debt with growth options in the leverage equation and covenant index with growth options for the leverage, maturity, and secured debt equations. These growth option interaction variables are therefore treated as endogenous variables themselves in the interaction variable models that follow (Greene, 2012).

Results

Table 2.8 reports results from the nonlinear GMM models. Our first hypothesis was that *Leverage* and *Maturity* would be substitutes for one another. Results from Table 2.8 suggest neither significantly affects the other, as both are positive but insignificant. One possible explanation for this result is that, specifically in the leverage equation, covenant index, the interaction of covenant index and growth, and secured debt appear to offer strong explanatory power. These variables were omitted in previous REIT studies and may be more important in determining firm leverage. Alternatively, the interaction of growth options within the model may work in a more complex way than is currently modeled by the interaction variables, for example we may not be including enough or the right interaction variables. We will look at an alternative model where we partition our sample into above and below median growth option groups, to investigate if possibly this resolves our discrepancy with earlier studies.

Looking at the other results of Table 2.8 we do observe some new and unique results compared to the current corporate finance literature in the leverage equation. First, the

coefficient on the interaction of maturity and growth options is not significantly different from zero, suggesting that high market to book firms do not face higher liquidity risk.

The current corporate literature has observed a negative and significant relationship on this coefficient, suggesting that liquidity risk does exist for high growth firms.

Second, one of the main findings of Billett et al. (2007) is that, for corporate non-financial firms, covenants and growth opportunities are negatively related to leverage, but that for high growth firms, covenants attenuate the negative effect of growth opportunities. Surprisingly, we find that growth options are not significantly related to leverage, the relationship exhibits a negative sign but it is not statistically significant at better than a 10% level. This negative sign has been documented in much of the previous literature (Barclay et al., 2003; Giambona et al., 2008:Johnson et al., 2003; Rajan and Zingales, 1995).

Consistent with our hypothesis 2, we find that, in the leverage equation, the use of stronger covenant protection is positively related to leverage. This observed positive relationship suggests that greater covenant restrictions would offer greater protection to investors in the particular high leverage situations where the under and over investment agency conflicts are greatest, and that the use of these covenants leads to higher leverage. This positive effect of covenant protection, however is attenuated for high growth firms as demonstrated by the negative and significant interaction of covenants with market-to-book ratio. This result suggests that financial flexibility concerns may be influencing higher growth firms, and that the addition of financial covenants, while increasing the

ability to borrow at a higher leverage amount (higher debt capacity), would also decrease financial flexibility by reducing overall debt capacity leading to the observed attenuation effect of growth opportunities on the positive relationship between covenants and the use of leverage.

Not surprisingly, covenant protection is also increasing in leverage as can be seen by the positive and significant coefficient on leverage in the covenant equation. A result that is consistent with prior literature. [20]

Looking at secured debt, note that consistent with the observed correlations in Table 2.3, as well as hypothesis 5, secured debt and leverage are complementary. The coefficient on secured debt is positive and significant in the leverage equation while the coefficient on leverage is also positive and significant in the secured debt equation. This result is observed even when we control for the relationship between leverage and covenants. As discussed in hypothesis 5, the relationship in the leverage equation is likely driven by the added security of high quality real estate assets offered as collateral. The relationship in the secured debt equation is possibly caused by restricted access to the public bond market. Access to the bond market is based on credit rating, and since increased leverage is a key factor in a firms credit rating, increasing leverage could reduce a firms credit rating, and either restrict access to the bond market or make it less attractive via higher financing rates.

Examining further the results of the secured debt and covenant equations, growth options

[20] Billett et al. (2007) also confirms this result.

are positively and significantly correlated to both secured debt and the covenant index, suggesting that growth options increase the use of both secured debt and covenants. Given that high growth firms have more incentive to perpetuate the over and under investment problems described in Myers (1977) it is consistent that they would be subject to higher controls on debt, via higher covenant restrictions. Similarly, consistent with hypothesis 4, high growth firms are likely to use more secured debt, as this will allow them a more accessible source of funds as compared to public bonds. In other words, high growth firms use public bonds as a liquid source of capital and may use higher amounts in the face of new investment opportunities.

The short-term debt equation is weakly identified in terms of the endogenous financial policy variables, as in Billett et al. (2007). Again, we do not observe the substitutive relationship between leverage and short-term debt, as we would have expected. Several exogenous control variables; firm size, firm size squared, volatility, and term premium, do however offer statistically significant explanatory power.

Examining the relationship between secured debt and covenants for REITs, we do find evidence of a substitution effect. This is consistent with hypothesis 3, which suggests that even though secured debt and covenants both offer protection to the investor, covenants in public bonds often restrict the level of secured debt likely causing the observed negative relationship. Note that while secured debt exhibits a negative and significant sign in the covenant equation, the negative effect of covenants on secured debt only occurs for high growth firms, which is seen by the observed negative sign on the interaction between growth and covenants. This suggests that the limitation in covenant restrictions on secured

debt is most relevant to the high growth firms that are most likely to utilize covenant protection. The observed negative relationship provides evidence of a conflict between the unsecured creditors that require covenant protection and the secured creditors.

Results for the other control variables in our analysis are consistent with prior literature. One notable exception is that for our sample of REITs, covenant restrictions are decreasing in firm size, which is opposite of the result from Billett et al. (2007).

Financial Crisis

The financial crisis dramatically impacted all aspects of the real estate market. It is important to document what effect this time period had on the financial policy of REITs. To test this effect, we re-estimate the model in Table 2.8 but include a crisis dummy variable equal to for years 2007, 2008, and 2009 and otherwise equal 0, and include that variable in all 4 capital structure variable equations. Table 2.9 summarizes our results. Panel A repeats the results from Table 2.8 and Panel B gives the new results including the crisis dummy variable. Note all exogenous variables except the market-to-book ratio are suppressed to preserve space. The results are generally consistent with and without the crisis variable. One difference is that the significance of the coefficient on the covenant index in the secured debt equation is lost but the sign remains positive. Importantly, however, the observed negative, substitutive, relationship between secured debt and covenant restrictions remains consistent, as there is still a negative sign on the interaction variable between covenant and growth options in the same secured debt equation.

Importantly note the significance of the crisis variable, it is statistically significant in all 4 equations. First, notice that the financial crisis positively influenced leverage. Second, financial crisis increased short-term debt, while having the opposite effect on secured debt. Third, the financial crisis leads to a loosening of covenant restrictions.

The first effect, an increase in leverage, was likely due to a decrease in market value, as stock prices dropped significantly during this period. The second effect, an increase in short-term debt while secured debt decreased, was likely a result of the tightening credit market, specifically the secured debt (mortgage) market. As property values decreased, the ability to finance property was significantly reduced. Additionally, property-level financing that did occur, was likely subject to shorter maturity, due to the general uncertainty in the market. The response in the bond market appears to be opposite however, at least in terms of covenant restrictions. The third result shows that public bonds were issued with fewer limitations, suggesting that firms with access to this market feared loss of financial flexibility and included fewer restrictions on future funding decisions.

Growth Options

In Table 2.8 and Table 2.9 above growth options are treated as both an exogenous variable and an endogenous interaction variable with both covenant index and maturity. The results from the tables above produced statistically insignificant coefficients on leverage and maturity in each other's equations. In an attempt to resolve this inconsistency with prior literature, we re-run the analysis above without any growth

option interaction variables, but instead partition the sample at the median value for the Market-to-book ratio, generating two samples. The first sample is relevant for above median growth option firms and the second sample is relevant for below median growth option firms. Table 2.10 panel A provides results for the above median growth option firms and panel B provides the results for below growth option firms. Notice some key observations not seen in the previous interaction variable analysis.

First notice that, consistent with hypothesis 1, under this new specification leverage and maturity are both positive and statistically significant at better than a 1% level in both above median and below median growth option samples. The coefficients in the previous interaction variable analysis supported such results but did not produce statistically significant results. This suggests that capital structure decisions vary greatly between low growth firms and high growth firms, and that there is a benefit to analyzing them separately for each group individually. The result, that leverage and maturity are substitutes, is consistent with previous corporate non-financial results (Billett et al., 2007) and REIT results from Giambona (2008), but contrary to the one-way relationship revealed for REITs in Alcock et al. (2014).

Second, observe that the positive sign on maturity in the leverage equation for both above and below median growth option groups suggest that both groups exhibit a lack of liquidity risk, however the magnitude is lower for high growth firms. This provides evidence consistent with an attenuation effect of high firm growth options on the substitution effect of leverage and maturity, suggesting higher liquidity risk for high growth firms. Notice that this relationship would have been identified by a negative and

significant sign on the interaction variable between growth options and maturity in the earlier specifications from Tables 2.8 and 2.9. This however was not observed, as the sign was negative but insignificant. This new result from Table 10 is consistent with Billett et al. (2007) who also observed an increase in liquidity risk for high growth firms.

Third, further clarification on hypothesis 2 is provided by this partitioned sample. The effect of the covenant index on leverage is positive and statistically significant for both above median and below median growth option firms, consistent with hypothesis 2, but the magnitude of the coefficient is nearly 6 times higher in the below median growth option group, the difference in these coefficients between the two samples is consistent with the negative attenuation effect of the growth option interaction with the covenant index in the leverage equation of Tables 2.8 and 2.9. This offers further refinement however as we see that the negative attenuation effect of growth options on the positive effect of covenants on leverage, is such that it does not completely eliminate the positive relationship, or cause it to go negative.

Fourth, the often observed negative relationship between growth options and leverage, when examined for the two samples, appears only in the above median growth options sample, and is actually positive in the below median sample. This is consistent with a study by Chen and Zhao (2006) that finds leverage is positively related to market-to-book ratio for 88% of Compustat firms and that the well-documented negative relationship is driven by a small subset of high market-to-book firms.

Finally, the relationship between control mechanisms for the agency costs of debt is

further clarified. The hypothesized negative relationship between secured debt and covenants, hypothesis 3, is only observed in the above median sample, which is consistent with the results of a negative sign on the interaction variable between covenants and growth options in the secured debt equation of the model specification utilizing interaction variables (Tables 2.8 and 2.9).

This relationship suggests that for high growth firms only, the issuance of covenants negatively impacts firm secured debt levels and that secured debt levels reduce the presence of bond covenants. Therefore the potential intercreditor conflict between unsecured and secured debt holders appears to be influencing firm financial policy as it relates to the use of restrictive financial covenants and secured debt levels.

Robustness Test

For robustness, the results to our non-linear system GMM are re-estimated using ordinary least squares (OLS). As noted in Altonji and Segal (1996), the possibility exists for a small sample bias in GMM results with the potential to cause spurious significant relationships. Although our sample includes 625 firm-year observations, this is still far fewer than the 7016 firm-year observations utilized in Billett et al (2007), which utilized a similar technique. Therefore, we present some key similarities and differences when comparing OLS results to the non-linear GMM results in our study. Table 2.11 provides OLS results using the full sample, comparable to Table 2.8 of the GMM results. Table 2.12 provides OLS results for the sample partitioned by growth options, comparable to Table 2.10 of the GMM results.

Overall, the majority of results under OLS are consistent with those from the GMM specification. Examining the relationship between secured debt and covenants under OLS, the results are consistent with the negative relationship observed in our study. OLS results actually produce statistically significant negative relationships between both variables, even for low growth firms (Table 2.12). Results from GMM (Table 2.10) suggest this negative relationship only exists for high growth firms. Looking at the relationship between leverage and covenant structure, OLS also confirms that leverage is increasing in covenants, and that this result is reduced for high growth firms. Finally, the OLS results are also consistent with the idea that secured debt and leverage complement one another.

However, two significant differences exist between the OLS and GMM results. The first significant difference is that the result that leverage and maturity are substitutes is not completely supported by the OLS results. In Table 2.11 leverage is negatively related to short-term debt (supporting a complementary relationship between leverage and maturity). However, in Table 2.12 the high growth firm sample supports the substitutive relationship, while the low growth firm sample produces insignificant results. The second significant difference is that secured debt does not show evidence of increasing in growth options under the OLS analysis. In Table 2.8 and 2.11 this result is statistically insignificant. Given that the results under OLS do not account for the endogenous relationship between leverage, maturity, secured debt, and covenants, we feel that these contrary results can be explained by the presence of endogeneity between these variables, and argue that the results under the GMM specifications are more accurate. Furthermore,

given the general consistency of the results between the two methods, we conclude that our results under the GMM specification are not spurious in nature or driven by a small sample bias.

Conclusion

Secured debt represents over 50% of total debt on average within the REIT industry. In other industries, the average is less than 5%. While we have an intuitive understanding of why REITs use such a substantial amount of secured debt, it is currently unknown what effect this has on other financial policies. This subject is non-trivial, as the different types of debt potentially create not only principal-agent conflicts (per traditional agency cost of debt arguments), but also intercreditor conflicts (since different types of debt will be associated with different levels of collateral, seniority, and rights).

Utilizing data from bonds issued by equity REITs from 1993-2014, the primary goal of this study utilize the REIT industry to examine the interactions among effect of secured debt on the key financial policies of leverage (how much to borrow), debt maturity (how long to borrow), covenant structure (restrictions that accompany different types of debt), and secured debt (what type of debt to borrow). Because prior studies show that these policies are jointly determined, we utilize nonlinear GMM to simultaneously estimate the effects of these variables. Furthermore, we provide a detailed analysis of the covenant package found in REIT bonds, which previously has not yet been documented.

Our summary of the results from this study begins with the findings regarding the

covenant structure of REIT bond issues. We find that the covenant structure of REIT bond issues differs substantially from that of non-REITs in that the covenant structure is uniquely adapted to the REIT industry and its various regulations. Furthermore, we find substantial variation within the REIT industry in regards to the firms' credit ratings. Covenant protection in our sample varies from a minimum of zero covenants to a maximum of eleven covenants for a given firm in a given year. While certain leverage restricting covenants do occur frequently in bond issues of investment grade firms, these covenants are not nearly as common in below investment grade firms. Additionally, these leverage-restricting covenants, when present, occur alongside other covenants that are not standardized.

Contrary to the prior corporate literature, our findings suggest that covenant restrictions are positively related to leverage, but that this positive effect is significantly attenuated by the presence of growth options in the firm. This result is consistent with the findings from Riddiough and Steiner (2016), where a desire to maintain financial flexibility motivates high growth firms to issue bonds with more covenants, while not dramatically increasing leverage, in order to maintain the option and capacity to borrow more debt in the future.

Our key findings from the GMM models examining the interaction of secured debt with other endogenous financial policies can be summarized as follows. We find that secured debt and leverage are complements. Given the high quality and redeployability of the underlying assets of REITs, issuing secured debt would give secured debt holders a priority claim to an underlying asset of the firm, increasing the allowable leverage ratio. Also, because public bond issuance is influenced by credit ratings, leverage also increases

secured debt by limiting access to the unsecured bond market.

Another notable finding is that secured debt is increasing in firm growth options. This suggests that secured debt acts as a liquidity store for REITs to preserve financial flexibility, and therefore is more likely to be utilized by high growth firms. Related to this, our results suggest that secured debt acts as a substitute for covenant protection for high growth firms, which provides some evidence of intercreditor conflicts between the secured and unsecured debt holders.

We also examine the impact of the financial crisis on the four financial policies examined in this study. The results suggest that the crisis is associated with an increase in leverage (stock prices dropped significantly) and short-term debt, a decrease in secured debt, and (somewhat surprisingly) a loosening of covenant restrictions. The leverage effect is likely due to a decrease in market value, as during this period. The short-term debt effect is likely a result of the tightening credit market, specifically the secured debt (mortgage) market. As property values decreased, the ability to finance properties was significantly reduced. Property-level financing that did occur was likely subject to shorter maturity, due to the general uncertainty in the market. The covenant restriction effect (public bonds were issued with fewer limitations), suggests that REITs with access to this market feared loss of financial flexibility and included fewer restrictions on future funding decisions.

Overall, this study contributes specifically to the real estate literature by providing a better understanding of interrelated financial policy decisions and the composition of bond covenants within the REIT industry. More generally, this study contributes to the

corporate finance literature by providing insights into how corporate financial policies interact within an environment of potential intercreditor conflicts.

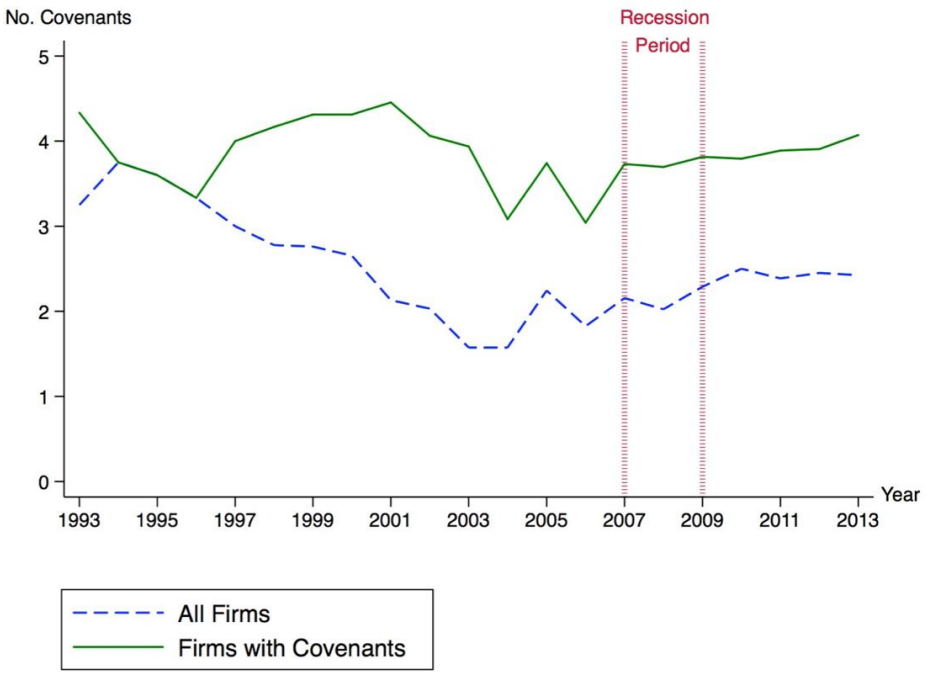

Figure 2.1: Mean number of covenants per firm.

Note: This figure tracks the average number of covenants present across all existing bond-issues for a given firm, in a given year. The results are presented separately for all firms in the sample and then only for firms that have bond issues containing some type of covenant restrictions.

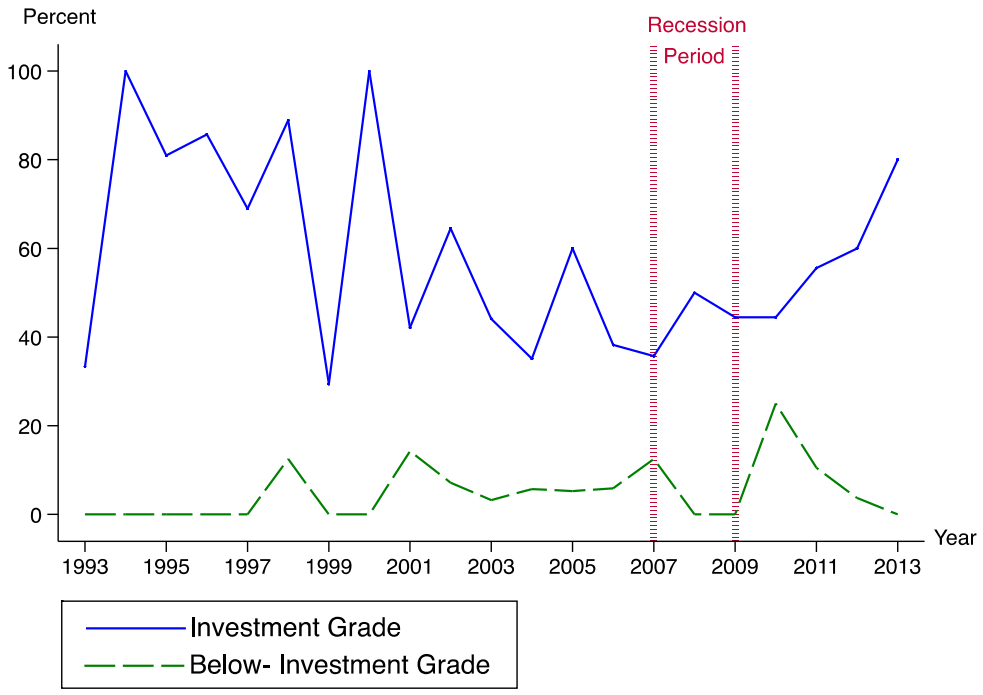

Figure 2.2: Total leverage restrictions by bond issue.

Note: This figure tracks the mean number of bond issues in a given year that contain any type of covenant restriction on a firm's total leverage. The annual means are presented separately for firms with investment grade and below-investment grade credit ratings.

Table 2.1: Variable definitions.

Variable	Type	Source	Definition
Leverage	Endogenous	Compustat	Total debt / firm market value
Maturity (≤ 3 years)	Endogenous	Compustat	Debt due in 3 years or less / total debt
Secured Debt	Endogenous	Compustat	Secured debt / total debt
Covenant Index	Endogenous	Mergent FISD	Index constructed from 15 categorical covenant types represented in outstanding public bond issues by firm-year
Market-to-Book	Exogenous	Compustat	Market value / book value
Profitability	Exogenous	Compustat	EBIT / book value
Sales (firm size)	Exogenous	Compustat	Net sales ($MM, cpi adjusted)
Volatility	Exogenous	Compustat	Standard deviation of EBIT / book value, over prior 5 years
Earnings Growth	Exogenous	Compustat	$[EPS_{(t+1)} - EPS_{(t)}] / \text{Share price}_{(t)}$
Asset Maturity	Exogenous	Compustat	Book value / (depreciation and amortization)
Term Premium	Exogenous	Compustat	10 year treasury yield minus 6 month treasury yield (monthly, matched to fiscal year end of the firm)
Convertible	Exogenous	Mergent FISD	1 if the firm has convertibe bond issues outstanding; 0 otherwise
Modified Z-Score[1]	Exogenous	Compustat	[(3.3*pretax income) + sales + (1.4*retained earnings) + (1.2 *working capital)] / total assets
Property type dummies	Exogenous	SNL	Dummy variable for industrial/office, retail, lodging, healthcare, self-storage facilities, diversified, unclassified, and residential (excluded) property types

Notes: (1) Following Mackie-Mason (1990) and Giacomini et al. (2015) our calculation of Z-score omits the market-to-book component, as this measure is already included as a dependent variable in our models.

Table 2.2: Covenant usage: REITs vs. Non-REITs.

Covenant Type	REITs	Non-REITs	Difference
Secured debt	9.3%	44.3%	-35.0%
Sale / Leaseback	5.5%	29.2%	-23.7%
Dividend	6.1%	27.0%	-20.9%
Share repurchase	3.3%	22.6%	-19.3%
Asset sale	48.7%	64.5%	-15.8%
Stock issuance	1.6%	17.3%	-15.7%
Merger	49.0%	64.6%	-15.6%
Poison put	13.6%	29.1%	-15.5%
Subordinated debt	0.6%	6.0%	-5.4%
Cross default	46.1%	51.0%	-4.9%
Investment	0.4%	4.2%	-3.8%
Ratings / Net worth	0.4%	4.1%	-3.7%
Funded debt	1.0%	3.0%	-2.0%
Senior debt	0.5%	1.4%	-0.9%
Total leverage	36.9%	30.4%	6.5%

Notes: This table compares the covenant structure of our sample of REIT bond issues outstanding (1993-2014) to non-REIT bond issues outstanding (1960-2003) (as summarized in Table 3 of Billet et. al, 2007). The covenant types are listed in descending order of the differences. Note that the REIT sample is less than the Non-REIT sample for all covenant types, except for total leverage. The largest and most notable difference is in regards to covenant restrictions on secured debt.

Table 2.3: Correlations between bond covenants.

Covenant Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dividend	1.00														
2. Share repurchase	0.34 ***	1.00													
3. Funded debt	-0.02	-0.02	1.00												
4. Subordinate debt	0.24 ***	0.36 ***	-0.01	1.00											
5. Senior debt	0.11 ***	-0.01	-0.01	0.00	1.00										
6. Secured debt	0.06	0.13 ***	-0.03	0.21 ***	0.10 ***	1.00									
7. Total leverage	0.11 ***	0.16 ***	0.11 ***	0.07 *	-0.04	0.11 ***	1.00								
8. Sale / Leaseback	0.05	0.16 ***	-0.02	0.16 ***	-0.01	0.36 ***	0.03	1.00							
9. Stock issuance	0.19 ***	0.29 ***	-0.01	0.41 ***	0.00	0.07 **	0.08 **	0.26 ***	1.00						
10. Ratings / Net worth	-0.01	0.36 ***	-0.01	0.00	0.00	-0.01	0.07 *	-0.01	0.00	1.00					
11. Cross default	0.19 ***	0.13 ***	0.11 ***	0.06	0.06	0.14 ***	0.76 ***	0.05	0.07 *	0.06	1.00				
12. Poison put	0.13 ***	0.25 ***	0.00	0.15 ***	-0.02	0.13 ***	-0.07 *	0.08 **	0.11 ***	0.15 ***	0.16 ***	1.00			
13. Asset sale	0.21 ***	0.13 ***	0.11 ***	0.05	0.05	0.21 ***	0.66 ***	0.12 ***	0.02	0.05	0.79 ***	0.13 ***	1.00		
14. Investment	0.24 ***	-0.01	-0.01	0.00	0.00	0.10 ***	0.07 *	-0.01	0.00	0.00	0.06	0.06 *	0.05	1.00	
15. Merger	0.21 ***	0.11 ***	0.11 ***	0.05	0.05	0.22 ***	0.66 ***	0.11 ***	0.02	0.05	0.79 ***	0.13 ***	0.99 ***	0.05	1.00

Notes: This table reports Pearson correlation coefficients for the 15 covenant types in our sample. Covenant classification equals 1 if the covenant type exists within a given bond issue, 0 otherwise. The covenant types across the top row correspond with the respective numbering in the first column. Significance at the 1%, 5% , and 10% level is indicated by ***, **, and *, respectively.

