Real Estate Property Portfolio Risk: Evidence from REIT Portfolios

by

Thomas M. Springer
Professor of Finance and Real Estate
Clemson University
314 Sirrine Hall
Clemson, SC 29634
Email: springe@clemson.edu
Ph: 864-656-3746

and

Ping Cheng
Assistant Professor of Real Estate
Florida Atlantic University
777 Glades Road
Boca Raton, Fl 33431
Email: pcheng@fau.edu
Ph: 561-297-3456

Presented at the
Real Estate Research Institute
Annual Conference
Chicago, Illinois
April 27-28, 2006

Abstract

Because of abundant available information with which the market can price risk and return metrics, publicly-traded Real Estate Investment Trusts (REITs) offer a unique and convenient way to study the pricing of the risk associated with portfolios of real property. Using REIT data, we estimate individual models classified by the primary property type. The results reveal the degree to which real property portfolio risk factors, such as the degree of diversification (measured with Herfindahl indexes based on property sub-type and geography), portfolio obsolescence, and property-level projected demographic trends affect various measures of financial risk. Overall, the property diversification measures are influential in explaining risk, although their effect on risk varies by property type. The effects of portfolio age and demographic trend measures on risk and risk-adjusted returns vary considerably and are not consistent across property types. The models also test for the effects on risk and risk-adjusted returns of REIT operating, ownership and financial characteristics.

Investor Perception of Real Property Portfolio Risk: Evidence from REIT Portfolios

Real Estate Investment Trusts (REITs) offer many favorable attributes to investors seeking to hold a real estate investment portfolio. In addition to their enhanced liquidity, availability to smaller investors, and ready access to diversified property portfolios, publicly-traded REITs are highly transparent. In contrast to private and direct investment in real estate, there is abundant available information on publicly-traded REITs that the market can use to price their risk and return metrics. Because of this, publicly-traded REITs offer both a unique and convenient way to study real property portfolios.

The sources of REIT risk are diverse and inter-related. REIT risk can be viewed as the volatility of periodic returns. Using a market model, REIT risk can be decomposed into systematic risk and firm-specific risk. Research is mixed (Seiler, et al., 1999), but there is evidence that, in a modern portfolio theory (MPT) context (Markowitz, 1952), a separate and additional risk factor for real estate exists. Thus, the REIT investor is exposed to the risk of both the property market, because the REIT holds a portfolio of real estate investments, and the general risk of the equities market in which the shares trade.

In this study, we assess how real property portfolio risk is priced in the public real estate investment market. The results reveal the degree to which real property portfolio risk factors, such as the degree of diversification and portfolio obsolescence, affect various measures of financial risk and risk adjusted performance, namely return volatility, beta and Sharpe's index. Intuitively, the results will show how investors in the aggregate perceive the various risk factors. In turn, the results can then be used to implement financial decisions such as pricing (risk adjustments to discount rates) and portfolio rebalancing (see Liang and McIntosh, 1999).

This paper extends the research of Anderson and Springer (2005), who look specifically at retail properties, to assess the pricing of risk across the major property types, those being multi-family housing, retail, office, industrial, and hospitality properties. The next section provides a background from the literature. The following section describes the data and the method. Subsequent sections discuss the results, implications of the results and conclusions.

Background and a Review of the Literature

The risk of REITs and of real estate investments, in general, has been widely studied. Because investors can purchase part or all of a real estate portfolio through a variety of vehicles, the question of how performance metrics play a role in the investor's selection of investment mode becomes more intriguing.

An understanding of the risk premium in real estate has been a difficult subject. Furthermore, the relationship between risk and return in real estate is unstable and often counter-intuitive (Shilling, 2003). It is well established that real estate risk varies over time and across property types. It has been shown that, during the 1990's, REITs began to show a direct linkage to real estate returns, but the linkage is cyclical (Clayton and MacKinnon, 2001). Clayton and MacKinnon (2001) further demonstrate the time-varying nature of REIT volatility and betas. At the same time, Chiang, Lee and Wisen (2005) find that, when using a 3-factor model, the REIT industry beta has remained relatively stable over time, specifically 1972 through 2002. Goldstein and Nelling (1999) find that REITs tend to relate more directly with the general stock market in falling markets. Litt et al. (1999) break down the risk premium of individual REITs and show firm-specific risk ranging from 2% to 9% for individual REITs.

Many studies look at the relationship between REIT returns and returns from private real