Table 2.4: Conditional probabilities between bond covenants.

Covenant Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dividend		0.24	0.00	0.06	0.03	0.12	0.64	0.06	0.06	0.00	0.91	0.30	0.97	0.06	0.97
2. Share repurchase	0.53		0.00	0.13	0.00	0.27	0.93	0.20	0.13	0.13	0.93	0.67	0.93	0.00	0.87
3. Funded debt	0.00	0.00		0.00	0.00	0.00	0.88	0.00	0.00	0.00	1.00	0.13	1.00	0.00	1.00
4. Subordinate debt	1.00	1.00	0.00		0.00	1.00	1.00	0.50	0.50	0.00	1.00	1.00	1.00	0.00	1.00
5. Senior debt	0.50	0.00	0.00	0.00		0.50	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
6. Secured debt	0.09	0.09	0.00	0.05	0.02		0.59	0.25	0.02	0.00	0.75	0.27	0.91	0.02	0.93
7. Total leverage	0.08	0.05	0.03	0.01	0.00	0.09		0.03	0.01	0.01	0.95	0.09	0.91	0.01	0.91
8. Sale / Leaseback	0.11	0.16	0.00	0.05	0.00	0.58	0.47		0.11	0.00	0.63	0.26	0.84	0.00	0.84
9. Stock issuance	0.67	0.67	0.00	0.33	0.00	0.33	1.00	0.67		0.00	1.00	0.67	0.67	0.00	0.67
10. Ratings / Net worth	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00		1.00	1.00	1.00	0.00	1.00
11. Cross default	0.09	0.04	0.02	0.01	0.01	0.10	0.77	0.03	0.01	0.01		0.17	0.91	0.01	0.91
12. Poison put	0.12	0.12	0.01	0.02	0.00	0.14	0.29	0.06	0.02	0.02	0.70		0.67	0.01	0.67
13. Asset sale	0.09	0.04	0.02	0.01	0.01	0.11	0.71	0.04	0.01	0.01	0.87	0.16		0.01	1.00
14. Investment	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	0.00	1.00	0.50	1.00		1.00
15. Merger	0.09	0.04	0.02	0.01	0.01	0.11	0.71	0.04	0.01	0.01	0.87	0.16	0.99	0.01	

Notes: Conditional probabilities are presented for the 15 covenant types in our sample. Each reported number is the probability of observing the horizontally listed covenant type in a bond issue conditional on observing the vertically listed covenant type within the same bond issue.

Table 2.5: Descriptive statistics (stratified by bond-issuing firms).

	Bond Issuers		Non-Issuers	
Variable	Mean	Median	Mean	Median
Endogenous capital structure variables				
Leverage	0.42	0.41	0.42	0.41
Maturity (≤ 3 years)	0.31	0.29	0.35 ***	0.31
Secured Debt	0.51	0.46	0.65 ***	0.80 ***
Covenant Index	0.15	0.13	NA	NA
Other dependent variables				
Market-to-Book	1.29	1.22	1.25 *	1.16 **
Sales (firm size)	741	442	955	142 ***
Profitability	5.04	5.10	5.48 **	5.94 ***
Volatility	1.28	0.80	2.37 ***	1.31 ***
Earnings Growth	-0.31	-0.08	-0.05 *	-0.05
Asset Maturity	31.50	28.95	37.78 ***	33.98 ***
Term Premium	1.79	1.83	1.64 **	1.67
Modified Z-score	0.11	0.14	0.25 ***	0.22 ***
Convertible	0.25	0.00	NA	NA
Property type:				
Residential	0.18	0.00	0.14 *	0.00
Industrial /Office	0.24	0.00	0.19 **	0.00
Retail	0.29	0.00	0.23 ***	0.00
Lodging	0.08	0.00	0.07	0.00
Healthcare	0.06	0.00	0.05	0.00
Self Storage	0.02	0.00	0.02	0.00
Diversified	0.10	0.00	0.15 ***	0.00
Unclassified	0.03	0.00	0.15 ***	0.00

Notes: This table provides summary statistics for our sample, which is stratified by bond-issuing firms and non-issuing firms (*i.e.* firms that have not issued any bonds). Statistically significant differences in the means and medians at the 1%, 5% , and 10% level are indicated by ***, **, and *, respectively.

Table 2.6: Descriptive statistics (stratified by growth options).

	High Growth Options		Low Growth Options	
Variable	Mean	Median	Mean	Median
Endogenous capital structure variables				
Leverage	0.38	0.36	0.48 ***	0.47 ***
Maturity (≤ 3 years)	0.29	0.27	0.34 ***	0.32 ***
Secured Debt	0.45	0.38	0.57 ***	0.57 ***
Covenant Index	0.18	0.20	0.12 ***	0.07 ***
Other dependent variables				
Market-to-book	1.51	1.42	1.04 ***	1.07 ***
Sales (firm size)	792	427	661 *	429
Profitability	5.65	5.35	4.91 ***	5.00 ***
Volatility	1.08	0.66	1.45 ***	0.97 ***
Earnings Growth	0.00	0.00	0.00	0.00
Asset Maturity	32.13	29.52	31.77	30.21
Term Premium	1.56	1.67	1.94 ***	1.98 ***
Modified Z-score	0.15	0.16	0.08 ***	0.11 *
Convertible	0.25	0.00	0.27	0.00
Property type:				
Residential	0.22	0.00	0.13 ***	0.00
Industrial	0.18	0.00	0.32 ***	0.00
Retail	0.35	0.00	0.22 ***	0.00
Lodging	0.03	0.00	0.14 ***	0.00
Healthcare	0.08	0.00	0.04 **	0.00
Self Storage	0.01	0.00	0.02	0.00
Diversified	0.12	0.00	0.21 *	0.00
Unclassified	0.05	0.00	0.00 ***	0.00

Notes: This table provides summary statistics for our sample of bond issuing REITs (625 firm-year observations), which is stratified by high growth option firms (above median *Market-to-Book*) and low growth option firms (below median *Market-to-Book*). The median *Market-to-Book* in our sample is 1.20. Statistically significant differences in the means and medians at the 1%, 5% , and 10% level are indicated by ***, **, and *, respectively.

Table 2.7: Correlations between endogenous capital structure variables and growth options.

Variable	*Leverage*	*Maturity (≤ 3 years)*	*Covenant Index*	*Secured Debt*	*Market-to-Book*
Leverage	1.00				
Maturity (≤ 3 years)	0.06 **	1.00			
Covenant Index	-0.05	-0.09 ***	1.00		
Secured Debt	0.26 ***	0.01	-0.33 ***	1.00	
Market-to-book	-0.43 ***	-0.07 **	0.11 ***	-0.18 ***	1.00

Notes: Market-to-Book proxies for growth options. Pearson correlation coefficients are reported. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

Table 2.8: Joint determinates of financial policy variables (Nonlinear GMM).

Independent Variables	Dependent Variable			
	Leverage	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*
Leverage		0.239	0.799 *	2.585 ***
		(0.85)	(1.92)	(7.16)
Maturity (≤ 3 years)	0.618		0.123	0.131
	(0.99)		(0.28)	(0.35)
Secured Debt	0.473 ***	-0.193		-0.952 ***
	(7.01)	(-1.22)		(-7.84)
Covenant Index	1.017 ***	0.238	2.156 **	
	(4.18)	(0.32)	(2.10)	
Market-to-Book x Covenant Index	-0.371 *	-0.395	-2.901 ***	
	(-1.89)	(-0.72)	(-3.55)	
Market-to-Book x Maturity	-0.251			
	(-0.52)			
Market-to-Book	0.116	-0.024	0.425 ***	0.297 ***
	(0.68)	(-0.21)	(2.96)	(4.06)
Profitability	-1.790 ***			
	(-5.36)			
Ln (Sales)	0.008	-0.507 ***		-0.050 ***
	(0.93)	(-2.85)		(-3.11)
Ln (Sales)^2		0.042 ***		
		(2.98)		
Volatility	-1.551 ***	-3.907 *		3.649 ***
	(-3.42)	(-1.76)		(3.76)
Earnings Growth		0.145		
		(1.20)		
Asset Maturity		-0.002		
		(-1.46)		
Term Premium		0.011 *		
		(1.87)		
Convertible				-0.050 *
				(-1.89)
Modified Z-score			0.126	0.309 ***
			(1.24)	(3.02)

Table 2.8: Continued.

Independent Variables	Dependent Variable			
	Leverage	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*
Property type:				
Industrial / Office			-0.088	
			(-1.34)	
Retail			0.131	
			(1.46)	
Lodging			0.147 **	
			(2.08)	
Healthcare			-0.018	
			(-0.13)	
Self storage			-0.105	
			(-0.85)	
Diversified			0.172 ***	
			(2.62)	
Unclassified			0.518 **	
			(2.52)	
Intercept	-0.068	1.958 ***	-0.233	-0.664 **
	(-0.30)	(3.28)	(-0.70)	(-2.55)
Overidentification Statistic		0.172		
Firm-Year Observations		625		
Firms		104		

Notes: This table reports results from a four-equation simultaneous model estimated using nonlinear GMM, which treats each of the four capital structure variables as endogenous. T-values are provided in parentheses below the coefficient estimates. Standard errors are consistent in the presence of heteroskedasticity and correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

Table 2.9: Effect of financial crisis (Nonlinear GMM).

	Model 1. Full Sample - Without Crisis				Model 2. Full Sample - With Crisis			
	Dependent Variable				Dependent Variable			
Independent Variables	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*
Leverage		0.239	0.799 *	2.585 ***		0.102	1.025 **	2.329 ***
		(0.85)	(1.92)	(7.16)		(0.40)	(2.14)	(6.43)
Maturity (≤ 3 years)	0.618		0.123	0.131	0.666		0.589	0.554
	(0.99)		(0.28)	(0.35)	(1.03)		(1.19)	(1.40)
Covenant Index	1.017 ***	0.238	2.156 **		1.030 ***	0.128	1.161	
	(4.18)	(0.32)	(2.10)		(4.25)	(0.21)	(0.99)	
Secured Debt	0.473 ***	-0.193		-0.952 ***	0.462 ***	-0.106		-0.939 ***
	(7.01)	(-1.22)		(-7.84)	(6.97)	(-0.77)		(-6.90)
Market-to-Book x Covenant Index	-0.371 *	-0.395	-2.901 ***		-0.378 *	-0.213	-2.239 **	
	(-1.89)	(-0.72)	(-3.55)		(-1.87)	(-0.48)	(-2.55)	
Market-to-Book x Maturity	-0.251				-0.347			
	(-0.52)				(-0.70)			
Market-to-Book	0.116	-0.024	0.425 ***	0.297 ***	0.138	-0.080	0.426 ***	0.316 ***
	(0.68)	(-0.21)	(2.96)	(4.06)	(0.77)	(-0.82)	(3.24)	(3.72)
Crisis Dummy	No	No	No	No	0.043 ***	0.058 **	-0.115 *	-0.175 ***
					(3.02)	(2.26)	(-1.87)	(-3.89)
All Other Table 8 Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overidentification Statistic	0.172				0.128			
Firm-Year Observations	625				625			
Firms	104				104			

Notes: Both models repeat the non-linear GMM specification from Table 8, but Model 2 adds a financial crisis dummy variable (*Crisis Dummy*). Model 1 (a duplication of the results from Table 8) is presented for convenience of comparison. The table presents results only for key variables (results for all other variables are suppressed). Standard errors are consistent in the presence of heteroskedasticity and correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

Table 2.10: Effect of growth options (Nonlinear GMM).

	Model 1. High Growth Options				Model 2. Low Growth Options			
	Dependent Variable				Dependent Variable			
Independent Variables	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt %*	*Covenant Index*	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt %*	*Covenant Index*
Leverage		1.353 ***	3.727 ***	3.815 ***		0.549 ***	-0.622	0.979 ***
		(2.62)	(3.60)	(3.60)		(2.86)	(-1.28)	(3.98)
Maturity (≤ 3 years)	0.294 ***		1.027	-0.525	0.480 ***		-1.187 *	0.852 ***
	(3.12)		(1.44)	(-1.28)	(2.80)		(-1.71)	(3.53)
Covenant Index	0.112 *	-0.175	-1.246 ***		0.670 ***	0.126	-0.485	
	(1.81)	(-0.47)	(-3.68)		(2.78)	(0.47)	(-0.67)	
Secured Debt	0.292 ***	-0.274		-1.123 ***	0.486 ***	-0.435 **		-0.124
	(8.70)	(-1.22)		(-5.01)	(4.26)	(-2.53)		(-0.97)
Market-to-Book	-0.049 **	0.093	0.302 *	0.181 *	0.315 **	-0.432 **	-0.468 **	0.514 ***
	(-2.23)	(1.17)	(1.76)	(1.84)	(2.04)	(-2.20)	(-1.98)	(3.77)
Crisis Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Other Table 8 Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overidentification Statistic		0.4097			0.2454			
Firm-Year Observations		312			313			
Firms		73				78		

Notes: Both models repeat the non-linear GMM specification from Table 8, but stratifies the sample into by high growth option firms (above median *Market-to-Book*) and low growth option firms (below median *Market-to-Book*). The table presents results only for key variables (results for all other variables are suppressed). Standard errors are consistent in the presence of heteroskedasticity and correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

Table 2.11: Determinates of financial policy variables (OLS robustness test).

Independent Variables	Dependent Variable			
	Leverage	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*
Leverage		0.100 *	0.494 ***	0.118 ***
		(1.92)	(5.45)	(2.63)
Maturity (≤ 3 years)	0.179		0.069	-0.029
	(1.44)		(1.02)	(-0.87)
Secured Debt	0.160 ***	0.011		-0.178 ***
	(8.99)	(0.44)		(-9.59)
Covenant Index	0.442 ***	-0.020	-0.359	
	(3.26)	(-0.11)	(-1.17)	
Market-to-Book x Covenant Index	-0.250 **	0.017	-0.362	
	(-2.50)	(0.13)	(-1.61)	
Market-to-Book x Maturity	-0.106			
	(-1.05)			
Market-to-Book	-0.058	-0.075 **	-0.012	0.053 ***
	(-1.47)	(-2.41)	(-0.22)	(2.88)
Profitability	-0.604 ***			
	(-2.60)			
Ln (Sales)	0.007	0.155 ***		0.004
	(1.38)	(2.79)		(0.72)
Ln (Sales)^2		-0.012 ***		
		-(2.69)		
Volatility	-0.571	0.607		0.828 **
	(-1.57)	(1.30)		(2.23)
Earnings Growth		-0.017		
		(-0.17)		
Asset Maturity		0.002 **		
		(2.49)		
Term Premium		0.008		
		(1.58)		
Convertible				0.079 ***
				(6.23)
Modified Z-score			-0.049	0.043 *
			(-1.05)	(1.88)

Table 2.11: Continued.

Independent Variables	Dependent Variable			
	Leverage	*Maturity (≤ 3 years)*	*Secured Debt*	*Covenant Index*
Property type:				
Industrial / Office			-0.160 ***	
			(-4.67)	
Retail			0.018	
			(0.56)	
Lodging			0.020	
			(0.44)	
Healthcare			-0.182 ***	
			(-3.51)	
Self storage			-0.161 *	
			(-1.84)	
Diversified			0.080 *	
			(1.90)	
Unclassified			0.021	
			(0.27)	
Intercept	0.381 ***	-0.191	0.462 ***	0.071
	(6.29)	(-1.05)	(4.93)	(1.49)
Adjusted R^2	0.263	0.050	0.335	0.223
Firm-Year Observations	625	625	625	625
Firms	104	104	104	104

Notes: This table reports results from four separate OLS models, which treat the four capital structure variables as exogenous. The specification of the models follows that from Table 8. T-values are provided in parentheses below the coefficient estimates. Standard errors are consistent in the presence of heteroskedasticity and correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

Table 2.12: Effect of growth options (OLS robustness test).

	Model 1. High Growth Options				Model 2. Low Growth Options			
	Dependent Variable				Dependent Variable			
Independent Variables	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt %*	*Covenant Index*	*Leverage*	*Maturity (≤ 3 years)*	*Secured Debt %*	*Covenant Index*
Leverage		0.233 **	1.194 ***	0.258 ***		0.029	0.224 *	0.094 *
		(2.37)	(7.15)	(2.69)		(0.42)	(1.85)	(1.81)
Maturity (≤ 3 years)	0.064 *		-0.010	-0.055	0.004		0.095	-0.005
	(1.92)		(-0.10)	(-1.02)	(0.08)		(1.00)	(-0.12)
Covenant Index	0.053	-0.033	-0.890 ***		0.223 ***	0.023	-0.734 ***	
	(1.51)	(-0.53)	(-9.21)		(3.32)	(0.27)	(-5.68)	
Secured Debt	0.152 ***	-0.016		-0.233 ***	0.152 ***	0.014		-0.127 ***
	(8.97)	(-0.48)		(-8.70)	(5.04)	(0.37)		(-5.05)
Market-to-Book	-0.075 ***	-0.039	-0.005	-0.015 *	-0.197 **	-0.064	-0.224	0.134 **
	(-3.89)	(-1.25)	(-0.09)	(-0.53)	(-2.48)	(-0.66)	(-1.54)	(2.07)
Crisis Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Other Table 8 Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.416	0.076	0.468	0.325	0.179	0.046	0.236	0.221
Firm-Year Observations	312				313			
Firms	73				78			

Notes: This table reports results from four separate OLS models which treat the four capital structure variables as exogenous. The specification of the models follows that from Table 10. T-values are provided in parentheses below the coefficient estimates. Standard errors are consistent in the presence of heteroskedasticity and correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and *, respectively.

CHAPTER 3: THE DETERMINANTS OF FOREIGN INVESTMENT IN REITS

Introduction

On December 18th, 2015 president Obama signed the Protecting Americans from Tax Hikes (PATH) Act into law. This law made several key changes relative to the REIT industry through changes in the Foreign Investment in Real Property Tax Act of 1980 (FIRPTA). Prior to this revision FIRPTA imposed a withholding tax on all distributions or capital gains received by foreign investors owning over 5% of a U.S. REIT. Additionally foreign pension and retirement funds were subject to more stringent tax treatments vs. U.S. Pension funds. With the passing of the PATH Act, the 5% threshold was raised to 10% and foreign pension and retirement funds were given equal treatment to U.S. pension funds (Kenny 2015).

This modification to FIRPTA, was brought about to encourage foreign investment in real estate, and specifically should benefit REITs in particular. This leaves the question of what foreign investment looks like for REITs. What drives this investment? The purpose of our analysis will be to answer this question.

Our analysis will utilize the level of institutional investment in REITS to explore the motivations for foreign investment. We will utilize public security ownership information from Thompson-Reuters Institutional Holdings Database to identify the level of total, domestic, and foreign institutional ownership for each publicly listed Equity REIT, from 2000-2014, and combine this information with data from SNL Financial,

Compustat, and the Center for Research in Security Prices (CRSP) database, to develop a model of institutional investment in REITs. We will follow previous work by Gompers and Metrick (2001) and Ferriera and Matos (2008), in developing these models of institutional investment.

From this analysis we will be able to differentiate the common drivers of institutional investment from those that specifically influence foreign investment in REITs, to better understand what motivates foreign investors.

While our analysis is limited to institutional investors, we feel that such analysis leads to a more general understanding of the role of foreign investment in REITs because institutional investors comprise the majority of ownership in the REIT industry. Over 2000-2014, institutional investors in our dataset own on average 62% of the total public equity outstanding for the REITs in our sample, an average that peaks at over 80% in 2008. Additionally, our dataset excludes institutional investors that do not file 13f reports with the SEC. SNL financial, which tracks their own database of institutional investors, puts the institutional ownership in REITs as high as 92% as of September 2016[21].

Our results will first examine OLS results for the determinants of foreign investment in REITs as has been completed in the previous institutional ownership literature, but then expand our analysis utilizing quantile regression, to better control for extreme

[21] Based on average institutional ownership recorded in SNL Financial, average includes all active U.S. Equity REITs available in the SNL Financial database as of September 2016. Note several REITs record institutional investment above 100%.

observations, omitted variable bias, and heterogeneity in the preferences of institutional investor across REITs with different levels of institutional investment.

Our analysis leads to several interesting insights into the motivations of foreign investment. First, foreign institutional investors prefer investing in larger REITs that have higher liquidity. This result is common among all institutional investors in REITs, foreign and domestic. Second, foreign investors prefer REITs with lower volatility, a trend that is opposite for the domestic investors in our analysis. Third, foreign investors follow a momentum strategy by increasing ownership immediately following an increase in returns over the previous 3 months, but exhibit a negative relationship with older returns from 3-12 months previous. Fourth, foreign investors prefer REITs that are also included in the S&P 500 index.

Examining REIT foreign investment across firms with the highest and lowest levels of foreign institutional investment, we discover heterogeneity among these investors. Foreign investors in REITs with high levels of foreign investment prefer value stocks, while most foreign investors prefer growth stocks. Additionally, foreign investors in REITs with low levels of foreign investment fail to be motivated by stock price momentum unlike most other foreign investors in REITs.

The remainder of this article proceeds as follows. The next section reviews the relevant literature. The third section describes our sample as well as the variables used in this study. Our methodology is described in the fourth section. Results from our analysis of

foreign institutional investment in REITs are presented in the fifth section. The sixth section concludes our analysis.

Literature Review

A review of the literature will focus primarily on three related lines of literature. First we will briefly discuss key elements of the institutional investment literature. Second we will discuss relevant literature related to foreign institutional investment. Third we will discuss REIT related findings.

Institutional Investment

The institutional investment literature has primarily focused on the concept that institutional investors move together when buying and selling securities. Banerjee (1992) labels this as heading behavior, and describes a model where institutional investors observe previous actions from other institutional investors and gather some information from this activity and follow suit. Lakonishok, Schleifer, and Vishney (1992) examines herding behavior of pension fund managers, and finds some evidence that they herd in their investments in smaller stocks, and follow a positive-feedback strategy (buying when the market is going up). However they find that neither following a positive-feedback strategy nor a negative-feedback strategy occurs on average over their data. Grinblatt, Titman, and Wermers (1995) examines herding for mutual funds and finds the statistically significant presence of momentum trading and herding, but that it is relatively small in size. Falkenstein (1996) presents an alternative explanation to herding, where institutional investors simply have a preference for certain types of investments,

and therefore gravitate to stocks that posses those features. Falkenstein (1996) finds that institutional investors have a preference for volatility[22], liquidity, and size, but an aversion to low priced stocks with little information.

Gompers and Metrick (2001) study the relationship between institutional investors and equity prices. In their analysis they first examine the determinants of institutional investment, such as momentum and other firm-level control variables. Their analysis uncovers that institutional investors have a significant preference for large stocks with higher liquidity and lower previous returns. Interestingly they draw a comparison to an earlier study by Cohen (1998) that finds institutional investors buy stock from individuals as markets decline but sell stocks to individuals as markets rise, supporting a negative-feedback trading strategy. Gompers and Metrick (2001) also conclude that over time individual investor preferences have shifted to that of the institutional investor[23].

In their analysis Gompers and Metrick (2001) examine several potential determinants of institutional investment from 1980 through 1996. They utilize 13F filings with the SEC to identify institutional ownership and examine the influence of market capitalization (size), book-to-market ratio, dividend yield, price per share, an S&P500 dummy variable equal to 1 if the security is included in the index, volatility, age, momentum, and turnover, as independent variables in the determination of the level of institutional ownership. Besides

[22] Sias (1996) attributes this to an increase in volatility due to institutional involvement rather than a preference in risk.
[23] This conclusion further supports our use of an institutional database to draw conclusions about foreign investors in general.

the main conclusions related to size, volatility, and returns already discussed, they find the following results regarding the determinants of institutional investment levels using 68 quarterly cross-sectional regressions: Book-to-market is mostly positive and significant, demonstrating a preference for value stocks; price is positive and significant suggesting a preference for lower transaction costs; age is positive and significant; and dividend yield is negative and significant. Previous literature suggests that institutional investors take into consideration "prudent man" laws when making investment decisions on behalf on investors, and therefore prefer safer and more established investments. Therefore we would expect age, and dividend yield to both be positively related to institutional investment[24], making the negative relationship between dividend yield and institutional investment somewhat surprising.

Following Gompers and Metrick (2001), as well as previous literature, we will control for these variables in our analysis of foreign institutional ownership in REITs. Additionally, given that REITs have a high degree of institutional ownership[25], we feel our analysis of foreign institutional investment will give a strong representation of overall foreign investment in REITs.

[24] For a full explanation see Del Guercio (1996).
[25] Median Institutional Investment in our sample (see Table 1) is 69%, increasing to 77% for the larger half of our sample (see Table 3). Additionally SNL Financial (which includes institutional investors not captured by 13F filings) reports a current (September 2016) median level of institutional investment of 92% for REITs.

Foreign Institutional Investment

Building upon Gompers and Metrick (2001), Ferreira and Matos (2008) examine the determinants of foreign institutional investment across 27 non-us countries from 2000-2005. They too document a positive relationship between institutional investment level and both size and volatility. Opposite to previous findings in the institutional investment literature, they observe a negative relationship between foreign institutional investment and book-to-market, suggesting a preference for growth stocks among foreign investors, while domestic investors prefer value stocks. Additionally, they are only able to support previous findings of a negative relationship between stock return and institutional investors for domestic firms, with the relationship being positive for foreign firms. This suggests that foreign investors follow a momentum strategy[26] and chase previous returns, while domestic investors follow a contrarian strategy. Finally, they find that foreign investors avoid firms with higher dividends while domestic investors prefer them.

Ferreira and Matos (2008), add additional variables to their analysis that may also be of interest in our analysis. They discover a negative relationship between leverage and institutional investment, for both foreign and domestic institutional investors under most specifications. Also, they control for an investors preference for cash holdings, which is positive and significant only for foreign investors. Finally they add an additional control for return on equity and find mostly insignificant results although some evidence of a positive relationship exists. Again given prudent-man law considerations, it would be expected that stronger previous earnings should increase institutional investment.

[26] This is consistent with findings from (Tesar and Werner, 1995; Grinblatt and Keloharju, 2000)

REIT Investment

Chan, Leung, and Wang (1998) utilize 13F SEC filings to document institutional investment in REITs from 1986-1995. Using a matching sample of non-REIT firms, they conclude that institutional investment in REITS during this time period was significantly higher, in terms of percentage of shares outstanding, than your average firm. Ling and Ryngaert (1997) also documents that institutional investment was much higher in REIT IPOs beginning in the 1990s. IPOs with institutional investment in the range of 40-50% were not uncommon during this time period. The results of Chan et. al. (1998), which included a much larger sample of REIT firms was lower with an average of approximately 30% in 1995.

Ling and Naranjo (2006), explore the dynamics of mutual fund capital flows relative to NAREIT index returns. Their results determine that previous returns (weekly and monthly) do increase current mutual fund flows, suggesting a momentum effect on mutual fund investment. In a previous study Ling and Naranjo (2003) found that the relationship between REIT equity flows (primarily initial public offering and secondary public offerings) was not affected by previous returns post 1992. Our analysis will further explore the responsiveness of institutional investment to prior returns for REIT institutional investors, comparing the results from both foreign and domestic investors.

While previous literature has examined institutional investment in REITs, the role of foreign investment has been left largely unexplored. As background we will discuss two

papers regarding foreign investor preference for real estate. Gerlowski, Fung, and Ford (1994) analyze foreign investment in U.S. private real estate by investors from Japan, Canada, and the United Kingdom from 1980-1989 by state and region. They conclude that regions with the largest and most developed economies attract the most private foreign investment and that regions with higher taxation serve as a strong deterrent to foreign investment. They also find that the south and west regions of the United States attract the most investment. In our analysis we will look at any regional preference in terms of foreign investment in REITs.

Mauck and Price (2017) examine the foreign property investment activities of publicly traded real estate operating companies in the U.S. and compare those investments to their domestic property investments. They discover that property investment in the retail, office, industrial, and self-storage industries is lower in foreign countries by U.S. real estate operating companies. Given the analyses in Mauck and Price (2017), the effect of property type may be an interesting variable to explore when examining foreign investment in REITs.

Data

Definitions

Our analysis will focus on the determinants of foreign investment for REITs. In doing so, we will utilize institutional investment data from 13f filings with the SEC to determine the level of institutional ownership in a given REIT. The data on 13f filings comes from the Thompson-Reuters Institutional Holdings Database and contains holdings data as

reported by institutional managers with over $100 million in assets under management. This dataset identifies ownership shares of a given security by manager as well as manager country, and therefore allows us to identify the origin of the institutional investment[27]. These shares of ownership and country of origin results are reported on a quarterly basis beginning in Q1 2000 to the end of our sample in Q4 2014[28]. This ownership information data was then aggregated for each of the equity REITs in our sample[29], giving the total shares outstanding in each quarter held by institutional investors, further subdivided into foreign (non-U.S.) and domestic (U.S.) ownership, for each firm-quarter observation. This data was then merged with annual Compustat financial data, monthly Center for Research in Security Prices (CRSP) transaction data, and quarterly firm -level data from SNL Financial, for each of the REITS in our sample. The combination resulted in a total of 6,561 firm-quarter observations on 197 unique firms. Consistent with Gompers and Metrick (2001), Ferreira and Matos (2008), Falkenstein (1996), and others, we calculate institutional ownership at the firm-quarter level, as a percentage, by dividing total shares owned by institutional investors by the number of shares outstanding from the CRSP database for the month end of the current quarter. Of the 6,561 observations, 305 generated observations above 100% and were subsequently drop from our analysis, leaving 6,256 observations. Foreign and domestic institutional ownership were then calculated for each firm-quarter by dividing their

[27] If no country is listed for a manager anywhere in our sample, or alternatively if a manager has inconsistent county information, these results are excluded from our foreign and domestic institutional ownership totals. These excluded observations occur at an average and median level of 1.1% and .5% respectively across all REITs in our firm.
[28] Q1 2000 is the first quarter in which country of origin is consistently populated.
[29] Our sample includes all publicly listed REITS from 2000-2014.

respective shares held by institutional investors by the total number of shares outstanding for the firm.

Again, consistent with previous research we calculate several firm level control variables as follows:

Market Capitalization (in logs):[As a proxy for size] Price per share multiplied by number of shares outstanding. Calculated as of the month end of the current quarter from the CRSP database

Market-to-book ratio: [as a proxy for growth vs. value] Market value / book value. Calculated at year-end for the fiscal year immediately preceding the current quarter from the Compustat Database.

Leverage: Total debt / market value. Calculated at year-end for the fiscal year immediately preceding the current quarter from the Compustat Database.

Return on Equity: [as a proxy for profitability] Net income as a percentage of average equity for the quarter immediately preceding the current quarter from the SNL Financial Database.

Volatility: Standard deviation of monthly returns over the previous two years from the CRSP database

Dividend Yield: Most recent dividend per share, annualized, and divided by the current price per share for the quarter immediately preceding the current quarter from the SNL Financial Database.

Cash to Total Assets: Cash and cash equivalents divided by total assets for the quarter immediately preceding the current quarter from the SNL Financial Database.

Turnover: Volume divided by shares outstanding for the month preceding the first month of the current quarter from the CRSP database

Stock Return - 0-3 months: gross return over the past three months from the CRSP database

Stock Return – 3-12 months: gross return over the nine months preceding the current quarter from the CRSP database.

Given that our database is composed entirely of Equity REITs, we also collect REIT specific control variables for property type (residential, manufactured housing, industrial/office, retail, lodging, health care, self storage, diversified, unclassified) and geographic headquarters (West, Northeast, Southeast, Mid-Atlantic, Southwest, Midwest), as well as collect data on whether a REIT utilizes an UPREIT ownership

structure, is self-managed, or is self-advised. All these REIT specific variables are contained in the SNL Financial Database.

Summary Statistics

Table 3.1 presents summary statistic for the variables in our merged dataset. Note that the Institutional Ownership for the entire time period of our analysis averaged 62% with a median of 69%. Suggesting a relatively high level of institutional ownership among REITs. Because of this, we feel that our results relative to institutional foreign investment are representative of foreign investment generally in REITs as an asset class. Notice that roughly 6% of total investment in a given REIT on average comes from foreign institutional investment, which comprises approximate 9.5% of all institutional investment on average per REIT.

Figure 3.1 explores the relationship between total institutional ownership, foreign institutional ownership, and domestic institutional ownership from 2000 through 2014. Figure 3.1 reports aggregate amount of institutional investment in dollars, across all firms in the sample for a given year, divided by total market capitalization for all firms. As you can see the general trend has been an increase in ownership over time for all types of institutional ownership. Interestingly, we do observe a spike in foreign institutional ownership following 2010, that appears to be unique to foreign institutional investors, suggesting that foreign investors respond differently than domestic investors do in terms of investment decisions.

More to that point, Figure 3.2 examines the percentage of foreign investment as a proportion of total institutional investment from 2000-2014. As you can see, this relationship has varied over time and in general seems to be increasing, note that the post 2010 spike is very pronounced in this graph. This also suggests that within the institutional investment environment the role of foreign investment is both varied and increasing in relative size. Note that while foreign investment made up only 8 % of all REIT institutional investment in 2000, it was almost 18% of all REIT institutional investment in 2012

In order to better understand the relationship between foreign investment and our firm specific characteristics, we split the sample into above median and below median foreign investment, and present the results in Table 3.2. Notice that t-tests on the difference in mean and median demonstrate statistically significant differences between the two samples. First, not surprisingly, market capitalization is higher amongst firms with higher levels of foreign investment. Volatility however does not appear to exhibit statistically significant differences across the two samples, which is contrary to previous results from both Gompers and Metrick (2001) and Ferreira and Matos (2008). The above median foreign investment sample shows a preference for growth firms (as evidenced by a higher market-to-book ratio), lower leverage, higher liquidity (as evidenced by a higher turnover ratio), and a preferences for lower previous returns, particularly those from 3 to 12 month previous. It is also worth noting that significant variation exists among property types and geographic headquarter. Notably for property types, manufactured housing and

diversified[30] both decrease significantly (50% or more) as a proportion of the total in the above median sample. It will be interesting to see whether these geographic or property type variables continue to have explanatory power as we move into a multivariate analysis.

Given the strong relationship between foreign investment and market capitalization in Table 3.2, along with the well-documented relationship between size and institutional investment from previous studies, we further segment our summary statistics into above median and below median market capitalization in Table 3.3. Clearly we can see that among REITs size is a key differentiator between high and low institutional investment. Institutional investment is approximately 43% higher and statistically significant on average for the above median group, while foreign investment is approximate 100% higher and statistically significant on average for the above median group. Even Domestic Institutional investment is roughly 34% higher and statistically significant for the above median group.

Table 3.3 also demonstrates that size is related to several other key determinants in our study. Market-to-book ratio is higher, leverage is lower, turnover is higher, and dividend yield is higher for the above median market capitalization sample. Additionally, as was the case in the sample partitioned by above and below median foreign investment, the manufactured housing and diversified property types have a much lower representation within the above median market capitalization sample.

[30] Diversified REITs are usually geographically concentrated with several different property types offered.

Figure 3.3 gives us yet another look at aggregate foreign institutional investment over time for REITs from 2000 to 2014, but breaks down the analysis into subgroups by size (market capitalization). Notice that in general foreign investment is higher for the larger size groups. However since 2010 there appears to be a drop in foreign investment for the lowest 25% of the sample in terms of size, with a dramatic increase among the top 10% of the sample in terms of size. This suggests that since 2010, there is a potential preference for larger firms among foreign investors that is disproportionately associated with the top 10% largest firms.

Interestingly, notice that Figure 3.4, which presents aggregate foreign institutional investment by property type, exhibits a similar pattern to figure 3.3. Foreign investment in retail experiences a large spike post 2010 while manufactured housing and diversified REITs contain a decrease during the same period. Given these results it will be interesting to see, once completing our multivariate analysis how these graphically related characteristics influence foreign investment.

As a final wrap up to our summary statistics, Table 3.4 breaks down our ownership and firm-level characteristics by property type. Notably in this table we see that institutional investment is highest among residential, industrial/office, and lodging while foreign institutional investment is the highest among the same property types plus the retail property type. The retail property type represents the largest break between foreign and domestic institutional investment, as retail contains a relatively low percentage of

domestic institutional investment, but a relatively high level of foreign institutional investment with mean retail foreign and domestic investment levels being on average 7% and 52% respectively versus the entire sample average foreign and domestic institutional investment being at 6% and 55% respectively.

Table 3.4 also emphasized some of the firm-level variables that vary across property types. Similar to the results in table 3.3 we see that on average diversified and manufactured housing are the smallest in terms of market capitalization. We observe that the market-to-book ratio is much higher among unclassified firms, with lodging, industrial/office, and diversified firms containing the lowest market-to-book ratios. Also notice that return on equity is the highest for manufactured homes and the lowest for lodging. Lodging also contains the highest volatility in returns.

Further exploring the relationships between the variables in our analysis, Table 3.5 presents the Pearson correlations for the 3 institutional investment variables, firm-level variables, and property types. Notice the strong correlation between institutional ownership variables, however observe that foreign institutional investment has the lowest correlations among the three, with the correlation between foreign and domestic institutional investment at .45. Exploring the components responsible for these differences in foreign institutional investment will be the goal of the remainder of this paper.

Table 3.5 also demonstrates the strong correlation that size has with institutional investment. As was seen in Table 3.3, the strongest correlation exists between foreign institutional investment, which leads us to suspect that foreign investors may favor size even more than domestic investors in their investment decisions. Gompers and Metrick (2001) and Lakonishok, Schleifer, and Vishney (1992), among others, have well documented the strong preference of institutional investors within the United States for large stocks. However Bennett, Sias, and Starks (2003), more recently documented a decrease in this preference driven by both an increased attractiveness in the return characteristics of smaller stocks vs. larger stocks, and the greater potential to exploit informational advantages among the smaller securities.

This strong correlation between size and foreign investment could however, also be driven by the relationships among firm size and the other firm-level variables in our analysis. Size is positively and significantly correlated, at a high magnitude with market-to-book ratio, and negatively correlated at a high magnitude with leverage, the diversified property class, and dividend yield. It is possible that a preference for or against any of these other characteristics could also be driving the observed correlation with size. For example Ferreira and Matos (2008) document, in their multivariate analysis, that growth options are a positive driver for foreign institutional investors investing outside the United States.

Methodology

Our analysis will employ several different model specifications in order to test the drivers of foreign institutional investment in REITs. Our main dependent variables of interest will be institutional investment variables measuring the percentage of institutional investment (ownership) to total firm ownership. Our analysis will include the measurement of total institutional investment, foreign institutional investment, and domestic institutional investment, and the determination of the drivers of such investment. Our particular focus will be on foreign institutional investment, and the similarities and differences in its determinants versus domestic institutional investors.

Our initial analysis will follow the methodology of Ferreira and Matos (2008) and complete an ordinary least squares (OLS) panel regression of institutional investment (total, foreign, and domestic) within the United States REIT market, using the firm-level control variables suggested in previous literature, and summarized in section 3 of our paper. Additionally, we will include time dummy variables for each quarter of our data and cluster standard errors by firm as suggest by Peterson (2007) and utilized in the results presented in Ferreira and Matos (2008). Peterson (2007) suggests that in order to control for cross-sectional and time-series dependence in residuals it is appropriate to include dummy variables for the time variable and cluster standard errors at the firm level. Peterson (2007) identifies this format as appropriate within the corporate finance literature, and demonstrates that the standard errors under this specification perform better than Fama-Macbeth standard errors in the presence of an unobserved firm effect.

Going one step further, in order to control for commonality among the various REITs, we will re-run the OLS panel regressions as specified above with the addition of several dummy variables for REIT specific characteristics including property type and geographic headquarters. In these regressions controlling for the REIT specific variables we will also control for general differences in ownership structure, including whether or not a REIT is an UPREIT, is self-managed, and/or is self-advised. If there are any variations in foreign investment based upon property type or geography we will identify them in this portion of our analysis. In a final step of our OLS analysis we will include firm fixed effects and drop all REIT specific dummy variables. This will ensure that all inter-cluster correlation at the firm level is eliminated.

Going beyond OLS we will re-estimate our model including time and firm fixed effect using a quantile regression approach, as has recently been done within the REIT literature (Chen Peng, Shyu, and Zeng, 2010; Zhou and Anderson, 2013). In terms of our analysis, quantile regression, introduced by Koenker and Basset (1978), has some distinct advantages over OLS, including lower sensitivity to outliers, lower sensitivity to omitted variables, and the ability to view the variability of the explanatory variables over different levels of the dependent variable. In our analysis, the characteristics between firms with high levels of foreign investment vs. firms with lower levels of foreign investment look quite different (see Table 3.2). It is possible that the characteristics that attract foreign investors to REITs in the top 10% of our foreign investment sample may vary dramatically from those with foreign investment in the lowest 10%. Quantile regression will allow us to examine this issue without reducing our sample size.

Finally, in an effort to further explain foreign institutional investment, we will rerun the median (50%) quantile regressions and test the added influence of the financial crisis, as well as secured debt. It will be interesting to document the effect of the recent financial crisis in terms of institutional investment in REITs, as REITs offered the opportunity to invest in institutional grade real estate cash flows, during a period of crisis. As documented in Devos, Ong, Spieler, and Tsang (2013) institutional investors did reallocate their REIT portfolios to larger less risky REITs during this time period. As seen in Figure 3.1, and also documented in Devos, et. al. (2013), REIT institutional investment peaked around 2008 and declines towards the later part of the recession. However when controlling for our multivariate analysis, which includes volatility and size, among other variables, it will be interesting to observe the impact of the financial crisis. Additionally, because we are including leverage in our analysis, we will also include a measure of secured debt[31]. Chapter 2 of my dissertation REIT demonstrated secured debt can act as a substitute for bond debt, and that firms that utilize secured debt, also on average have higher overall leverage ratios. To control for the effect of secured debt raising leverage ratios due to a reallocation of capital structure, we will further run this analysis including a control variable for secured debt.

[31] Measured as a ratio of secured debt to total debt, as in Blazevich, King, and Womack (2017).

Results

Foreign Institutional Investment (OLS)

Table 3.6 presents our initial findings related to institutional investors. As discussed in our methodology, institutional investment, calculated as the percentage of shares held by institutional owners (total, domestic, and foreign) is regressed on a series of firm-specific controls suggested by prior research (Gompers and Metrick, 2001; Ferreira and Matos, 2008). The following results are calculated using OLS with time fixed effects included for each quarter of our analysis from 2000-2014.

First notice that consistent with prior institutional analysis, size and liquidity, measured by market capitalization and turnover respectively, are both positive and significant drivers for all institutional investment. Additionally, institutional investors seem to favor value stocks, represented by the negative coefficient on the market-to-book ratio, which is likewise consistent with previous findings in the institutional ownership literature. Surprisingly, volatility does not appear to be a major driver for institutional investment in REITs, while possessing a negative coefficient, it is not statistically significant across our analysis. Instead we see a negative relationship between institutional investment and both cash holdings and dividend yield. Ferreira and Matos (2008) generally find an insignificant or positive relationship to dividend yield across institutional investment, however recent REIT literature (Devos et. al., 2013) finds a similar negative relationship when examining REITs. Furthermore, the negative relationship between cash holdings and Institutional investment appears to be unique to REITs, as the non-REIT sample from Ferreira and Matos (2008) produced the opposite relationship. Given that REITs are in

the business of holding real estate assets, and are required to hold 75% or more of their assets in real estate or cash, holding cash may be seen as a suboptimal use of funds by institutional investors foreign and domestic, making a cash heavy REIT less desirable.

Another surprising result from this initial regression related to REIT institutional investment is that the coefficient on the S&P500 index is negative and significant. Gompers and Metrick (2001) find the opposite relationship in 61 of 68 cross-sectional regressions. One possible explanation for this result however could be the time period difference between our study and theirs. As discussed in Bennett et. al. (2003), institutional investor preferences have shifted towards smaller stocks where they can better exploit informational advantages.

Notice that with regard to the regression of domestic institutional ownership that the coefficients and statistical significance from this regression match up closely with those of the institutional investment regression. Given that domestic investors make up the majority of institutional investors this result is not at all surprising. Additionally foreign institutional investment follows the same directional relationships of both institutional investment and domestic institutional investment when it comes to size, liquidity, and cash holdings.

We do however see several interesting differences between the regression of institutional ownership (and likewise domestic institutional ownership) on firm specific control variables and that of the regression of foreign institutional ownership, on the same control

variables. First, notice that market-to-book is negative but insignificant, failing to support a value stock preference for foreign investors. Second, foreign investment does exhibit a positive and weakly significant (at a 10% level) correlation between the past 3 months returns, showing that foreign investors likely follow, at least in part, a momentum strategy over our sample period. Third, they invest more heavily in S&P 500 constituents, which Gompers and Metrick (2001) contribute to institutional investors being influenced by prudent man laws with regard to their investment on behalf of investors.

Given that the focus of our analysis is on foreign investment, Table 3.7 expands the above analysis for foreign investment, and looks at the influence of several REIT specific control variables. Previous REIT literature has drawn strong connections between institutional investment and property types (Devos et. al., 2013), and the foreign investment literature has drawn connections to geographic location (Ford et. al. 1998). Therefore to expand the OLS model above, we add control variables for property type, geographic headquarters, and REIT ownership characteristics[32].

In Table 3.7 we run three different specifications. Specification (1) includes only property type dummy variables, specification (2) includes only geographic headquarters dummy variables, and specification (3) includes both property type and geographic dummy

[32] Ownership characteristics include whether or not a REIT is self-managed, self advised, or an UPREIT. Note this information is pulled from SNL financial, and only includes the last observed ownership status for a given firm. Because our dataset starts in 2000, we feel that this is reasonable assumption as most changes in ownership status would have likely completed by that time. Legislation in 1992-1993 precipitated the Modern REIT era, which could have led to several ownership changes around this time period.

variables. In all 3 specification the results are consistent, so for simplicity we will focus our analysis on specification (3). Notice that the main results from Table 3.6 relative to foreign institutional investment's relationship with the key firm-level variables remains unchanged in Table 3.7. The property type dummy variables do, however highlight some specific preferences. Utilizing the residential property type as the excluded dummy variable, foreign investors show little preference between the majority of property types and the residential property type. A negative and statistically significant relationship is however noted between foreign investment and the manufactured housing, self-storage, and unclassified property types. Examining Table 3.4, the relationship with manufactured housing was expected given its lower absolute level of foreign investment, but self storage and unclassified do not exhibit such obvious relationships. Unclassified REITs could also be referred to as specialized REITs, in that this group often specialized in some specific use, such as cell phone towers or car dealerships for example. It appears that these specialized REIT receive less attention by foreign investors, all other control variables held constant.

The relationships with geographic headquarters in Table 3.7 are all negative but insignificant, suggesting little evidence that there is a geographic preference among foreign investors. Further analysis including property location may yield stronger results, however many REITs are geographically dispersed making identification more difficult. Of course, the excluded geographic location, the Midwest, makes it unsurprising that at minimum we would find negative coefficients, as Simon Property Group, Inc. is located in Indiana and has a comparatively high level of foreign ownership.

This discussion on Simon Property Group, Inc. leads to the motivation for our next analysis in Table 3.8. Despite our best efforts to control for firm characteristics, there are always going to be excluded variables related to the uniqueness of each firm[33]. Cleary as you look at Simon Property Group, you can make some firm level observations, yes it is large (the largest in fact), it has lower volatility, slightly above average leverage, and higher than average return on equity, however, these statistics could be observed on any number of REITs in our sample at any given time, and yet most would agree that Simon is different. Therefore in Table 3.8 we will control for firm level fixed effects along with time fixed effects.

Using firm fixed effects requires dropping out all our time invariant dummy variables related to REIT characteristics, but should help us overall control for inter-firm correlation between our observations. In first examining total intuitional ownership in Table 3.8, we do see a strengthening of significance on several coefficients. Notably leverage and volatility are negative and significant. Leverage is clearly related to increased bankruptcy risk for the firm, and therefore firms exhibiting lower leverage may be preferred by institutional investors. The negative relationship with volatility however, goes against what most literature has found as a general preference for volatility among institutional investors (Falkenstein, 1996; Gompers and Metrick, 2001). Further analysis will lead to more insight on these results for REITs.

[33] In fact R^2 for our analysis with and without REIT control variables (Table 6 vs. Table &) improved very little, casting doubt on their usefulness in the analysis of foreign investment in REITs.

Examining the results relevant to foreign investment from Table 3.8, we see a loss of significance on the negative effect of cash holdings on institutional ownership but still observe a positive and weakly significant relationship with the past 3 months stock returns for an individual stock, a momentum effect. Also, we now see a weakly significant negative relationship between volatility and foreign investment in REITs, which would be consistent with previous institutional investment studies.

Foreign Institutional Investment (Quantile Regression)

As discussed in the methodology section, quantile regression has been utilizes in recent REIT analysis (Chen, Peng, Shyu, and Zeng, 2010; Zhou and Anderson, 2013), and may prove useful in our analysis. Quantile regression has several advantages over OLS including lower sensitivity to outliers[34], lower sensitivity to omitted variables, and the ability to view the variability of the explanatory variables over different levels of the dependent variable. In reviewing the summary statistics in Table 3.1, extreme results exist among our observations. Additionally the benefit of viewing variation among firms with different levels of foreign investment may be interesting, given that institutional investment is likely heterogeneous in nature.

Table 3.9 presents the first results based on quantile regression at the median (50%). Notice results are generally consistent with our previous results for total institutional

[34] Quantile regression measures changes in quantiles (such as median) instead of measuring average (mean) reducing the impact of extreme observations.

investment as well as domestic institutional investment. Which, given the fact that specification other than regression technique is consistent from table 3.8 to table 3.9, is unsurprising. Notice however that foreign institutional investment presents a much more consistent picture. Basically all the observations from previous regressions are present and statistically significant here including a positive relationship with size, stock return over the past 3 months, and the S&P 500 index, and a negative relationship between leverage, volatility and cash holdings. Furthermore, the relationship with market-to-book ratio, which has remained insignificant up to this point is positive and significant at a 5% level. This suggests that foreign investors in REITs, unlike domestic investors, may favor growth stocks. This is a similar result as was observed in Ferreira and Matos (2008) for foreign institutional investors outside the United States.

To further exploit the advantages of quantile regression in our analysis of foreign investment, we will examine foreign investment at more extreme quantiles. Table 3.10 presents quantile regressions at the median, 90% and 10% quantiles for foreign institutional investment. Interestingly firms investing in REITs with the highest level of institutional ownership tend to favor value stocks, as exhibited in the negative relationship between foreign investment and the market-to-book ratio in the 90% quantile regression. This result may also provide guidance as to why we reached an insignificant result under standard OLS regressions on growth options. Additionally we see that the relationship between stock returns over the previous 3 months, lacks statistical significance among our 10% quantile, which may explain the previous weakly significant results obtained in OLS.

While we do observe heterogeneity in foreign institutional investment drivers across groupings of REITs, our analysis leaves to future research to determine the exact types and reasons for this heterogeneity.

Foreign Institutional Investment (Effect of the Financial Crisis and Secured Debt)

The final section of our results will explore the addition of two variables to our analysis, and will utilize our quantile regression methodology at the median. Table 3.11 shows the influence of the financial crisis, and Table 3.12 explores and additional firm level control variable secured debt.

The financial crisis falls right in the middle of our analysis period, so naturally some sort of test of its influence on our results is necessary. Additionally, while it clearly looks like institutional investment decreased in absolute terms over the later part of the recession (post 2008), it is unclear if this is due to firm characteristics or the recession itself. Table 3.11 gives us some insight into these remaining questions.

First observe that the crisis period itself has a positive relationship with all forms of institutional investment. While basic characteristics in stocks likely led to a drop in overall institutional investment in REITs, the relative attractiveness of REIT stocks to institutional investors appears to be higher during this time period as exhibited by a positive coefficient on the crisis period dummy variable. In other words institutional

investors were not shifting out of REIT securities as dramatically as historical relationships between key financial variables would suggest.

Second, notice that in Table 3.11 we lose significance on the coefficient on volatility in the total institutional investment equation, but observe a positive and significant relationship between domestic investment and volatility. This relationship is the exact relationship that has been identified consistently in previous literature, and it shows up once we control for the crisis period. Given that the crisis period contained overall higher volatility and experienced an overall drop in institutional investment this change in relationship is not surprising.

Third, notice the effect of the financial crisis on the relationship with previous returns. Notice that for domestic firms, they now exhibit a positive relationship between the previous 3 months returns and foreign investment, a momentum effect, that was previously insignificant. Additionally, Foreign firms now exhibit a significant negative momentum effect due to returns over the longer 3-12 previous period, while still maintaining a positive relationship with short-run 0-3 month returns.

Finally, in Table 3.12 we add the influence of secured debt into our analysis. Chapter 2 of this dissertation emphasized the importance of controlling for this variable, particularly as it pertains to REITs, and that it can uniquely influence capital structure decisions. Therefore it will also be interesting to test whether secured debt has any influence on

foreign investment. As the results from Table 3.12 indicate, secured debt is positively related to all forms of institutional investment for REITs.

This result is somewhat surprising given that secured debt is negatively correlated with all forms of institutional investment, however secured debt is also positively correlated with leverage. Considering this correlation, this coefficient likely reflects that increases in leverage due to the issuance of additional secured debt do not discourage foreign investment to the same extent as unsecured leverage. One explanation for this relationship is that secured debt is not subject to the same firm level restrictions (financial covenants) as unsecured public debt. Because secured debt does not restrict future financing options as severely as unsecured debt, this lack of restriction is likely driving institutional investor preference for secured debt (ceteris paribus).

Conclusion

The determinants of institutional investment have received in-depth exploration within the corporate finance literature. Additionally a study by Ferreira and Matos (2008) explored this issue for foreign institutional investors, and noted some significant differences between the determinants of both foreign and domestic investors. However the issue of foreign investment in REITs has received little attention. Adopting a framework similar to that of Ferreira and Matos (2008) our study analyzes the determinants of foreign investment for REITs utilizing ownership information from 13f filings with the SEC that identify ownership amounts and country of origin for institutional investors. Because institutional investors make up the vast majority of

investors in REITs as a group, this analysis allows us to gain a better understanding of the characteristics that attract foreign investment in REITs.

Following recent studies within the REIT literature we utilize quantile regression, in addition to OLS, to analyze our results. Quantile regression allows us to avoid errors in our analysis due to extreme observations and omitted variables, while also allowing us to examine heterogeneity in the preference of institutional investors. Our findings identify the following major conclusions.

Foreign and domestic institutional investors both hold a preference for larger REITs, REITs with higher liquidity, and REITs with higher previous returns over the last 0-3 months, a momentum effect. Foreign investors, however, exhibit a negative relationship with longer-run 3-12 month previous returns. Foreign investors additionally have a preference for growth stocks over value stocks at the median quantile, a preference for lower volatility, and a preference for firms listed in the S&P 500. Domestic firms have the opposite preference in terms of value vs. growth, volatility, and S&P 500 inclusion. In examining foreign investment in greater depth, our analysis also identifies heterogeneity in foreign institutional investor preference within our sample.

Overall, our study helps fill a gap in the current literature related to the determinants of foreign investment in REITs, and gives a better understating of the differences between foreign and domestic REIT investors.

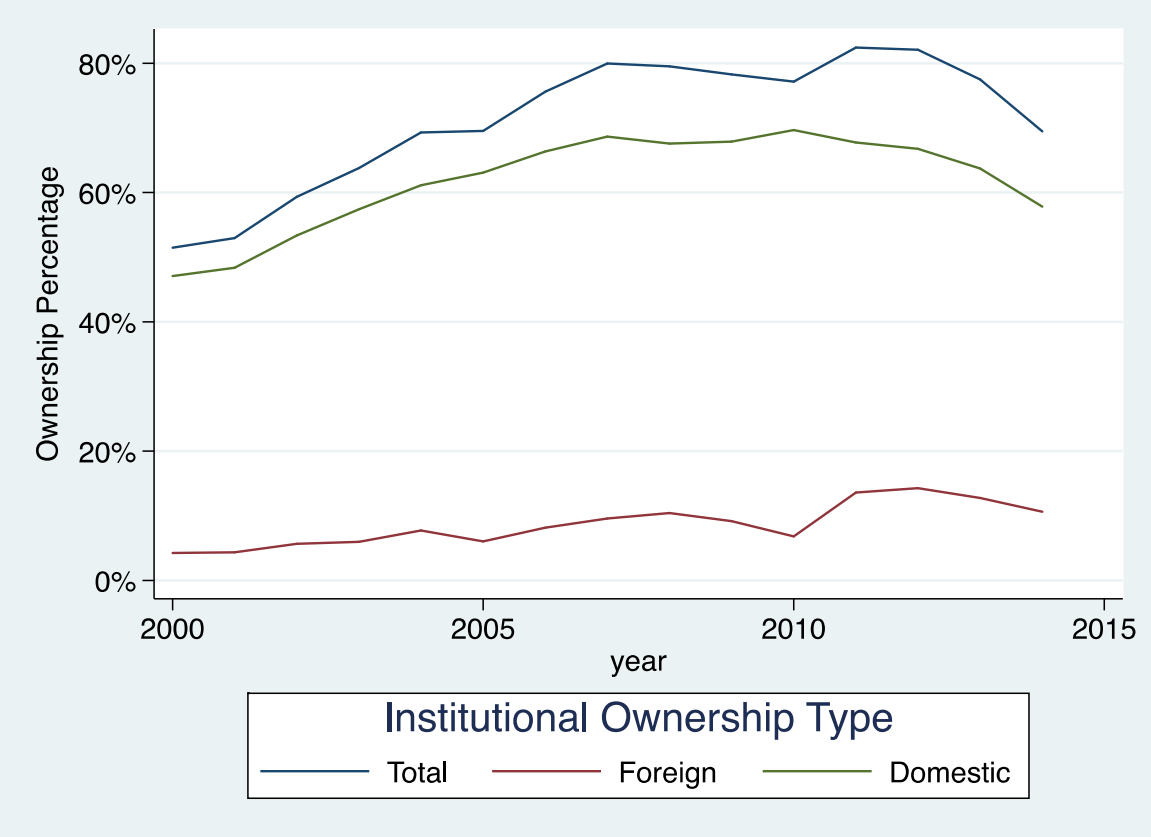

Figure 3.1: Institutional Investment in REITs, 2000-2014

Note: Graph shows aggregate institutional ownership percentage by year for all Equity REITs in the NAREIT index from Q1 2000 through Q4 2014. Total ownership includes shares owned by institutional investors of unknown origin. Institutional ownership shown as a percentage of total shares outstanding.

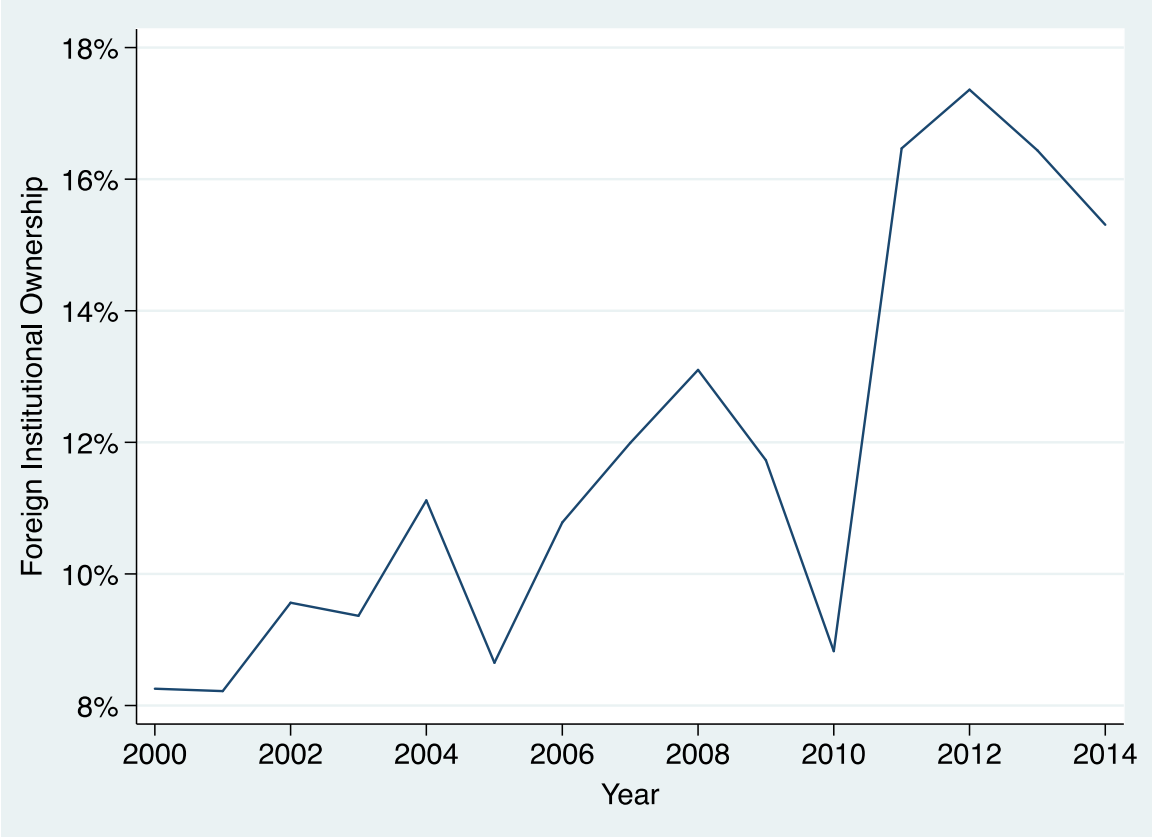

Figure 3.2: Foreign Investments as % of Total in REITS, 2000-2014

Note: Graph shows aggregate foreign institutional investment as a percentage of total aggregate institutional investment by year for all Equity REITs in the NAREIT index from Q1 2000 through Q4 2014. Total ownership includes shares owned by institutional investors of unknown origin.

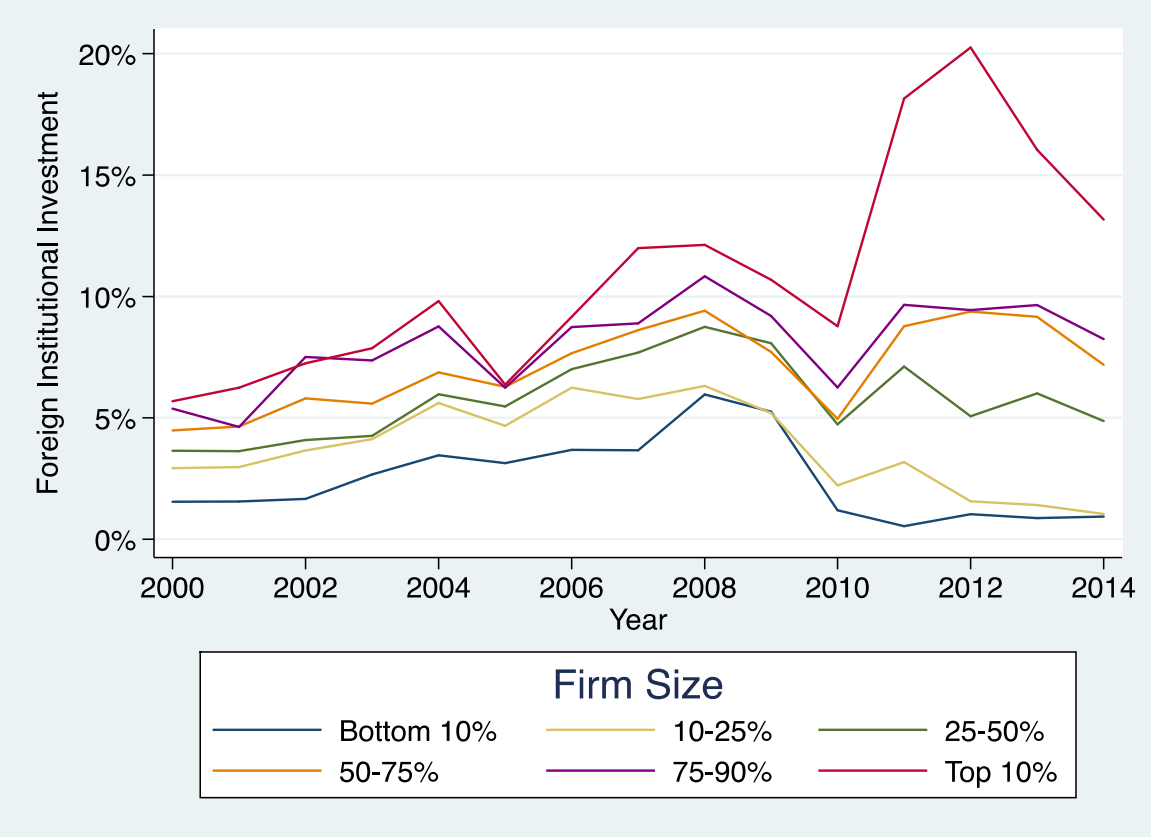

Figure 3.3: Foreign Investment in REITs by Firm Size, 2000-2014

Note: Graph shows aggregate foreign institutional investment as a percentage of shares outstanding for each firm size sub group by year for all Equity REITs in the NAREIT index from Q1 2000 through Q4 2014. Total ownership includes shares owned by institutional investors of unknown origin.

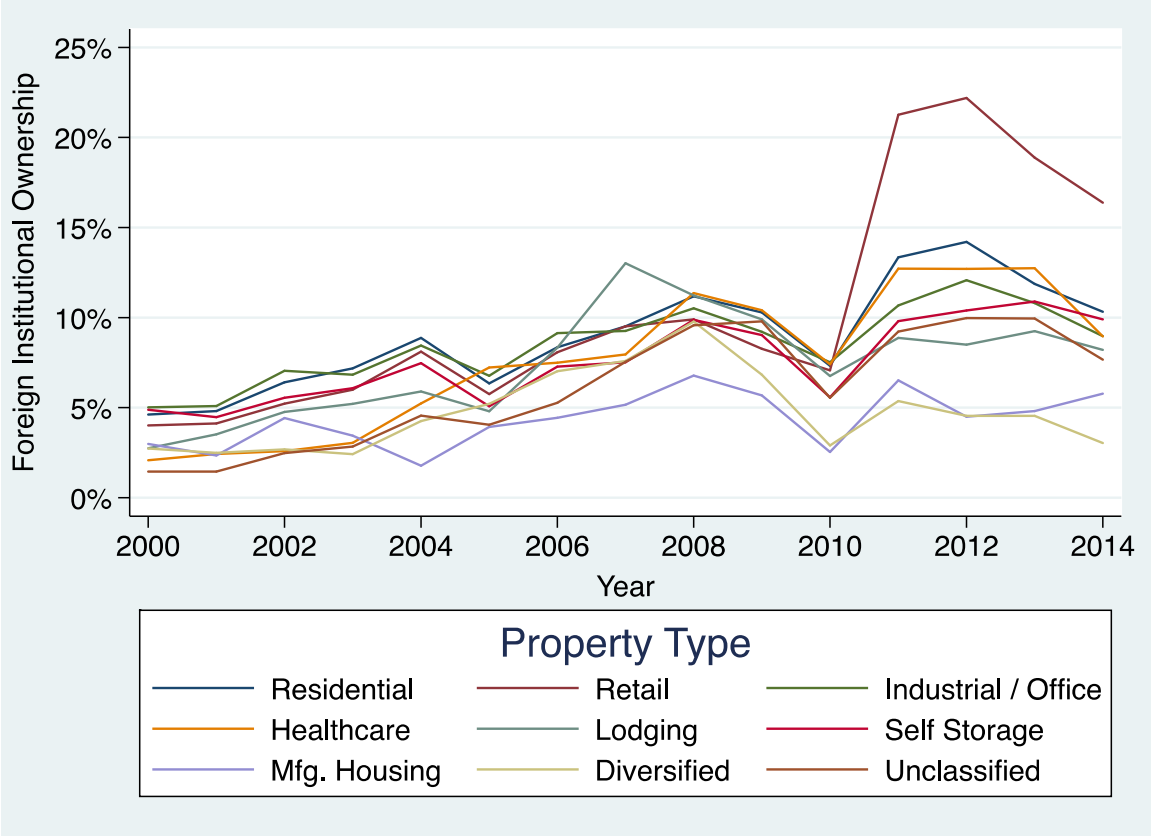

Figure 3.4: Foreign Investment in REITs by Property Type , 2000-2014

Note: Graph shows aggregate foreign institutional investment as a percentage of shares outstanding for each property type sub group by year for all Equity REITs in the NAREIT index from Q1 2000 through Q4 2014. Total ownership includes shares owned by institutional investors of unknown origin.

Table 3.1: Descriptive Statistics Equity REITs 2000-2014

Variable	Mean	Median	Std. Dev.	Min	Max	N
I. Ownership Variables						
Institutional Ownership	0.62	0.69	0.27	0.00	1.00	6256
Foreign Institutional Ownership	0.06	0.05	0.05	0.00	0.48	6256
Domestic Institutional Ownership	0.55	0.61	0.24	0.00	0.97	6256
II. Firm-level control variables						
Market Capitalization (log)	6.91	7.01	1.44	1.02	10.94	6232
Market-to-book ratio	1.29	1.21	0.36	0.54	3.28	6232
Leverage	0.42	0.42	0.16	0.00	0.90	6214
Return on Equity	0.09	0.07	0.36	-6.90	9.96	6081
Volatility	0.08	0.06	0.05	0.02	0.59	6039
Dividend Yield	0.06	0.06	0.04	0.00	1.07	6193
Cash to Total Assets	0.02	0.01	0.04	0.00	0.67	6193
Turnover	1.34	1.02	1.23	0.00	17.16	6256
Stock Return - 0-3 months	0.04	0.04	0.16	-0.91	2.32	6255
Stock Return - 3-12 months	0.13	0.13	0.31	-0.97	5.44	6196
III. Property Type Variables						
Residential	0.13					6256
Manufactured Housing	0.03					6256
Industrial /Office	0.23					6256
Retail	0.25					6256
Lodging	0.10					6256
Healthcare	0.09					6256
Self Storage	0.02					6256
Diversified	0.09					6256
Unclassified	0.06					6256
IV. Geographic Headquarters						
West	0.16					6256
Northeast	0.04					6256
Southeast	0.22					6256
Mid-Atlantic	0.27					6256
Southwest	0.11					6256
Midwest	0.21					6256

Note: Above summary statistics report institutional investment, firm level control variables, property type, and geographic location of a firm's headquarters for all REITs which contail some level of institutional investment recorded by 13F filings from 2000 through 2014. N represents total number of firm-quarter observations for the specified period.

Table 3.2: Descriptive Statistics Equity REITs 2000-2014 - Above/Below Median Foreign Investment

	Above Median Foreign Investment						Below Median Foreign Investment					
Variable	Mean	Median	Std. Dev.	Min	Max	N	Mean	Median	Std. Dev.	Min	Max	N
I. Ownership Variables												
Institutional Ownership	0.77	0.80	0.16	0.21	1.00	3128	0.47 ***	0.48 ***	0.27	0.00	1.00	3128
Foreign Institutional Ownership	0.10	0.09	0.04	0.05	0.48	3128	0.03 ***	0.03 ***	0.02	0.00	0.05	3128
Domestic Institutional Ownership	0.66	0.69	0.15	0.06	0.93	3128	0.44 ***	0.44 ***	0.26	0.00	0.97	3128
II. Firm-level control variables												
Market Capitalization (log)	7.64	7.63	1.14	4.07	10.94	3120	6.18 ***	6.37 ***	1.34	1.02	10.94	3112
Market-to-book ratio	1.36	1.28	0.35	0.73	3.28	3120	1.23 ***	1.14 ***	0.36	0.54	3.28	3112
Leverage	0.40	0.40	0.14	0.00	0.90	3108	0.45 ***	0.45 ***	0.17	0.00	0.90	3106
Return on Equity	0.08	0.07	0.15	-1.26	2.89	3062	0.09	0.07	0.49	-6.90	9.96	3019
Volatility	0.07	0.06	0.05	0.02	0.59	3069	0.08	0.06 **	0.05	0.02	0.55	2970
Dividend Yield	0.05	0.05	0.03	0.00	0.46	3107	0.06 ***	0.06 ***	0.04	0.00	1.07	3086
Cash to Total Assets	0.02	0.01	0.03	0.00	0.31	3107	0.03 ***	0.01 ***	0.05	0.00	0.00	3086
Turnover	1.74	1.37	1.43	0.11	17.16	3128	0.94 ***	0.73 ***	0.82	0.00	0.00	3128
Stock Return - 0-3 months	0.04	0.04	0.17	-0.85	1.69	3128	0.05 **	0.05	0.15	-0.91	2.32	3127
Stock Return - 3-12 months	0.10	0.11	0.29	-0.93	5.44	3117	0.17 ***	0.14 ***	0.33	-0.97	4.41	3079
III. Property Type Variables												
Residential	0.16					3128	0.11 ***					3128
Manufactured Housing	0.02					3128	0.04 ***					3128
Industrial /Office	0.27					3128	0.20 ***					3128
Retail	0.25					3128	0.24					3128
Lodging	0.09					3128	0.10 **					3128
Healthcare	0.09					3128	0.09					3128
Self Storage	0.03					3128	0.01 ***					3128
Diversified	0.05					3128	0.13 ***					3128
Unclassified	0.05					3128	0.07 ***					3128
IV. Geographic Headquarters												
West	0.18					3128	0.14 ***					3128
Northeast	0.04					3128	0.04					3128
Southeast	0.20					3128	0.24 ***					3128
Mid-Atlantic	0.24					3128	0.29 ***					3128
Southwest	0.11					3128	0.11					3128
Midwest	0.23					3128	0.19 ***					3128

Note: Above summary statistics report institutional investment, firm level control variables, property type, and geographic location of a firm's headquarters for above median and below median foreign investment levels for REITs which contail some level of institutional investment recorded by 13F filings from 2000 through 2014. N represents total number of firm-quarter observations for the specified period. Significant difference in means (medians) at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.3: Descriptive Statistics Equity REITs 2000-2014, by Above/Below Median Size

	Above Median Market Capitalization						Below Median Market Capitalization					
Variable	Mean	Median	Std. Dev.	Min	Max	N	Mean	Median	Std. Dev.	Min	Max	N
I. Ownership Variables												
Institutional Ownership	0.73	0.77	0.20	0.00	1.00	3129	0.51 ***	0.54 ***	0.28	0.00	1.00	3127
Foreign Institutional Ownership	0.08	0.08	0.05	0.00	0.48	3129	0.04 ***	0.03 ***	0.03	0.00	0.20	3127
Domestic Institutional Ownership	0.63	0.68	0.18	0.00	0.95	3129	0.47 ***	0.49 ***	0.26	0.00	0.97	3127
II. Firm-level control variables												
Market Capitalization (log)	8.02	7.86	0.77	7.02	10.94	3105	5.80 ***	6.02 ***	1.04	1.02	7.02	3127
Market-to-book ratio	1.42	1.33	0.37	0.78	3.28	3105	1.17 ***	1.11 ***	0.31	0.54	2.74	3127
Leverage	0.37	0.38	0.12	0.00	0.73	3105	0.48 ***	0.48 ***	0.17	0.00	0.90	3109
Return on Equity	0.10	0.08	0.32	-4.65	9.96	3056	0.07	0.06 ***	0.40	-6.90	8.10	3025
Volatility	0.07	0.06	0.05	0.02	0.59	3082	0.08 **	0.06 **	0.06	0.02	0.55	2957
Dividend Yield	0.05	0.05	0.02	0.00	0.44	3087	0.07 ***	0.07 ***	0.04	0.00	1.07	3106
Cash to Total Assets	0.02	0.01	0.04	0.00	0.43	3087	0.02 ***	0.01 **	0.04	0.00	0.67	3106
Turnover	1.61	1.30	1.29	0.10	15.89	3129	1.07 ***	0.78 ***	1.10	0.00	17.16	3127
Stock Return - 0-3 months	0.03	0.04	0.13	-0.91	1.14	3129	0.05	0.05 **	0.18	-0.86	2.32	3126
Stock Return - 3-12 months	0.14	0.13	0.27	-0.86	5.19	3119	0.13 ***	0.12	0.35	-0.97	5.44	3077
III. Property Type Variables												
Residential	0.16					3129	0.11 ***					3127
Manufactured Housing	0.01					3129	0.05 ***					3127
Industrial /Office	0.29					3129	0.17 ***					3127
Retail	0.24					3129	0.25					3127
Lodging	0.06					3129	0.14 ***					3127
Healthcare	0.09					3129	0.09					3127
Self Storage	0.03					3129	0.01 ***					3127
Diversified	0.06					3129	0.13 ***					3127
Unclassified	0.07					3129	0.05 **					3127
IV. Geographic Headquarters												
West	0.21					3129	0.11 ***					3127
Northeast	0.06					3129	0.02 ***					3127
Southeast	0.20					3129	0.24 ***					3127
Mid-Atlantic	0.24					3129	0.29 ***					3127
Southwest	0.12					3129	0.10 **					3127
Midwest	0.18					3129	0.24 ***					3127

Note: Above summary statistics report institutional investment, firm level control variables, property type, and geographic location of a firm's headquarters for above median and below median market capitalization for REITs which contail some level of institutional investment recorded by 13F filings from 2000 through 2014. N represents total number of firm-quarter observations for the specified period. Significant difference in means (medians) at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.4: Descriptive Statistics for Institutional Ownership of Equity REITs 2000-2014, by Property Type

	Residential		Mfd. Housing		Industrial /Office		Retail		Lodging		Healthcare		Self Storage		Diversified		Unclassified	
Variable	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
I. Ownership Variables																		
Institutional Ownership	0.70	0.78	0.52	0.65	0.72	0.78	0.59	0.66	0.63	0.71	0.57	0.61	0.62	0.64	0.41	0.36	0.58	0.62
Foreign Institutional Ownership	0.07	0.07	0.04	0.04	0.07	0.06	0.07	0.06	0.05	0.05	0.06	0.05	0.07	0.07	0.04	0.02	0.06	0.04
Domestic Institutional Ownership	0.62	0.69	0.48	0.58	0.64	0.70	0.52	0.56	0.56	0.64	0.50	0.54	0.54	0.54	0.37	0.34	0.55	0.55
II. Firm-level Control Variables																		
Market Capitalization (log)	7.30	7.34	6.13	6.48	7.25	7.33	6.94	6.96	6.22	6.30	6.81	6.99	8.10	8.04	5.97	6.52	7.14	7.17
Market-to-book ratio	1.30	1.26	1.49	1.51	1.20	1.14	1.32	1.24	1.07	1.04	1.42	1.30	1.48	1.32	1.21	1.13	1.71	1.72
Leverage	0.46	0.44	0.47	0.44	0.42	0.42	0.46	0.46	0.46	0.44	0.35	0.35	0.24	0.27	0.43	0.47	0.25	0.22
Return on Equity	0.12	0.07	0.10	0.09	0.07	0.06	0.09	0.09	-0.01	0.03	0.08	0.07	0.07	0.08	0.16	0.07	0.12	0.11
Volatility	0.06	0.06	0.06	0.05	0.07	0.06	0.08	0.06	0.10	0.08	0.08	0.07	0.06	0.06	0.07	0.06	0.08	0.07
Dividend Yield	0.06	0.06	0.06	0.07	0.05	0.05	0.06	0.06	0.05	0.05	0.07	0.07	0.05	0.04	0.05	0.06	0.05	0.05
Cash to Total Assets	0.01	0.00	0.02	0.01	0.02	0.01	0.01	0.01	0.03	0.02	0.02	0.01	0.03	0.02	0.06	0.02	0.04	0.03
Turnover	1.50	1.13	0.97	0.86	1.42	1.07	1.27	0.96	1.46	1.14	1.43	1.16	1.23	0.93	0.96	0.69	1.42	1.18
Stock Return - 0-3 months	0.05	0.05	0.04	0.03	0.03	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.06	0.07	0.04	0.04	0.05	0.04
Stock Return - 3-12 months	0.13	0.13	0.10	0.08	0.11	0.11	0.14	0.15	0.14	0.15	0.16	0.12	0.17	0.18	0.14	0.10	0.14	0.11
III. Number of Observations	833		179		1466		1536		602		561		136		564		379	

Note: Above summary statistics report institutional investment and firm level control variable mean and median values, sudivided by property type, for all REITs which contail some level of institutional investment recorded by 13F filings from 2000 through 2014. Number of observations refers to total firm-quarter observations for a given property type based on the most populated variables.

Table 3.5: Summary Statistics Correlation Matrix for REITs from 2000-2014

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Institutional Ownership	1.00																						
2. Domestic Institutional Owne	**0.99**	1.00																					
3. Foreign Institutional Owners	**0.59**	**0.45**	1.00																				
4. Market Capitalization (log)	**0.56**	**0.51**	**0.59**	1.00																			
5. Market-to-book ratio	**0.10**	**0.07**	**0.19**	**0.43**	1.00																		
6. Leverage	**-0.12**	**-0.09**	**-0.17**	**-0.41**	**-0.56**	1.00																	
7. Return on Equity	**-0.05**	**-0.05**	**-0.01**	**0.05**	**0.20**	**-0.12**	1.00																
8. Volatility	**0.05**	**0.07**	**-0.05**	**-0.17**	**-0.27**	**0.36**	**-0.09**	1.00															
9. Dividend Yield	**-0.27**	**-0.27**	**-0.17**	**-0.28**	**-0.26**	**0.23**	**-0.06**	**-0.01**	1.00														
10. Cash to Total Assets	**-0.11**	**-0.10**	**-0.11**	**-0.03**	**0.15**	**-0.18**	**0.16**	**0.07**	**-0.20**	1.00													
11. Turnover	**0.38**	**0.35**	**0.31**	**0.25**	**-0.03**	**0.09**	**-0.04**	**0.45**	**0.00**	**-0.02**	1.00												
12. Stock Return - 0-3 months	0.00	0.01	**-0.03**	**-0.07**	**-0.09**	**0.08**	-0.01	**0.12**	**0.03**	0.01	0.00	1.00											
13. Stock Return - 3-12 months	0.00	**0.03**	**-0.11**	0.01	**0.03**	**-0.03**	**0.03**	**0.13**	**-0.25**	0.02	**-0.16**	**-0.05**	1.00										
14. S&P 500 Index	**0.18**	**0.14**	**0.30**	**0.48**	**0.23**	**-0.16**	0.01	**0.03**	**-0.16**	**0.11**	**0.17**	-0.01	0.00	1.00									
15. Residential	**0.12**	**0.11**	**0.09**	**0.11**	0.01	**0.09**	**0.03**	**-0.10**	0.01	**-0.13**	**0.05**	0.00	0.00	**0.09**	1.00								
16. Manufactured Housing	**-0.06**	**-0.05**	**-0.09**	**-0.09**	**0.09**	**0.05**	0.01	**-0.04**	0.02	-0.01	**-0.05**	-0.01	-0.02	**-0.05**	**-0.07**	1.00							
17. Industrial /Office	**0.21**	**0.22**	**0.08**	**0.13**	**-0.15**	**0.00**	**-0.03**	**-0.04**	**-0.05**	**-0.06**	**0.04**	**-0.03**	**-0.04**	**-0.03**	**-0.22**	**-0.09**	1.00						
18. Retail	**-0.05**	**-0.07**	**0.05**	0.01	**0.04**	**0.14**	0.01	0.01	**0.07**	**-0.12**	**-0.03**	0.01	0.02	**-0.03**	**-0.22**	**-0.10**	**-0.32**	1.00					
19. Lodging	0.01	0.02	**-0.05**	**-0.16**	**-0.21**	**0.08**	**-0.08**	**0.17**	**-0.07**	**0.07**	**0.03**	0.01	0.01	**-0.04**	**-0.13**	**-0.06**	**-0.18**	**-0.19**	1.00				
20. Healthcare	**-0.05**	**-0.07**	0.00	-0.02	**0.11**	**-0.14**	0.00	**0.03**	**0.11**	**-0.03**	0.02	0.02	**0.03**	0.00	**-0.12**	**-0.05**	**-0.17**	**-0.18**	**-0.10**	1.00			
21. Self Storage	0.00	-0.01	**0.02**	**0.12**	**0.08**	**-0.17**	-0.01	**-0.03**	**-0.05**	**0.03**	-0.01	0.01	0.02	**0.11**	**-0.06**	**-0.03**	**-0.08**	**-0.09**	**-0.05**	**-0.05**	1.00		
22. Diversified	**-0.25**	**-0.24**	**-0.17**	**-0.21**	**-0.08**	0.02	**0.07**	-0.01	**-0.03**	**0.27**	**-0.10**	0.00	0.01	**-0.10**	**-0.12**	**-0.05**	**-0.17**	**-0.18**	**-0.10**	**-0.10**	**-0.05**	1.00	
23. Unclassified	**-0.04**	**-0.03**	**-0.06**	**0.04**	**0.29**	**-0.28**	**0.03**	0.01	**-0.03**	**0.13**	0.02	0.00	0.00	**0.11**	**-0.10**	**-0.04**	**-0.14**	**-0.14**	**-0.08**	**-0.08**	**-0.04**	**-0.08**	1.00

Note: Above Pearson correlations are for the 3 dependant variables and 20 independant variables from our analysis. The sample Includes 197 REITs and 5,256 firm-quarter observations between 2000-2014. Significance at the 5% level indicated by **bold** text

Table 3.6: Determinants of Institutional Ownership for REITs 2000-2014, OLS

	Dependent Variable - Institutional Ownership		
Independent Variables	Total	Domestic	Foreign
I. Firm-level control variables			
Market Capitalization (log)	0.1116 ***	0.0929 ***	0.0177 ***
	(13.67)	(11.50)	(10.99)
Market-to-book ratio	-0.1153 ***	-0.1047 ***	-0.0063
	(-3.43)	(-3.28)	(-1.28)
Leverage	0.0936	0.0909	0.0061
	(1.15)	(1.22)	(0.49)
Return on Equity	-0.0104	-0.0108	0.0002
	(-1.13)	(-1.20)	(0.13)
Volatility	-0.2196	-0.1793	-0.0270
	(-1.15)	(-1.01)	(-0.95)
Dividend Yield	-1.0398 ***	-0.9993 ***	-0.0385
	(-3.90)	(-3.96)	(-1.23)
Cash to Total Assets	-0.7285 ***	-0.5712 ***	-0.1368 ***
	(-3.61)	(-3.27)	(-4.27)
Turnover	0.0462 ***	0.0416 ***	0.0039 **
	(5.42)	(5.32)	(2.56)
Stock Return - 0-3 months	0.0283	0.0252	0.0059 *
	(1.10)	(1.02)	(1.72)
Stock Return - 3-12 months	0.0194	0.0185	-0.0004
	(1.44)	(1.49)	(-0.16)
S&P500 Index Constituent	-0.1108 ***	-0.1144 ***	0.0054
	(-4.16)	(-4.31)	(1.02)
Intercept	-0.0734	-0.0095	-0.0667 ***
	(-0.89)	(-0.12)	(-4.22)
R-Squared	0.5917	0.5283	0.4964
Observations	5845	5845	5845

Note: Above equations estimate the determinants of institutional ownership using ordinary least squares. Estimation includes time (quarter) dummy variables. The sample includes 5845 firm-quarter observations from 2000-2014. T-statistics included in parenthesis. Standard errors are consistent in the presence of correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.7: Determinants of Institutional Ownership for REITs 2000-2014, Expanded OLS

Independent Variables	Dependent Variable - Foreign Ownership (1)	(2)	(3)
I. Firm-level control variables			
Market Capitalization (log)	0.0169 ***	0.0181 ***	0.0169 ***
	(9.82)	(10.87)	(9.95)
Market-to-book ratio	-0.0034	-0.0054	-0.0034
	(-0.61)	(-1.07)	(-0.61)
Leverage	-0.0018	0.0051	-0.0040
	(-0.15)	(0.43)	(-0.37)
Return on Equity	-0.0002	0.0004	-0.0002
	(-0.13)	(0.28)	(-0.14)
Volatility	-0.0340	-0.0349	-0.0333
	(-1.29)	(-1.19)	(-1.23)
Dividend Yield	-0.0345	-0.0321	-0.0301
	(-1.14)	(-1.05)	(-1.05)
Cash to Total Assets	-0.1099 ***	-0.1326 ***	-0.1088 ***
	(-3.74)	(-4.55)	(-3.64)
Turnover	0.0038 ***	0.0040 ***	0.0039 ***
	(2.62)	(2.67)	(2.72)
Stock Return - 0-3 months	0.0060 *	0.0060 *	0.0061 *
	(1.73)	(1.72)	(1.76)
Stock Return - 3-12 months	-0.0002	-0.0002	0.0000
	(-0.07)	(-0.08)	(-0.01)
S&P500 Index Constituent	0.0064	0.0043	0.0058
	(1.29)	(0.83)	(1.15)
II. Property Type Variables			
Manufactured Housing	-0.0161 ***		-0.0175 ***
	(-2.75)		(-2.94)
Industrial /Office	0.0000		0.0000
	(0.01)		(0.00)
Retail	0.0025		0.0018
	(0.50)		(0.36)
Lodging	-0.0045		-0.0048
	(-0.56)		(-0.58)
Healthcare	-0.0016		-0.0026
	(-0.30)		(-0.48)
Self Storage	-0.0158 *		-0.0161 *
	(-1.88)		(-1.72)
Diversified	-0.0067		-0.0074
	(-1.15)		(-1.25)
Unclassified	-0.0122 *		-0.0124 *
	(-1.73)		(-1.66)
III. Geographic Headquarters			
West		-0.0036	-0.0028
		(-0.58)	(-0.45)
Northeast		-0.0056	-0.0063
		(-0.59)	(-0.64)
Southeast		-0.0029	-0.0039
		(-0.63)	(-0.85)
Mid-Atlantic		-0.0040	-0.0046
		(-0.85)	(-1.02)
Southwest		-0.0055	-0.0048
		(-1.02)	(-0.92)
Intercept	-0.0632 ***	-0.0675 ***	-0.0567 ***
	(-3.67)	(-4.17)	(-3.42)
REIT Specific Controls Included?	Yes	Yes	Yes
R-Squared	0.5062	0.4985	0.5075
Observations	5805	5805	5805

Note: Above equations estimate the determinants foreign ownership using ordinary least squares. The sample includes firm-quarter observations from 2000-2014. REIT specific controls include 3 dummy variables for whether or not a REIT is Self managed, Self Advised, and/or of an UPREIT structure. Estimation includes time (quarter) dummy variables. Standard errors are consistent in the presence of correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.8: Determinants of Institutional Ownership for REITs 2000-2014, Fixed Effects

	Dependent Variable - Institutional Ownership		
Independent Variables	Total	Domestic	Foreign
Market Capitalization (log)	0.0415 **	0.0278	0.0119 ***
	(2.14)	(1.42)	(3.73)
Market-to-book ratio	-0.0814 ***	-0.0770 **	-0.0020
	(-2.61)	(-2.34)	(-0.27)
Leverage	-0.2953 ***	-0.2654 ***	-0.0292
	(-3.20)	(-2.88)	(-1.32)
Return on Equity	-0.0059	-0.0045	-0.0015
	(-1.09)	(-0.91)	(-1.15)
Volatility	-0.3028 **	-0.2460 **	-0.0453 *
	(-2.34)	(-2.03)	(-1.85)
Dividend Yield	-0.4163 ***	-0.4282 ***	0.0215
	(-2.76)	(-2.86)	(0.91)
Cash to Total Assets	-0.3803 ***	-0.3230 ***	-0.0437
	(-2.96)	(-3.07)	(-1.35)
Turnover	0.0151 ***	0.0151 ***	-0.0003
	(4.60)	(4.93)	(-0.28)
Stock Return - 0-3 months	0.0161	0.0126	0.0077 *
	(1.18)	(0.93)	(1.89)
Stock Return - 3-12 months	0.0129	0.0133	-0.0002
	(1.42)	(1.53)	(-0.08)
S&P500 Index Constituent	-0.0582 **	-0.0684 **	0.0132
	(-1.98)	(-2.21)	(1.56)
Intercept	(0.60) ***	(0.63) ***	(-0.02)
	(4.53)	(4.68)	(-0.81)
R-Squared	0.8763	0.8490	0.6529
Observations	5845	5845	5845

Note: Above equations estimating the determinants of institutional ownership are estimated using ordinary least squares controling for time (year-quarter) and firm-level fixed effets. The sample includes 5845 firm-quarter observations from 2000-2014. Standard errors are consistent in the presence of correlation among firm clusters. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.9: Determinants of Institutional Ownership for REITs 2000-2014, Quantile (.50)

	Dependent Variable - Institutional Ownership		
Independent Variables	Total	Domestic	Foreign
Market Capitalization (log)	0.0300 ***	0.0146 ***	0.0093 ***
	(6.83)	(3.80)	(10.93)
Market-to-book ratio	-0.0947 ***	-0.1023 ***	0.0040 **
	(-18.62)	(-16.86)	(2.36)
Leverage	-0.2806 ***	-0.2467 ***	-0.0191 ***
	(-14.88)	(-13.53)	(-4.43)
Return on Equity	-0.0038	-0.0006	-0.0015
	(-1.08)	(-0.33)	(-0.82)
Volatility	-0.3320 ***	-0.2682 ***	-0.0417 ***
	(-10.40)	(-7.74)	(-3.91)
Dividend Yield	-0.4938 ***	-0.6278 ***	0.0076
	(-8.27)	(-8.88)	(1.06)
Cash to Total Assets	-0.2745 ***	-0.2564 ***	-0.0515 ***
	(-11.89)	(-7.73)	(-3.47)
Turnover	0.0155 ***	0.0143 ***	0.0001
	(10.75)	(11.26)	(0.26)
Stock Return - 0-3 months	0.0109	0.0103	0.0056 ***
	(1.30)	(1.40)	(2.62)
Stock Return - 3-12 months	-0.0003	0.0031	-0.0001
	(-0.06)	(0.70)	(-0.06)
S&P500 Index Constituent	-0.0682 ***	-0.0657 ***	0.0074 ***
	(-11.88)	(-10.61)	(3.30)
Intercept	(0.67) ***	(0.72) ***	(-0.02) **
	(19.12)	(18.64)	(-2.06)
R-Squared	0.7001	0.6657	0.4759
Observations	5845	5845	5845

Note: Above equations estimate the determinants institutional ownership using quantile regressions at the median(50%) using robust standard errors. Regressions include control variables for firm and year fixed effects.The sample includes firm-quarter observations from 2000-2014. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.10: Determinants of Foreign Ownership for REITs 2000-2014, Quantile

	Dependent Variable - Foreign Institutional Investment		
Independent Variables	50%	10%	90%
Market Capitalization (log)	0.0093 ***	0.0105 ***	0.0108 ***
	(10.93)	(14.18)	(8.12)
Market-to-book ratio	0.0040 **	0.0012	-0.0050 ***
	(2.36)	(0.84)	(-2.57)
Leverage	-0.0191 ***	-0.0005	-0.0251 ***
	(-4.43)	(-0.14)	(-3.86)
Return on Equity	-0.0015	-0.0004	0.0004
	(-0.82)	(-0.32)	(0.16)
Volatility	-0.0417 ***	-0.0289 ***	-0.0552 ***
	(-3.91)	(-3.99)	(-4.17)
Dividend Yield	0.0076	0.0091	0.0196 *
	(1.06)	(0.96)	(1.81)
Cash to Total Assets	-0.0515 ***	-0.0349 ***	-0.0408 ***
	(-3.47)	(-3.18)	(-3.21)
Turnover	0.0001	0.0005 *	0.0014 ***
	(0.26)	(1.74)	(2.90)
Stock Return - 0-3 months	0.0056 ***	0.0008	0.0056 ***
	(2.62)	(0.48)	(2.67)
Stock Return - 3-12 months	-0.0001	-0.0002	-0.0008
	(-0.06)	(-0.15)	(-0.73)
S&P500 Index Constituent	0.0074 ***	0.0160 ***	0.0000
	(3.30)	(8.64)	(-0.02)
Intercept	(-0.02) **	(-0.05) ***	(0.03) ***
	(-2.06)	(-8.39)	(3.17)
R-Squared	0.4759	0.4408	0.5446
Observations	5845	5845	5845

Note: Above equations estimate the determinants foreign ownership using quantile regressions at the median(50%), 10%, and 90% level using robust standard errors. Regressions include control variables for firm and year fixed effects.The sample includes firm-quarter observations from 2000-2014. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.11: Determinants of Institutional Ownership for REITs 2000-2014, Crisis

	Dependent Variable - Institutional Ownership		
Independent Variables	Total	Domestic	Foreign
Market Capitalization (log)	0.0673 ***	0.0509 ***	0.0145 ***
	(18.16)	(11.70)	(18.51)
Market-to-book ratio	-0.0328 ***	-0.0429 ***	0.0075 ***
	(-4.90)	(-6.59)	(3.37)
Leverage	-0.1312 ***	-0.1214 ***	-0.0028
	(-8.05)	(-6.50)	(-0.66)
Return on Equity	-0.0088 *	-0.0049 *	-0.0008
	(-1.90)	(-1.81)	(-0.72)
Volatility	-0.0237	0.0634 **	-0.0454 ***
	(-0.71)	(2.49)	(-7.91)
Dividend Yield	-1.4082 ***	-1.3027 ***	-0.0514 ***
	(-32.66)	(-18.19)	(-6.83)
Cash to Total Assets	-0.2347 ***	-0.1796 ***	-0.0508 ***
	(-5.91)	(-4.76)	(-4.90)
Turnover	0.0321 ***	0.0243 ***	0.0038 ***
	(33.51)	(16.53)	(9.06)
Stock Return - 0-3 months	0.0450 ***	0.0441 ***	0.0032 **
	(7.78)	(7.02)	(2.06)
Stock Return - 3-12 months	-0.0138 ***	-0.0037	-0.0114 ***
	(-3.30)	(-1.10)	(-9.63)
S&P500 Index Constituent	-0.0405 ***	-0.0470 ***	0.0044 **
	(-8.08)	(-6.31)	(2.11)
Crisis Period (2007-2009)	0.0889 ***	0.0592 ***	0.0208 ***
	(24.94)	(20.39)	(16.70)
Post Crisis (2009-2014)	0.0509 ***	0.0362 ***	0.0051 ***
	(11.37)	(8.36)	(3.00)
Intercept	0.4418 ***	0.4793 ***	-0.0273 *
	(13.03)	(13.80)	(-1.67)
R-Squared	0.5891	0.5633	0.4057
Observations	5845	5845	5845

Note: Above equations estimate the determinants institutional ownership using quantile regressions at the median(50%) using robust standard errors. Crisis Period is a dummy variable equal to one if year is equal to 2007, 2008, or 2009. Post Crisis is a dummy variable equal to one if year is greater than 2009. Regressions include control variables for firm fixed effects.The sample includes firm-quarter observations from 2000-2014. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 3.12: Determinants of Institutional Ownership for REITs 2000-2014, Secured Debt

	Dependent Variable		
Independent Variables	Institutional	Domestic	Foreign
Market Capitalization (log)	0.0718 ***	0.0592 ***	0.0125 ***
	(15.85)	(11.58)	(16.65)
Market-to-book ratio	-0.0348 ***	-0.0411 ***	0.0054 ***
	(-4.40)	(-4.54)	(4.14)
Leverage	-0.0941 ***	-0.0825 ***	-0.0111 **
	(-4.44)	(-3.79)	(-2.39)
Return on Equity	-0.0050 *	-0.0019	-0.0007 *
	(-1.79)	(-0.46)	(-1.81)
Volatility	-0.0361	0.0731 ***	-0.0481 ***
	(-0.94)	(2.57)	(-4.76)
Dividend Yield	-1.3026 ***	-1.1488 ***	-0.0484 ***
	(-21.02)	(-19.68)	(-3.69)
Cash to Total Assets	-0.2479 ***	-0.1693 ***	-0.0650 ***
	(-6.70)	(-4.04)	(-10.61)
Turnover	0.0310 ***	0.0204 ***	0.0035 ***
	(17.40)	(14.32)	(7.06)
Stock Return - 0-3 months	0.0351 ***	0.0337 ***	0.0038 **
	(4.81)	(5.20)	(2.14)
Stock Return - 3-12 months	-0.0139 ***	-0.0041	-0.0094 ***
	(-3.47)	(-0.99)	(-8.20)
S&P500 Index Constituent	-0.0382 ***	-0.0366 ***	0.0111 ***
	(-5.26)	(-3.84)	(6.95)
Crisis Period (2007-2009)	0.0827 ***	0.0559 ***	0.0188 ***
	(19.30)	(14.15)	(12.73)
Post Crisis (2009-2014)	0.0476 ***	0.0348 ***	0.0013
	(8.81)	(7.02)	(0.86)
Secured debt	0.0407 ***	0.0383 ***	0.0114 ***
	(5.10)	(4.86)	(6.05)
Intercept	0.3681 ***	0.3727 ***	-0.0203
	(9.56)	(9.14)	(-1.22)
R-Squared	0.5981	0.5788	0.4301
Observations	5845	5845	5845

Note: Above equations estimate the determinants institutional ownership using quantile regressions at the median(50%) using robust standard errors. Crisis Period is a dummy variable equal to one if year is equal to 2007, 2008, or 2009. Post Crisis is a dummy variable equal to one if year is greater than 2009. Securd debt is equal to secured debt divided by total debt. Regressions include control variables for firm fixed effects.The sample includes firm-quarter observations from 2000-2014. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

CHAPTER 4: THE IMPACT FOR FOREIGN INVESTMENT FLOWS ON REIT RETURNS AND VOLATILITY

Introduction

Significant studies within the REIT literature have documented the relationship between capital flows and REIT returns[35]. In these studies the authors find evidence that returns drive future investment flow, as well as evidence that investment flows drive future returns. These results, however, vary depending on the particular source of capital that is analyzed. Additionally, the general finance literature has documented the influence of foreign institutional investment flows on returns[36]. However no study within the REIT literature has explored the relationship between foreign institutional investment flows and REIT returns.

Given recent legislative actions to modify the Foreign Investment in Real Property Tax Act in a way favorable to REITs[37], so as to encourage more foreign institutional investment within the industry, we feel a study into the effects these investors have on the return dynamics within the REIT industry is warranted.

As such, our analysis will explore the dynamic relationship between foreign institutional investment flows and returns within the REIT market. We will employ a vector auto-regression model to capture the long run relationships between these variables. Using

[35] See Ling and Naranjo (2003, 2006)
[36] See Froot et. al. (2001)
[37] see news article by Kenney (2015)

these results we will additionally map out the short-run relationships between these variables by employing impulse response functions. These impulse response functions will also allow us to gauge the persistence of these effects.

Our analysis will pull data from 13f filings from the Thompson-Reuters Institutional Holdings database, and track the level of institutional holdings across all equity REITs on a quarterly basis from Q1 2000 through Q4 2014. Further, this data will allow us to identify the country of origin for each institutional investor, so that we can divide institutional ownership into foreign and domestic categories. We will then use the change in institutional ownership at the firm level and aggregate this change for all equity REITs in a given quarter, to create a measure of quarterly institutional ownership flow for both foreign and domestic institutional investors. With this flow data, we will compare ownership flows to aggregate returns on the NAREIT Equity REIT index, and document the relationship between these variables over time.

In addition to examining dynamics between returns and foreign institutional flows, we will also examine the relationship between volatility and foreign flows in a separate VAR analysis. This analysis will allow us to determine if foreign institutional investment flows can impact future volatility, as is suggested by Sias (1996), and explain the observed positive correlation between institutional ownership and volatility.

Our results indicate that current foreign institutional ownership flows are negatively related to flows 1 period previous. Furthermore, foreign flows are negatively impacted by

lagged returns 2 quarters previous. Suggesting a possible negative feedback or contrarian trading motivation. Interestingly, the observed relationship between current REIT returns and 2 quarter lagged foreign flows suggests a negative relationship. We fell this relationship may be driven by a return reversal related to a previous period increase undetected at the quarterly frequency of our data.

Interestingly, domestic firms, as compared to foreign firms, exhibit a much stronger negative relationship between ownership flows and lagged returns with a negative relationship observed at both one and two lags of domestic ownership flow. Additionally domestic firms exhibit evidence that they follow a momentum strategy.

Furthermore, in all relationships discussed above the return and flow dynamics dissipate quickly for both foreign and domestic investors, with persistence of 3 quarters or less in all cases.

In comparing REIT return volatility to lagged foreign ownership flow, we observe a positive and significant relationship for both the first and second lag of foreign flows, suggesting that foreign movement in and out of the REIT market does impact future volatility. Furthermore we document that this effect is strongly persistent, lasting through all 8 quarters of the impulse response function analysis.

The remainder of this article proceeds as follows. The next section reviews the relevant literature related to our analysis. The third section describes our sample as well as the

variables used in this study. Our methodology is described in the fourth section. Results from vector auto-regression analysis on the dynamics of foreign flows and returns as well as foreign flows and return volatilities for REITs are presented in the fifth section. The sixth section concludes our analysis.

Literature Review

Our analysis will focus on two specific areas within the literature. First we will examine the influence of institutional ownership on returns. Second we will examine the influence of capital flows on returns.

Influence of Institutional Ownership on Returns

Institutional investors have been the focus of much literature documenting the behavior of institutional investors. Banerjee (1992) first documented that institutional investors observe the previous actions of other institutional investors, gain some information from those actions, and follow suit, a type of herding behavior. A study by Lakonishok, Schleifer, and Vishney (1992) examines this herding behavior in pension funds and finds that they tend to herd in their investment in smaller stocks, following a positive-feedback strategy. However, they find no evidence that on average of such herding behavior. In a study examining mutual funds, Grinblatt, Titman, and Wermers (1995) conclude that mutual fund managers exhibit a statistically significant level of momentum[38] trading and herding, but the actual size of such behavior is small.

[38] Tesar and Werner, 1995 as well as Grinblatt and Keloharju (2000) document a similar momentum following trend.

Taking a slightly different perspective, Falkenstein (1996) observes similar movements by institutional investors and instead attributes their tendency to move together to a similar set of investor preferences. He finds that institutional investors have a preference for volatility, liquidity, and size, but an aversion to low priced stocks. A study by Sias (1996) attributes this preference for volatility to a destabilizing effect caused by institutional investors. Sias (1996) suggests that instead of preferring volatility, institutional investors by way of their involvement in the securities market, create this volatility. Sias (1996) finds a contemporaneous relationship between institutional involvement and volatility. Our analysis on the relationship between foreign institutional investment flows and return volatility, will examine this issue for REITs. If foreign flows positively predict future volatility, this would suggest that foreign institutional investment activity drives return volatility.

Similar to Falkenstein (1996), Gompers and Metrick (2001) document the influence of institutional behavior. They find evidence that institutional investors have increased their presence in the securities market over time, and that this has caused a demand shift for the stocks that they prefer. Specifically, Gompers and Metrick (2001), examine the 13f filings from institutional investors from 1980 to 1996 to document institutional ownership levels. They determine that institutional investors have a preference for large stocks, with higher liquidity and lower previous returns[39]. Further, they document that

[39] Cohen (1998) also finds institutional investors buy stock from individuals as markets decline but sell stocks to individuals as markets rise.

the presence of higher institutional investment within a security is correlated with increased returns. They present two possible explanations for this effect. One explanation is that institutional investors are smarter and invest in better performing stocks, and another explanation is that institutional investment has caused a shift in demand for the stocks they prefer, causing the value of large and liquid securities to increase.

Gompers and Metrick (2001), interestingly create a measure for institutional investment inflow in the market, and find that in quarters with the highest inflow, the effect of institutional ownership levels on returns is the greatest, with low inflow quarters being statistically insignificant. They conclude that institutional investors have caused a demand shift in favor of larger, more liquid securities, supporting their second explanation.

Our analysis will utilize this inflow measure from Gompers and Metric (2001) and calculate flow for institutional ownership separately for foreign and domestic investors within the equity REIT market. We will compare this measure of institutional ownership to equity REIT returns over time.

Capital Flows and Returns

Moving now to the literature on capital flows we first discuss Warther (1995). Warther examines capital flows into mutual finds for a period between 1984-1992. Warther divides flows into expected and unexpected components, and finds that for the

unexpected component of flows, there is a positive contemporaneous correlation with equity returns[40]. Warther additionally finds some evidence that returns are positively correlated to past flows in weekly data, and finds a negative relationship between returns and subsequent flows in monthly data. Warther also concludes that flow data provides an interesting opportunity to document investor behavior but that we cannot conclusively use such analysis to support theories such as the "price pressure" hypothesis of Harris and Gurel (l986) and Shleifer (1986).

Foreign Institutional Investment

Froot, O'Connell and Seasholes (2001) look at foreign institutional investment across 44 countries, utilizing daily transaction flows in and out of a country, to complete a VAR analysis of institutional capital flows and stock returns. They document that in emerging markets capital inflows forecast future returns, but this relationship is not statistically significant for developed countries. In developed countries they do observe a negative relationship between market inflows and future returns over a longer period. Our data will be restricted to quarterly data, so timeframe will be an important consideration in the interpretation of our results.

In further exploring the dynamics of foreign institutional investors, Ferreira and Matos (2008) examine institutional ownership across 27 non-US countries from 2000-2005. In this analysis they find a negative relationship between the level of institutional ownership

[40] A positive cotemporaneous relationship between ownership flows and returns has also been documented in Tesar and Werner (1995) and Bohn and Tesar (1996).

and stock returns for domestic investors but a positive relationship between institutional ownership and stock returns for foreign investors. Chapter 3 of this dissertation expands upon this analysis, and examines the determinants of foreign investment in the equity REIT markets in the United States. Related to returns, this analysis documents that foreign institutional ownership exhibits a positive relationship with lagged returns from 0-3 months but a negative relationship to returns from 3-12 months previous. Related to volatility, they find that foreign investors in REITs prefer stocks with lower volatility, as opposed to domestic investors, which prefer higher volatility.

REIT Studies

Moving into the study of capital flows and REITs, two studies by Ling and Naranjo (2003,2006) explore the relationship between capital flows and returns for REITS utilizing vector auto-regression (VAR). Ling and Naranjo (2003) find that REIT equity flows are positively related to flows one quarter previous but negatively related to flows two quarters previous. They also find evidence that equity investors follow a momentum strategy as is evidenced by a positive relationship between equity flows and lagged returns for the entire sample from 1972-2002. Importantly, when they subdivided their sample in to pre and post 1992 subcategories, they find a structural change in the relationships. They find that the momentum relationship does not hold for the post 1992 sample, and that results from the post 1992 sample exhibit a positive effect of lagged equity flows on current returns, suggesting that increased equity flows increase future returns. Our sample covers the time period between 2000-2014 and will be based entirely after this structural break in the data.

Ling and Naranjo (2006) examine mutual fund flows from 1993 to 2003, and find results opposite to those from their earlier study on equity flows. Notably, for mutual funds there does appear to be a positive relationship between flows and previous returns, in support of a momentum strategy argument. Additionally, they find no evidence of previous flows affecting current returns.

In our analysis we will employ VAR to analyze the relationship between foreign institutional ownership flows on both returns and volatility. Our analysis will contribute to the literature on the influence of capital flows on returns by exploring this issue for foreign institutional investors in U.S. equity REITs.

Data

Consistent with Gomper and Metrick (2001), we gather data from 13f filings with the SEC to determine the level of institutional ownership in equity REITs from Q1 2000- through Q4 2014[41]. This information comes from the Thompson-Reuters Institutional Holdings Database and contains holdings data reported by all institutional managers managing over $100 million in assets. In addition to identifying securities held, this database also identifies the country of origin for each manager; given this information we are able to uniquely identify foreign and domestic holdings[42] for all publically traded

[41] Q1 2000 is the first year that country of origin is consistently populated in the Thompson-Reuters Institutional Holdings Database.

[42] If no country is listed for a manager anywhere in our sample, or alternatively if a manager has inconsistent county information, these results are excluded from our foreign and domestic institutional ownership totals. These excluded observations occur at an average and median level of 1.1% and .5%

equity REITs. From this data we are able to aggregate institutional ownership levels across all equity REITs in the NAREIT Equity REIT index and compute the change in aggregate institutional ownership (both foreign and domestic) from quarter t-1 to t.

We then combine this data with monthly return data from the National Association of Real Estate Investment Trusts (NAREIT) Equity REIT index, the monthly returns data from the Center for Research in Security Prices (CRSP) value weighted market index, treasury data from the Federal Reserve Bank of St. Louis, and market risk factors from Kenneth French's website, to generate the following variables for each quarter of our analysis:

Foreign Institutional Ownership Flow: Aggregate of the change in foreign ownership (calculated as number of shares*price) held across all equity REITs in our sample from t-1 to t, divided by total sample market capitalization from period t-1. Ownership calculated at quarter end, from the Thompson-Reuters Institutional Holdings Database. This is consistent with the institutional inflow calculation from Gompers and Metrick (2001).

Domestic Institutional Ownership Flow: Aggregate of the change in domestic ownership (calculated as number of shares*price) held across all equity REITs in our sample from t-1 to t, divided by total sample market capitalization from period t-1. Ownership calculated at quarter end, from the Thompson-Reuters Institutional Holdings

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respectively across all REITs in our firm.

Database. This is consistent with the institutional inflow calculation from Gompers and Metrick (2001).

Equity REIT Return: Return on the NAREIT equity REIT index over the previous 3 months. Collected quarterly. Data collected from the National Association of Real Estate Investment Trusts website. www.REIT.com

Equity REIT Return Volatility: Standard deviation of return on the NAREIT equity REIT index over the previous 3 month. Collected quarterly. Data collected from the National Association of Real Estate Investment Trusts website. www.REIT.com

Equity REIT Yield spread: NAREIT Equity REIT index Dividend Yield as reported for the last month of the current quarter, less the 10-year U.S. Treasury constant maturity rate. Data collected from the National Association of Real Estate Investment Trusts website. www.REIT.com

Treasury Bill Rate: Current return on the 3 month U.S. Treasury bill. Data from the Federal Reserve Bank of St. Louis website. www.stlouisfed.org

HML: Fama-French high book to market minus low book to market quarterly return factor. From Kenneth French's website.
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

SMB: Fama-French small firm minus big firm quarterly market return factor. From Kenneth French's website. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

Return on Market: Total Return on CRSP's value weighted market index. From the CRSP database.

Table 4.1 presents the summary statistics for the above data. Note that ownership flow has a mean close to zero for both foreign and domestic institutional investors, however it is positive. This small value for quarterly change is due to the dividing of the change in flows by market capitalization. Despite dividing flows by market capitalization, swings in flows of a greater magnitude are possible as is seen by the minimum and maximum observations on institutional ownership flow. Institutional flows can be as high as 11.83% of total market share and 4.8% of total market share for domestic and foreign institutional ownership respectively. A question our analysis will seek to answer is whether we can observe any noticeable impact from a change in ownership flow on future returns. Such return predictability may suggest the presence of a price pressure effect or a demand shift should the effect be permanent.

Figure 4.1 plots out the relationship between our main aggregate variables of focus, namely foreign and domestic institutional ownership flow. Notice that while some evidence of co-movement exists between these two series of data, overall we observe a great deal of variation between these two flows. This suggests that when analyzing the

relationships between foreign and domestic aggregate institutional flows, we will want to examine both groups separately.

Further examining foreign ownership flows, Figure 4.2, plots out the relationship between foreign flows and the return on the NAREIT equity index. At first glance this relationship appears more complex than a simple positive, negative, contemporaneous or lagged relationship, and requires a more sophisticated analysis.

Figure 4.3 presents a comparison of domestic ownership flows to NAREIT equity REIT returns, and again we see that this too requires more detailed analysis. However, in comparison with Figure 4.2, there appears to be a slightly more positive relationship between domestic flows and returns as compared to foreign flows relationship with returns. Further there appears to be some visual evidence, that domestic ownership levels may lag returns, notably in 2001 and again in 2004 and 2005.

Table 4.2 presents the contemporaneous correlations between foreign and domestic ownership flows and NAREIT Equity REIT index returns and volatility. Notice that contemporaneously there is very little correlation between ownership flows. Notice that while positive correlations exist between flows and equity returns, they are not significant at a 5% level. Not surprisingly REIT returns are negatively correlated to volatility.

Methodology

Following Ling and Naranjo (2003, 2006) and Froot et. al. (2001), our analysis will utilize an unrestricted VAR model to examine the long-term relationships between ownership flows and REIT returns. VAR models as proposed in Sims (1980) provide for the analysis of simultaneous equations of endogenous variables without the use of restrictions, and therefore can be completed in the absence of applicable theory. Ling and Naranjo (2006) complete their analysis on the relationship between REIT index returns and mutual fund flows and set out to analyze the short term and long-term relationships between the variables over time. Similar to their analysis, we will be looking to complete an analysis of the dynamic relationship between aggregate equity REIT institutional ownership flows (both foreign and domestic) and NAREIT equity REIT index returns. Following Ling (2003) our unrestricted VAR model will include both REIT returns and institutional ownership variables as dependent variables in a system of 2 simultaneous equations where each dependent variable is regressed on p lags of its self and each other. The number of lags, p, will be chosen by minimizing the Akaike information criterion (AIC) for each model separately. The first 2 lags of each variable will be presented in our results[43]. Our analysis will be completed for both foreign and domestic ownership flows separately, and will include 3 separate VAR models[44].

[43] In all our models the AIC suggest the choice of between 2 and 4 lags.

[44] All VAR models in our analysis contain matrices of parameters having all eigenvalues with moduli less than one, so that the VAR itself is stable. Additionally the results of the Augmented Dickey-Fuller test on all variables in the system reject the null of a unit root at greater than a 5% level of significance.

The first model will present a simple bivariate analysis without the inclusion of exogenous variables. This simple model will not control for any industry specific or macroeconomic variables.

The second model will add control variables for interest rates and the dividend yield spread to the first bivariate model, creating a four-factor model (2 endogenous+ 2 exogenous variables)[45]. Previous research by Froot et. al. (2001) suggests that interest rate can play a significant role in the determination of capital flows and returns. Additionally Ling and Navarro (2003, 2006) note that dividend yields are suggested to play an important role in REIT returns.

The third model will add three additional variables to the four-factor model, it will add the Fama-French SMB and HML market risk factors as well as a market return variable[46], creating a seven-factor model (2 endogenous + 5 exogenous variables). Consistent with Ling and Naranjo (2003, 2006), the addition of these risk factors from Fama and French (2006) help to control for macroeconomic risk factors in our analysis[47].

Finally we will repeat the above VAR analysis utilizing volatility in returns as opposed to returns themselves. Following this methodology we will be able to identify if

[45] Interest rates will be proxied by the 3-month U.S. Treasury Bill rates, and Dividend yield is equal to the dividend yield on the NARIET Equity REIT index for the current month less the U.S. Treasury 10 year constant maturity rate.
[46] Market return is proxied by the value weighed return on the CRSP market index
[47] As noted in Ling and Naranjo (2006), Liew and Vassalou (2000) and Lettau and Ludvigson (2001) document a connection between the Fama-French factors and macroeconomic risks.

institutional movement into and out of the REIT markets contributes to overall market volatility.

To further interpret the results of our different VAR analyses over the short-run, we will present a graphical analysis of the impulse response functions for the results of the seven-factor model under each specification above. The impulse response functions will map out the iterated response of a 1 standard deviation innovation in each of the dependent variables on its self and on each other over 8 quarters. This response will allow us to document the persistence of these dynamic relationships.

Results

VAR Analysis of Foreign Flows and Returns

The main purpose of our analysis in this section will be to document both the short-term and long-term relationships between foreign institutional ownership and Equity REIT returns. Table 4.3 present the first of our VAR results on these relationships.

As seen in Table 4.3, under all three specifications of the model, there exists a negative relationship between foreign institutional ownership flows and the previous one quarter flows over the time period of our analysis. This suggests that foreign flows are cyclical in nature, and that as foreign flows increase into REITs they are subsequently flowed by a decrease in the following quarter. As seen in Figures 4.1 and 4.2, this is consistent with the overall visual pattern observed.

Observing the effect of REIT returns on foreign ownership flows , we note that REIT returns from the period two quarters previous negatively impact current foreign ownership flows. This effect is consistent across all three models. This suggests that foreign investors follow a negative feedback or contrarian investment strategy similar to that found in Cohen (1998) and Gompers and Metrick (2001). In chapter 3 of this dissertation, foreign investors were found to follow a momentum pursuing strategy over the preceding 3 month, but over the longer 3-12 month horizon foreign ownership levels were negatively related to lagged returns. The 3-12 month lagged return relationship from that study is consistent with our findings here.

A final observation on Table 4.3 shows, that while only weakly significant at the 10% level, there does appear to be a negative impact of one quarter previous lagged foreign investment flows on returns, over the time frame of our analysis. It is possible this result is related to the frequency of our analysis, and that perhaps this is a reversal of a previous increase in return that has gone undetected due to the longer frequency of our analysis. Ling and Naranjo (2006) similarly notes that one drawback to quarterly analysis is that you may fail to detect short run relationships. It is, however, interesting that a similar negative relationship was observed, over longer periods, for foreign investors in developed countries in Froot, et. al. (2001), as our results would be analogues to that observation.

To examine the short run dynamics of our results under the above VAR model, we will now examine the impulse response functions for the effects of shocks to REIT returns and foreign institutional ownership flows on themselves and each other.

Figure 4.4a documents the impulse response function for a one standard deviation innovation in foreign ownership flows on subsequent ownership flows. Notice that over the short-term there is an initial drop in foreign ownership, that disappears after two quarters and quickly reduces to close to zero within 3 quarters. Figure 4.4b documents the response of foreign ownership flows to a one standard deviation innovation in equity returns and demonstrates an initial negative relationship in quarter 1 which continues to decrease into quarter 2, but is not persistent past quarter two as there is almost immediate reversal in quarter 3 to close to zero.

Figure 4.4c documents the effect of a one standard deviation innovation in foreign ownership flows on equity returns. Notice that while there is an immediate drop in quarter 1 that is completely reversed by quarter 2. Figure 4.4d suggests that there is little effect from a one standard deviation innovation in equity returns on future equity returns as the impulse response function fluctuates very close to zero. Again, based on the seven-factor model, a lack of response by equity returns to an innovation in equity returns, given a control for returns on the market is included, is not surprising. Note that in Table 4.3 the negative effect of two quarter previous lagged REIT returns on REIT returns becomes insignificant when controlling for market risk factors.

Importantly from the analysis above, notice that the persistence of the impacts of REIT returns and foreign institutional ownership flows on themselves and each other is relatively low, lasting only a few quarters in each case.

VAR Analysis of Domestic Flows and Returns

Considering the dynamics of foreign ownership changes and REIT returns would not be complete without also examining the effect of domestic flows for comparison. Table 4.4 presents the VAR estimates based on domestic ownership flows instead of foreign flows. First, notice that domestic flows are negatively related to lagged flows over the preceding 2 quarters, which suggests an even stronger negative reaction to current flows compared to foreign investors. Foreign flows were only negatively related to flows lagged 1 quarter previous.

Second, in Table 4.4 we see a significant positive relationship between future domestic ownership flows and REIT returns 1 quarter previous, suggesting that domestic institutional investors pursue a momentum strategy, which is the opposite of foreign investors in terms of the aggregate market. Interestingly, domestic institutional ownership flows do not seem to exhibit any statistically significant relationship between previous flows and future returns, showing no evidence of a price pressure effect during our sample period. This is consistent with the results from Ling and Navarro (2006), which measured the response of aggregate REIT returns to mutual fund flows in the REIT market.

To examine the short run dynamics of our results under the VAR model for domestic ownership flows, we will now examine the impulse response functions for the effects of shocks to REIT returns and domestic institutional ownership flows on themselves and each other.

Figure 4.5a graphs the impulse response function of domestic ownership flows to a one standard deviation innovation in flows. Notice that there is an initial negative response of flows that is persistent for 2 quarter after which it increases steeply before returning to zero. Figure 4.5b graphs the impulse response function of domestic ownership flows to REIT returns. Notice that the positive initial effect quickly reverts to zero after the first quarter, with little persistence. Figures 4.5c and 4.5d present the impulse response functions of REIT returns to shocks in REIT returns and domestic ownership flow. Notice that fluctuation is minimal and quickly reverts to zero.

Over the short run the impulse response functions related to REIT returns and domestic flows exhibit a similar lack of persistence as was observed for foreign institutional investors. These responses in many cases are even shorter in duration than those of foreign investors.

VAR Analysis Flows and Volatility

Completing our analysis on the relationships between foreign institutional ownership flows and returns, it is also appropriate to discuss volatility. Sias (1996) suggests that the contemporaneous positive relationship between institutional ownership and volatility is

driven by institutional investor actions. By testing the relationship between volatility and flows we will see if flows in and out of the market increase volatility. For this analysis it will be necessary to re-compute our flow variables in absolute values, as it is presumed that any effect that institutional ownership will have on volatility will occur due to moves both in to and out of the market, therefore if ownership flow impacts volatility, this result will be driven by the magnitude, not the direction of the change.

Table 4.5 presents our VAR analysis of the relationship between the magnitude of foreign institutional ownership flows and the volatility of equity REIT returns. First notice that in the bivariate model the magnitude of current foreign ownership flows shows a negative and significant relationship with both foreign ownership flows lagged two quarters and REIT return volatility in the preceding quarter. However, when we examine the volatility equation, we do not see a significant impact of lagged foreign flow magnitude on return volatility above and beyond the effects of lagged return volatility itself. This initial model suggest that foreign institutional ownership changes do not likely influence volatility above and beyond the influence of previous volatility.

These results change however when we move to the better specified four-factor and seven-factor models. Notice that the R-squared for the return volatility equation in these models is much higher than in the bivariate model. We now see that the magnitude of foreign institutional ownership changes within the REIT market over both the previous 2 quarters, positively and significantly impacts Equity REIT index return volatility. This result lends evidence to the argument that institutional investor activity creates volatility.

Notice also that the negative effect of volatility on foreign flows becomes insignificant in both the four and seven factor models.

To examine the short run dynamics between foreign flow and volatility, we will now examine the impulse response functions for the effects of shocks to REIT returns and foreign institutional ownership flows on themselves and each other.

The impulse response function of a one standard deviation innovation in foreign ownership flow on foreign ownership flow is shown by 4.6a. This impulse response function shows an initial increase in quarter 1 followed by a significant decrease in quarter 2, which again quickly reverts to zero after the third quarter. Figure 4.6b graphs out the impulse response function of a one standard deviation innovation in return volatility on foreign ownership flow, which while initially negative, shows very minimal impact and no persistence over time.

Figure 4.6c is very interesting however, as this impulse response function graphs out the impact of a one standard deviation innovation in foreign ownership flow magnitude on return volatility. Notice that here we see an initial positive response to the shock, which increases slightly in quarter 2 and dropping off thereafter, but persisting through all 8 quarters of this analysis. Figure 4.6d reports the impulse response function for a one standard deviation innovation in return volatility on return volatility and finds an initial increase in volatility which grows stronger in quarter 2 and oscillates towards zero as the positive effect persists over the 8 quarters of our analysis.

As compared to the relationships between foreign flows and returns, the relationships between foreign flows and volatility exhibit far greater persistence.

In results not presented in this analysis, I also examine the relationship between domestic institutional ownership flows and return volatility with the same VAR model as above. Interestingly, the effect of lagged domestic ownership flows on return volatility is insignificant over the time period of our analysis. However, when analyzing the pre crisis (pre-2007) period only, this effect does show up as positive and significant for two quarter previous lagged domestic flows. These results are not nearly as persistent, and do not carry the same level of significance as do the results between return volatility and foreign institutional ownership flows however.

Conclusion

Previous literature within the REIT literature has explored the relationships between capital flows and REIT returns. This literature has found that REIT returns can predict future capital flows and that capital flows can predict both future capital flows and future returns. These results have varied however depending on the nature of capital flows analyzed.

Our analysis adds to this growing literature on capital flow analysis within REITs by exploring the dynamic relationships between both capital flows and returns as well as capital flows and volatility, by exploring foreign institutional ownership flows.

Adapting a measure of institutional ownership flow from Gompers and Metrick (2001), we utilize 13f filing from the Thompson-Reuters Institutional Holdings Database to measure aggregate foreign institutional ownership flows for publicly listed equity REITs from Q1 2000 through Q4 2014. We then apply a VAR model to analyze the dynamic nature of the relationships between these foreign institutional flows and both NAREIT Equity REIT index returns and return volatilities.

Our major findings conclude several significant relationships between foreign flows and both REIT returns and return volatilities. We find that reverse momentum exists for foreign institutional flows within our sample data, with one quarter previous REIT flows negatively affecting future REIT flows. Further, we find evidence that one quarter previous REIT flows predict a decrease in future REIT returns. However we suspect that this effect is caused by a reversal in returns from a previous increase undetected by the quarterly frequency of our data.

Additionally, we find evidence of a negative-feedback or contrarian investment strategy among foreign institutional investors, where two quarter previous REIT returns predict a negative effect on future foreign institutional ownership flows. Further, in all of these dynamic results between foreign institutional ownership flows and REIT returns we observe a persistence of no more than 3 quarters, meaning all of these effects while significant are short lived.

Finally, when examining the relationship between volatility and foreign flows, we discover that increases in the magnitude of foreign flows over both of the previous two quarters increase future volatility in the equity REIT market. This result suggests that foreign movements in and out of the REIT market may be creating rather than seeking volatility, as has been previously argued by Sias (1996). As an additional note these effect of flows on volatility are far more persistent than the relationships between flows and returns, lasting to some degree through all 8 quarters of our short-term analysis.

These results from our study allow us to better understand the influences of foreign investment, through foreign institutional ownership flow, on the equity REIT market. We note several unique relationships specific to foreign institutional investors and provide a meaningful contribution to the growing REIT literature on capital flow analysis.

Table 4.1: Descriptive Statistics for Equity REITs 2000-2014

Variable	Mean	Median	Std. Dev.	Min	Max	N
I. Ownership Flow						
Foreign Inst. Ownership Flow %	0.11	0.26	1.60	-4.80	3.44	59
Domestic Inst. Ownership Flow %	0.17	0.00	2.96	-11.83	8.80	59
II. Market-level control variables						
Equity REIT Return (Quarterly)	0.04	0.05	0.11	-0.39	0.33	60
Equity REIT Return Volatility	0.04	0.04	0.03	0.00	0.21	60
Equity REIT Dividend Yield Spread	1.32	1.27	1.42	-1.11	6.67	60
Treasury Bill Rate (3 month)	1.68	1.03	1.88	0.01	6.00	60
HML	1.51	1.40	6.90	-13.62	23.85	60
SMB	1.22	0.72	4.98	-7.00	19.10	60
Return on Market (CRSP Value-Weighted)	0.02	0.02	0.09	-0.24	0.18	60

Note: Above summary statistics report institutional investment, firm level control variables, property type, and geographic location of a firm's headquarters for all REITs which contail some level of institutional investment recorded by 13F filings from 2000 through 2014. N represents total number of firm-quarter observations for the specified period.

Table 4.2: Summary Statistics Correlation Matrix for Equity REITs from 2000-2014

Variable	Foreign Ownership Inflow	Domestic Ownership Inflow	Equity REIT Return	Equity REIT Volatility
Foreign Ownership Inflow	1.00			
Domestic Ownership Inflow	-0.07	1.00		
Equity REIT Return	0.02	0.11	1.00	
Equity REIT Volatility	0.01	-0.07	**-0.45**	1.00

Note: Above Pearson correlations are for the 3 dependant variables and 20 independant variables from our analysis. The sample Includes 60 quarters from Q1 2000 through Q4 2014. Significance at 5% level indicated in bold.

Table 4.3: VAR Estimates Foreign Flows and REIT Returns

	Bivariate Model		Four-Factor Model		Seven-Factor Model	
Independent Variables	Foreign Ownership Flow	REIT Return	Foreign Ownership Flow	REIT Return	Foreign Ownership Flow	REIT Return
Foreign Ownership Flow (t-1)	-0.2286 *	-1.6639 *	-0.2314 *	-1.4764 *	-0.1993 *	-0.9860 *
	(-1.80)	(-1.82)	(-1.85)	(-1.87)	(-1.70)	(-1.88)
Foreign Ownership Flow (t-2)	-0.1225	0.4502	-0.1310	0.4205	-0.1650	0.2857
	(-0.96)	(0.49)	(-1.04)	(0.53)	(-1.41)	(0.55)
REIT Return (t-1)	-0.0154	0.2096	-0.0262	-0.0448	-0.0289	0.0471
	(-0.87)	(1.64)	(-1.34)	(-0.36)	(-1.58)	(0.58)
REIT Return (t-2)	-0.0360 **	-0.2774 **	-0.0399 **	-0.3383 ***	-0.0479 ***	-0.1208
	(-2.02)	(-2.16)	(-2.26)	(-3.05)	(-2.78)	(-1.57)
Dividend Yield Spread			-0.0020	-0.0496 ***	-0.0035 *	-0.0302 ***
			(-1.17)	(-4.57)	(-1.81)	(-3.50)
Treasury Bill Rate (3 month)			0.0004	-0.0185 **	0.0000	-0.0112 *
			(0.31)	(-2.17)	(-0.03)	(-1.84)
HML					-0.0008 ***	0.0062 ***
					(-2.79)	(4.59)
SMB					0.0009 **	0.0038 *
					(2.04)	(1.85)
Return on Market					-0.0253	0.4235 ***
					(-0.91)	(3.40)
Intercept	0.0031	0.0388 **	0.0056	0.1406 ***	0.0085 *	0.0744 ***
	(1.46)	(2.53)	(1.26)	(5.02)	(1.73)	(3.40)
R-Squared	0.1341	0.1285	0.1693	0.3620	0.2953	0.7277

Note: Above equations estimated utilizing vector autoregression (VAR) in order to control for the endogenous relationship between returns and institutional investment flows. Bivariate model includes only the endogenous variables. Four Factor model includes endogenous variables as well as variables for interets rate and dividend yield. Seven factor model adds Fama French factors in addition to the four factor model. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 4.4: VAR Estimates Domestic Flows and REIT Returns

	Bivariate Model		Four-Factor Model		Seven-Factor Model	
Independent Variables	Domestic Ownership Flow	REIT Return	Domestic Ownership Flow	REIT Return	Domestic Ownership Flow	REIT Return
Domestic Ownership Flow (t-1)	-0.3200 **	0.2536	-0.3786 ***	0.3908	-0.3561 ***	-0.1574
	(-2.54)	(0.51)	(-3.15)	(0.90)	(-2.93)	(-0.54)
Domestic Ownership Flow (t-2)	-0.2951 **	-0.1588	-0.3496 ***	-0.0535	-0.3352 ***	-0.0463
	(-2.35)	(-0.32)	(-2.93)	(-0.12)	(-2.82)	(-0.16)
REIT Return (t-1)	0.0396	0.1673	0.0682 **	-0.0928	0.0680 **	0.0250
	(1.22)	(1.30)	(1.99)	(-0.75)	(1.96)	(0.30)
REIT Return (t-2)	-0.0220	-0.2358 *	-0.0174	-0.3065 ***	-0.0183	-0.0811
	(-0.67)	(-1.81)	(-0.56)	(-2.73)	(-0.56)	(-1.03)
Dividend Yield Spread			0.0058 *	-0.0514 ***	0.0075 **	-0.0307 ***
			(1.88)	(-4.60)	(2.00)	(-3.42)
Treasury Bill Rate (3 month)			0.0068 ***	-0.0209 **	0.0075 ***	-0.0114 *
			(2.74)	(-2.33)	(2.82)	(-1.78)
HML					0.0001	0.0060 ***
					(0.13)	(4.34)
SMB					-0.0012	0.0048 **
					(-1.32)	(2.29)
Return on Market					0.0403	0.4291 ***
					(0.74)	(3.29)
Intercept	0.0019	0.0376 **	-0.0166 **	0.1455 ***	-0.0188 **	0.0728 ***
	(0.48)	(2.40)	(-2.06)	(5.02)	(-1.97)	(3.17)
R-Squared	0.1672	0.0770	0.2684	0.3267	0.2906	0.7093

Note: Above equations estimated utilizing vector autoregression (VAR) in order to control for the endogenous relationship between returns and institutional investment flows. Bivariate model includes only the endogenous variables. Four Factor model includes endogenous variables as well as variables for interets rate and dividend yield. Seven factor model adds Fama French factors in addition to the four factor model. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

Table 4.5: VAR Estimates Foreign Flows and REIT Return Volatility

	Bivariate Model		Four-Factor Model		Seven-Factor Model	
Independent Variables	Foreign Ownership Flow	REIT Volatility	Foreign Ownership Flow	REIT Volatility	Foreign Ownership Flow	REIT Volatility
Foreign Ownership Flow (t-1)	-0.1997	0.1534	-0.2034	0.1363	-0.1533	0.0851
	(-1.53)	(0.58)	(-1.56)	(0.56)	(-1.23)	(0.37)
Foreign Ownership Flow (t-2)	-0.1416	-0.0321	-0.1452	-0.0405	-0.1863	-0.0375
	(-1.08)	(-0.12)	(-1.11)	(-0.17)	(-1.50)	(-0.17)
REIT Volatility (t-1)	0.0252	0.1968	0.0383	0.0745	0.0469	0.0976
	(0.41)	(1.56)	(0.59)	(0.61)	(0.76)	(0.86)
REIT volatility (t-2)	-0.0609	0.3025 **	-0.0590	0.3446 ***	-0.0464	0.4705 ***
	(-0.98)	(2.40)	(-0.93)	(2.91)	(-0.73)	(4.08)
Dividend Yield Spread			-0.0007	0.0098 ***	-0.0014	0.0094 ***
			(-0.41)	(3.14)	(-0.72)	(2.72)
Treasury Bill Rate (3 month)			0.0006	0.0013	0.0005	0.0019
			(0.41)	(0.49)	(0.37)	(0.71)
HML					-0.0007 **	-0.0014 **
					(-2.06)	(-2.33)
SMB					0.0010 **	-0.0007
					(2.07)	(-0.80)
Return on Market					-0.0049	-0.0220
					(-0.17)	(-0.41)
Intercept	0.0028	0.0200 ***	0.0022	0.0087	0.0015	0.0053
	(0.76)	(2.69)	(0.42)	(0.88)	(0.28)	(0.54)
R-Squared	0.0651	0.1680	0.0750	0.3025	0.1771	0.4120

Note: Above equations estimated utilizing vector autoregression (VAR) in order to control for the endogenous relationship between return volatility and institutional investment flows. Bivariate model includes only the endogenous variables. Four Factor model includes endogenous variables as well as variables for interets rate and dividend yield. Seven factor model adds Fama French factors in addition to the four factor model. Significance at the 1%, 5% , and 10% level indicated by ***, **, and * respectively.

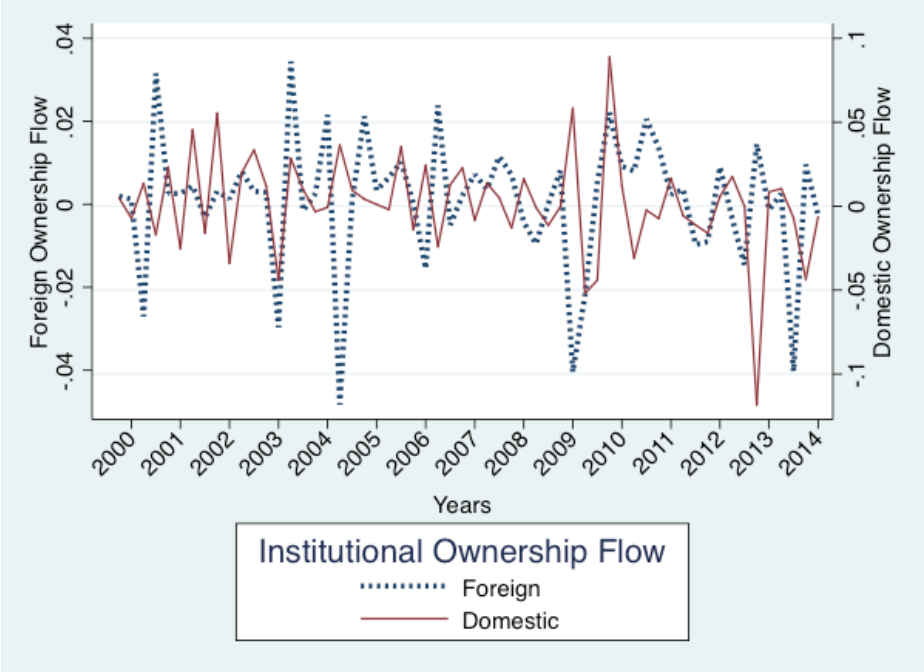

Figure 4.1: Institutional Ownership Flow - Foreign vs. Domestic

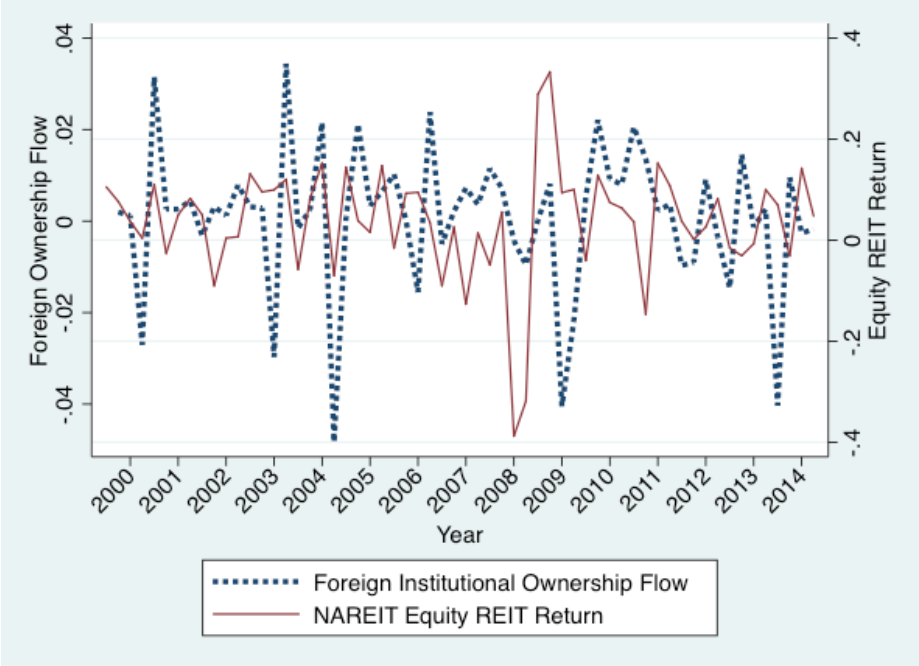

Figure 4.2: Foreign Ownership Flow vs. REIT Returns

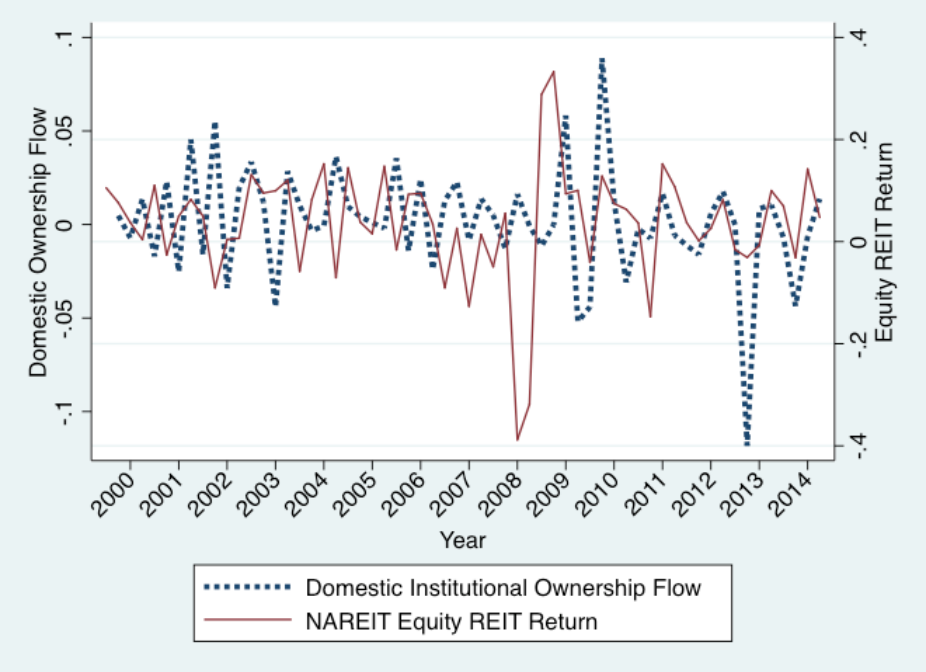

Figure 4.3: Domestic Ownership Flow vs. REIT Returns

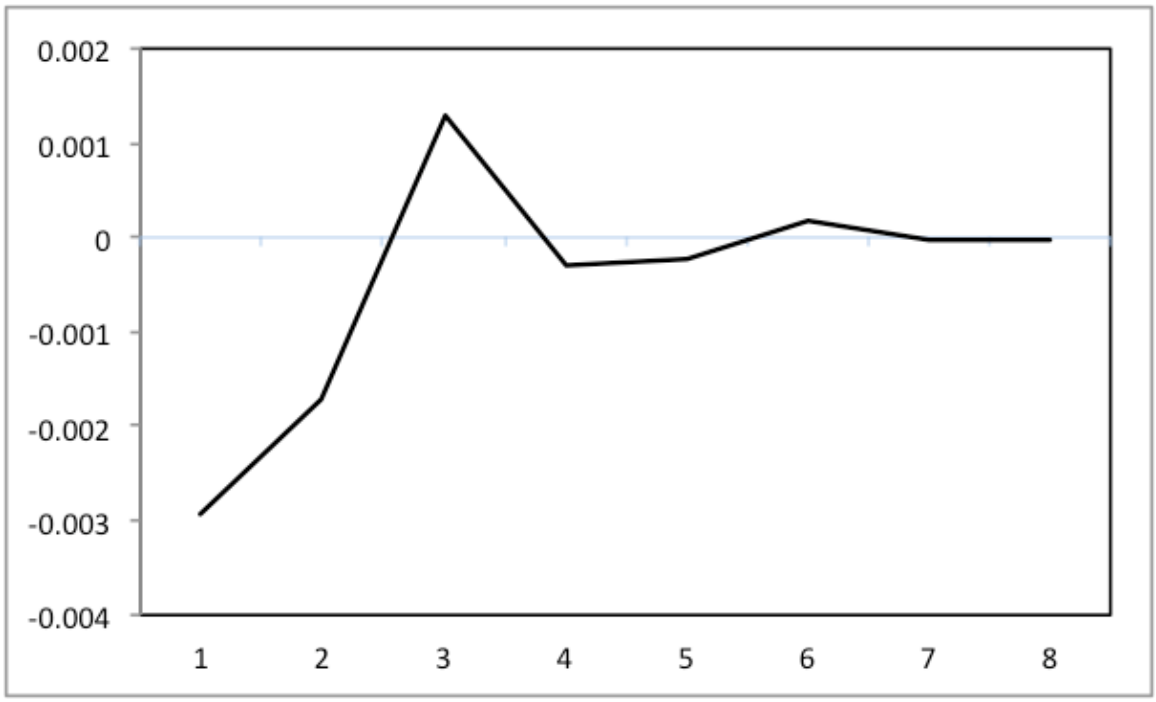

Figure 4.4a: Response of Foreign Ownership Flow to Foreign Ownership Flow

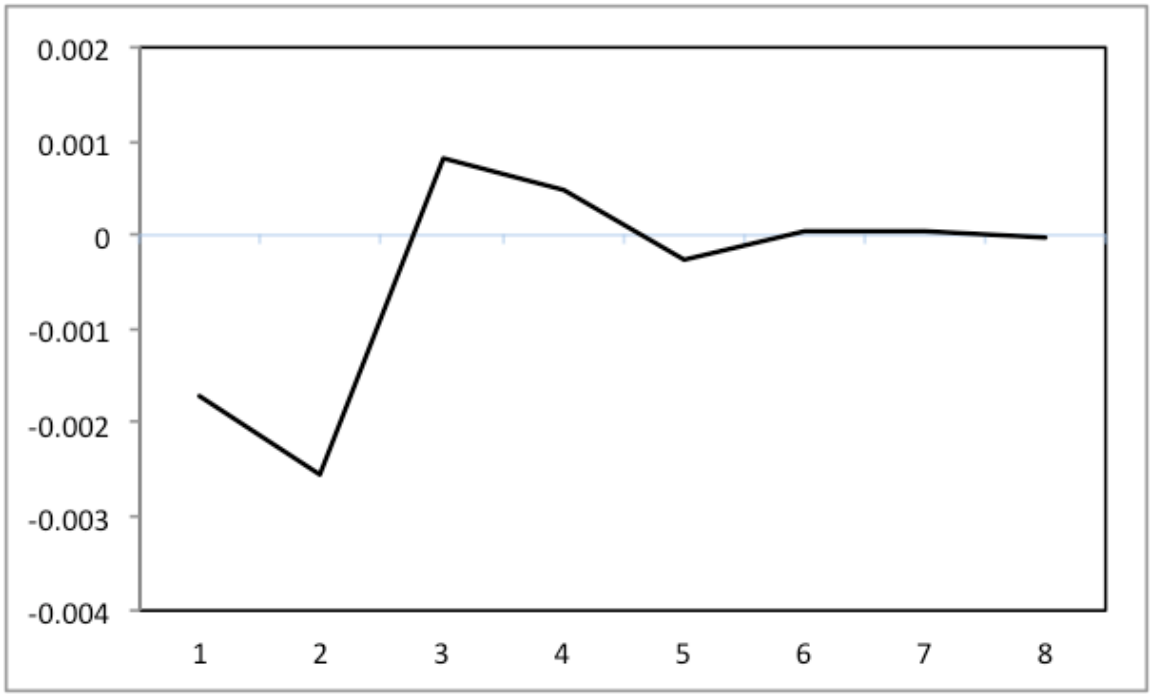

Figure 4.4b: Response of Foreign Ownership Flow to REIT Returns

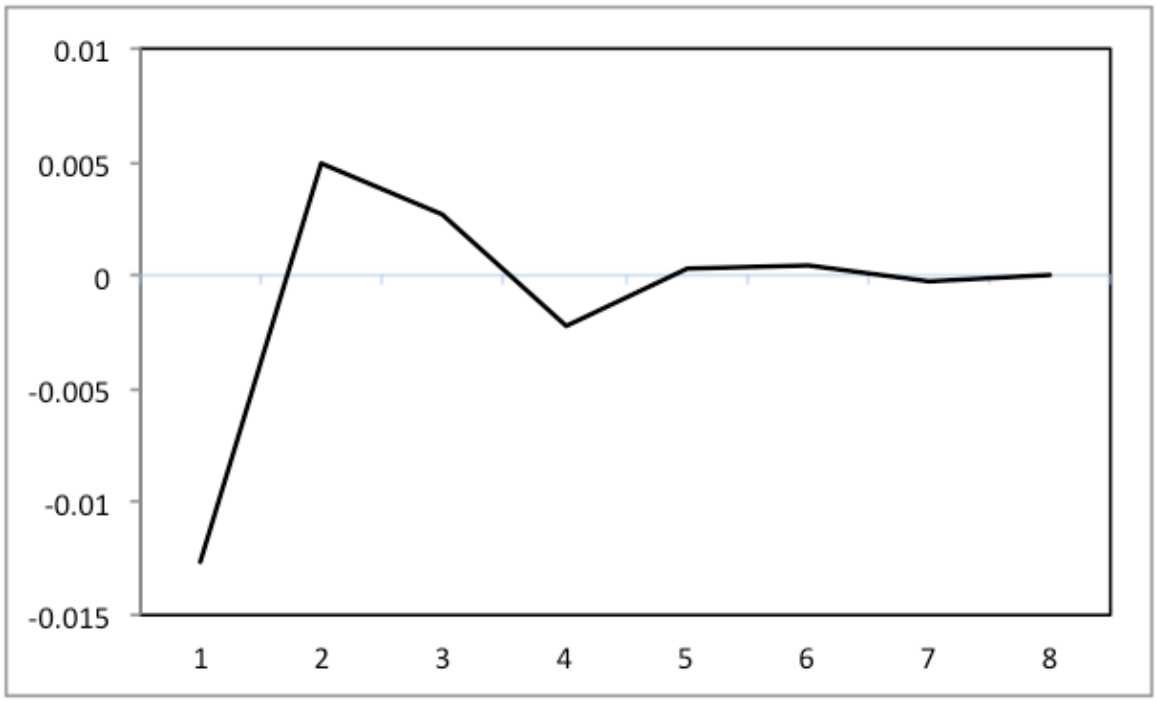

Figure 4.4c: Response of REIT Returns to Foreign Ownership Flow

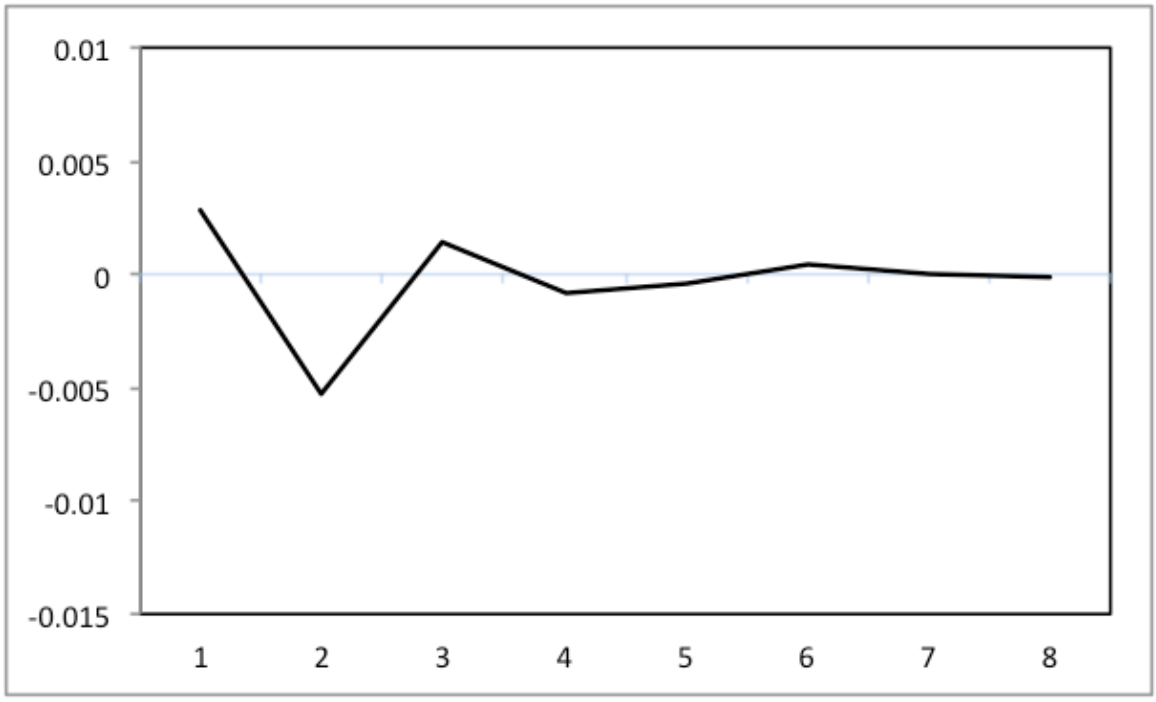

Figure 4.4d: Response of REIT Returns to REIT Returns

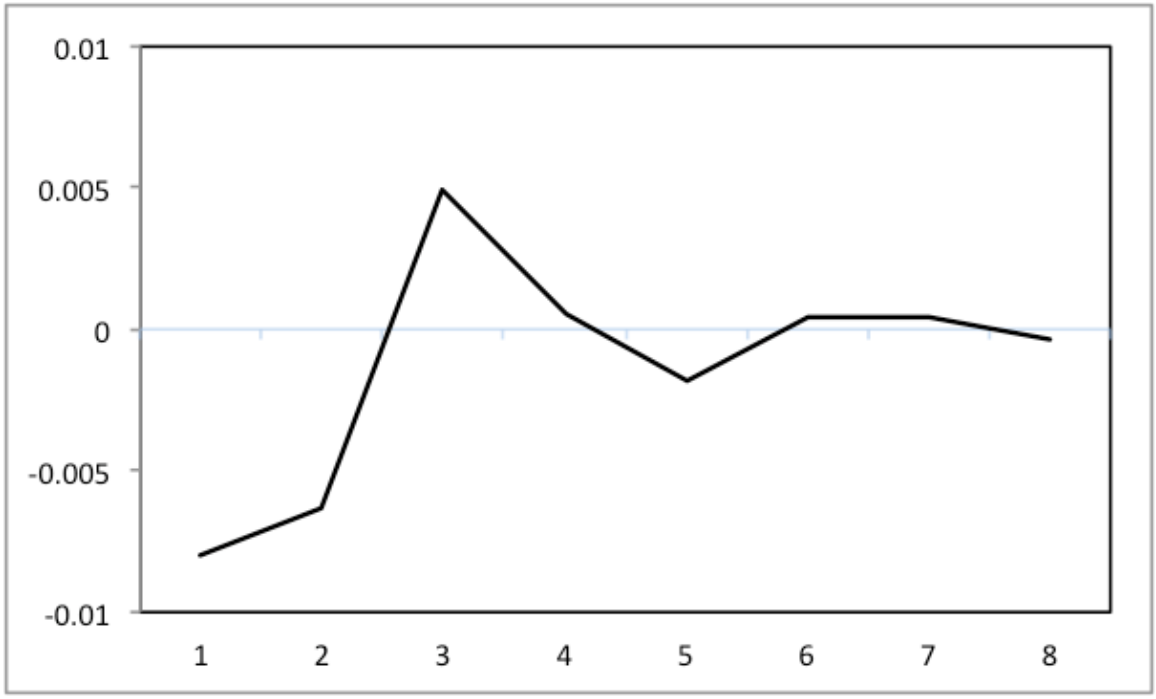

Figure 4.5a: Response of Domestic Ownership Flow to Domestic Ownership Flow

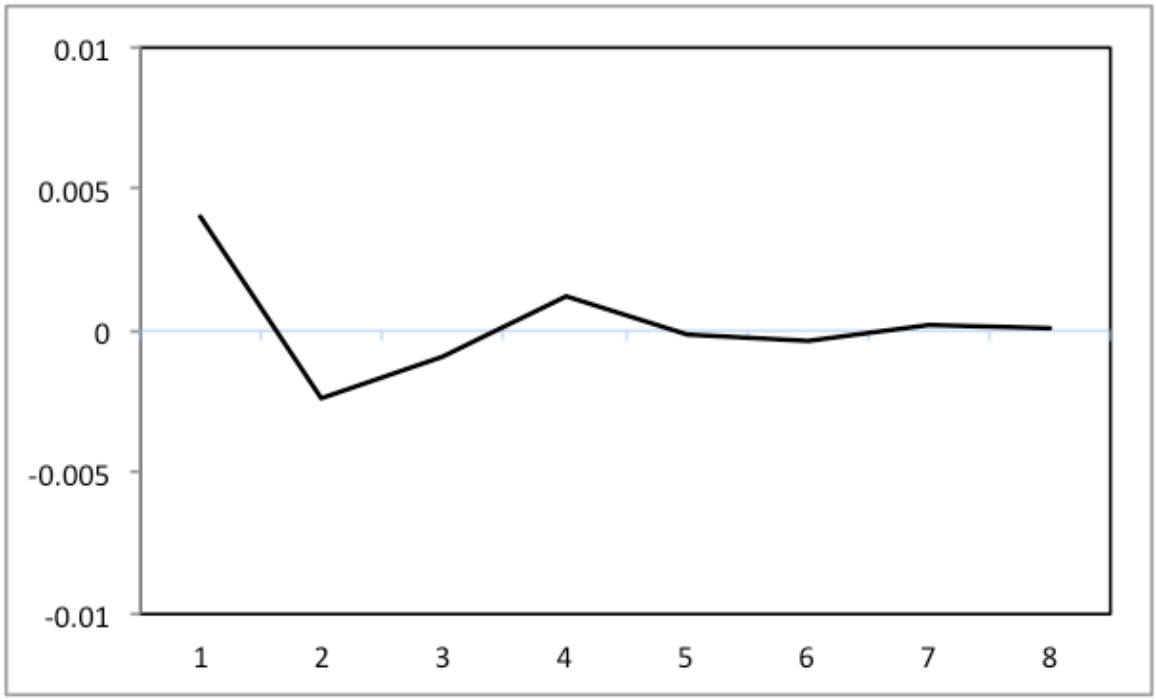

Figure 4.5b: Response of Domestic Ownership Flow to REIT Returns

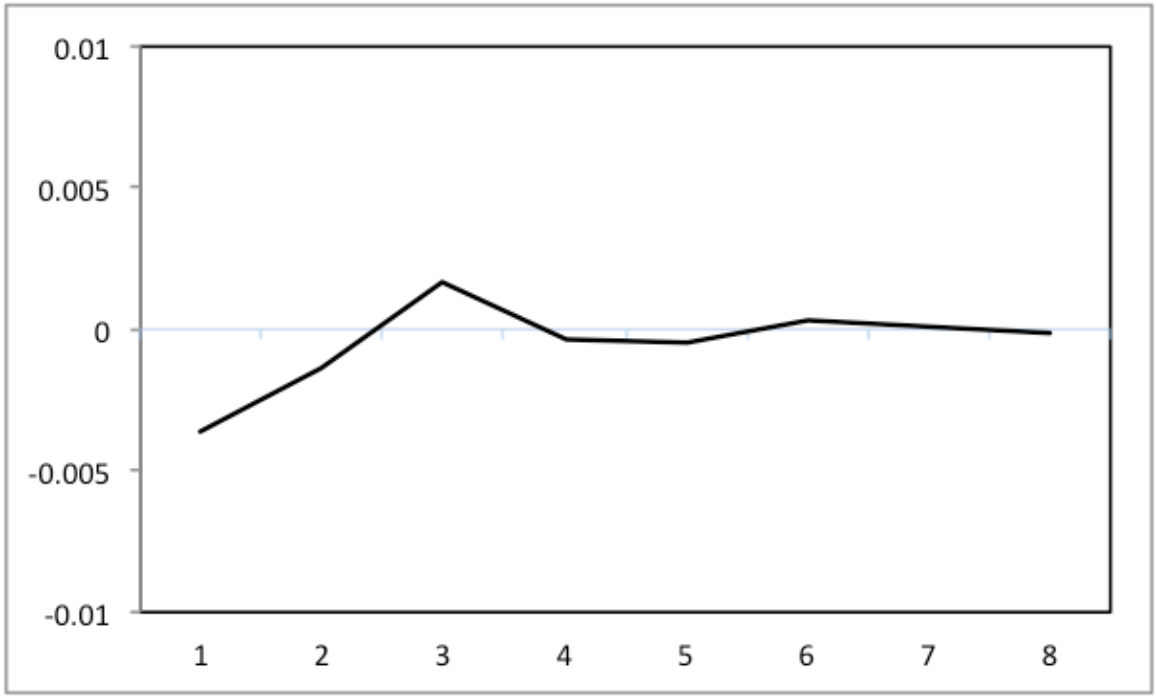

Figure 4.5c: Response of REIT Returns to Domestic Ownership Flow

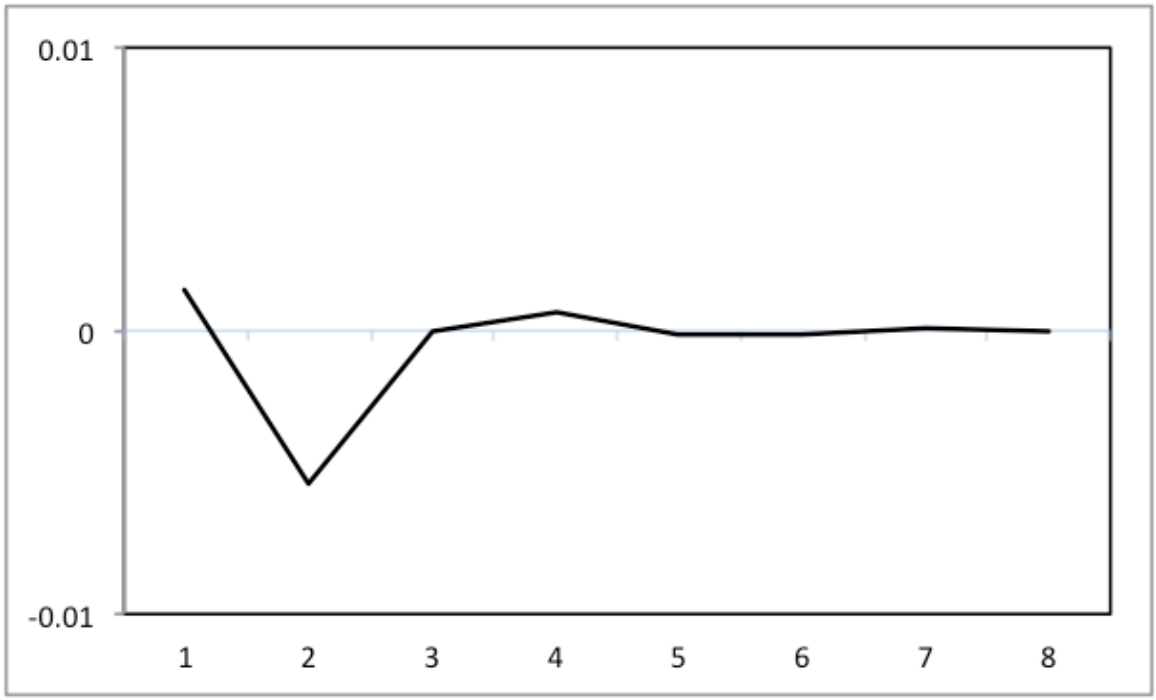

Figure 4.5d: Response of REIT Returns to REIT Returns

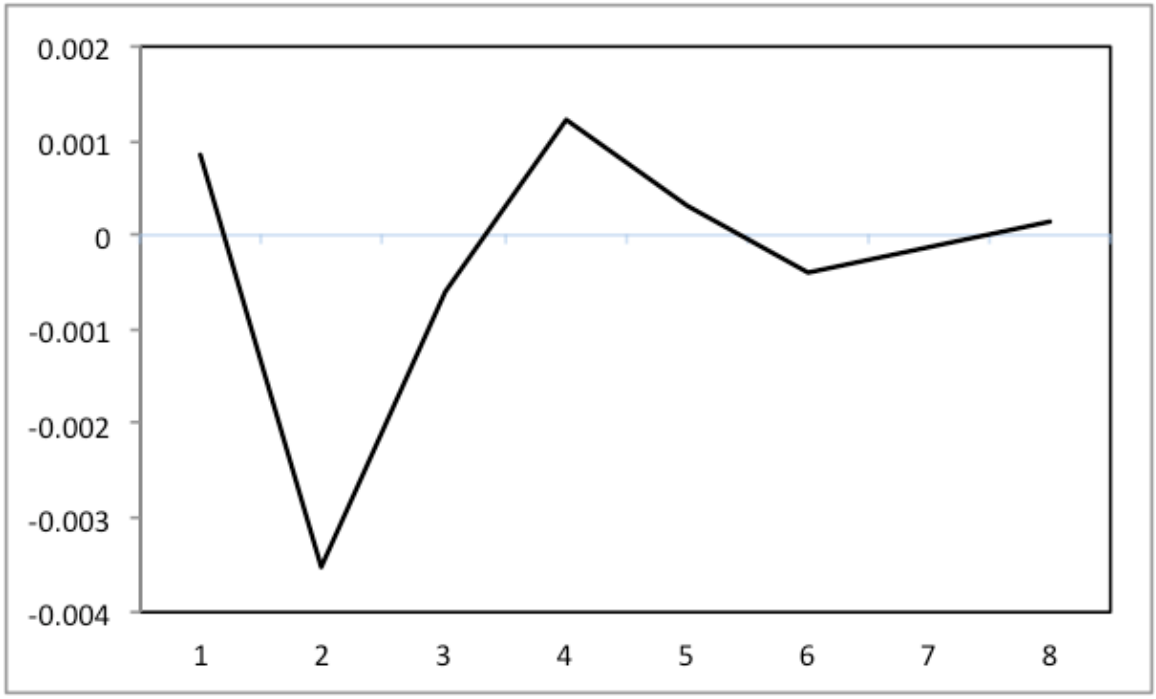

Figure 4.6a: Response of Foreign Ownership Flow to Foreign Ownership Flow

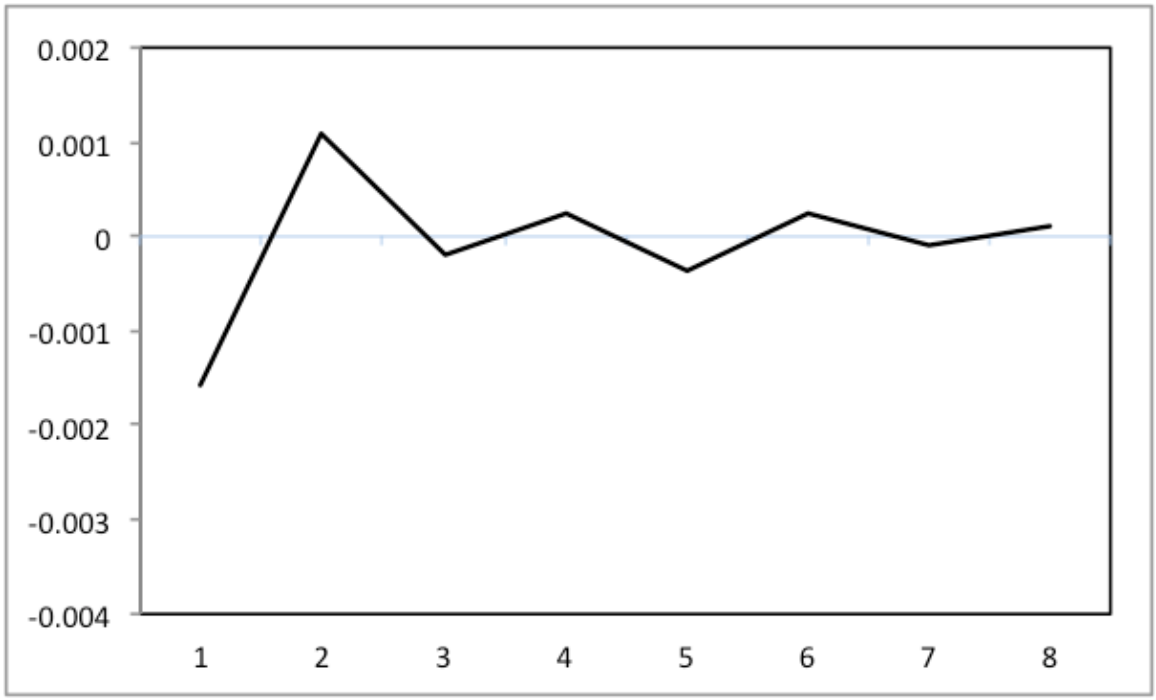

Figure 4.6b: Response of Foreign Ownership Flow to REIT Volatility

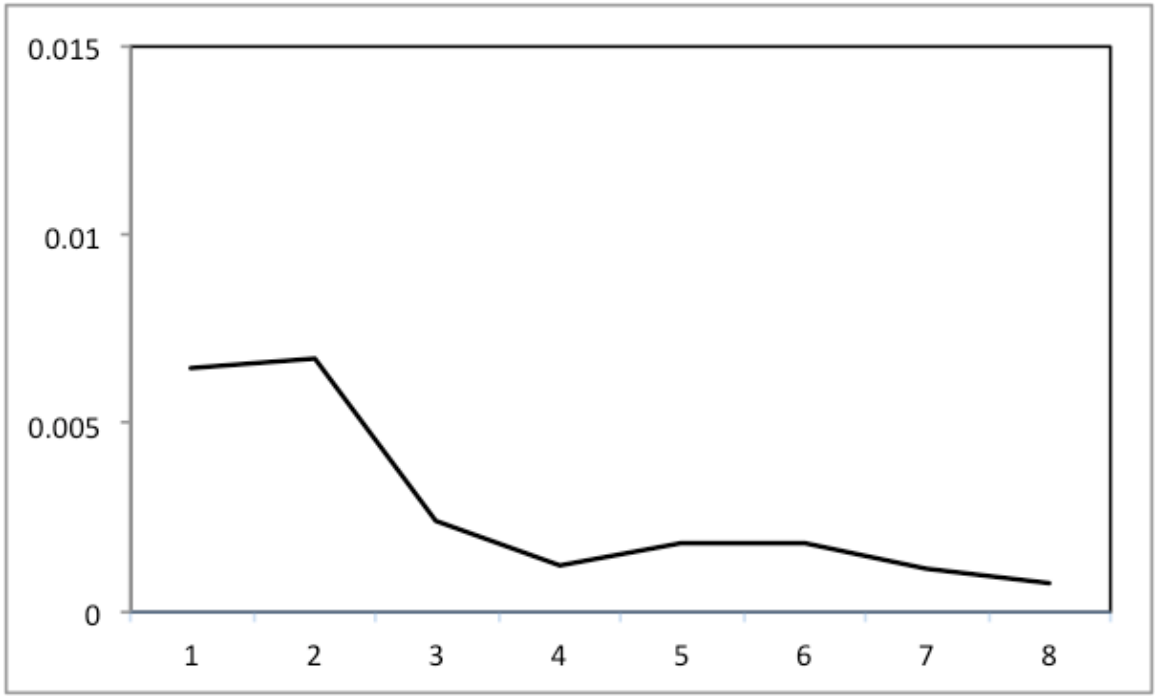

Figure 4.6c: Response of REIT Volatility to Foreign Ownership Flow

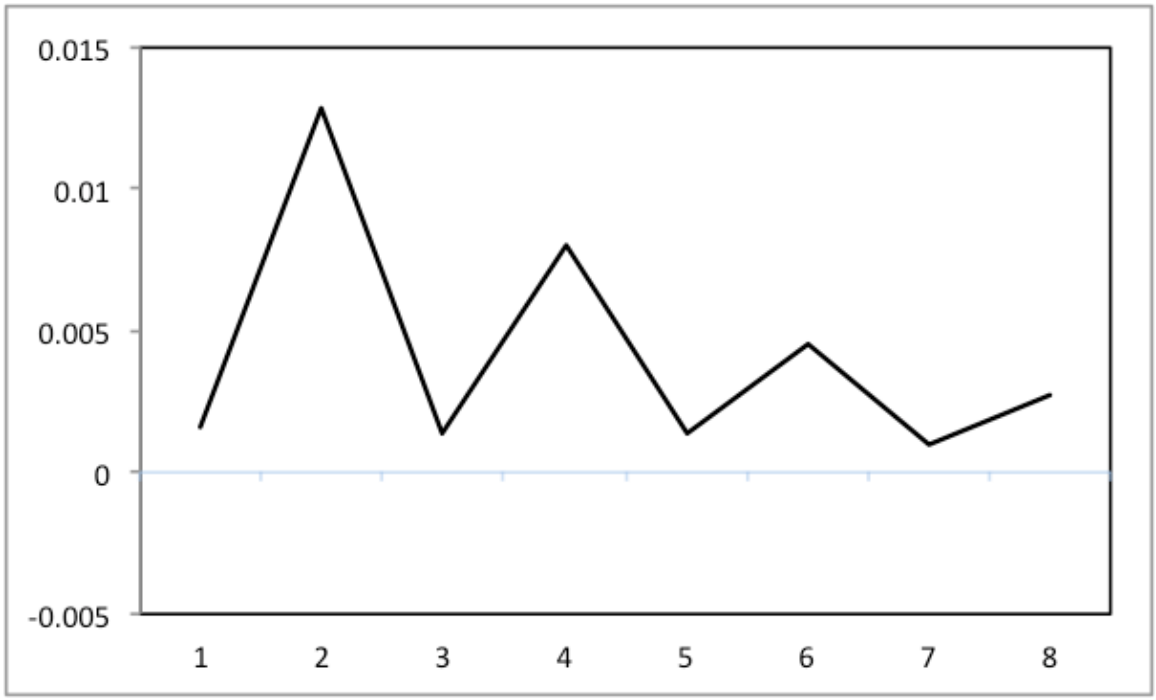

Figure 4.6d: Response of REIT Volatility to REIT Volatility

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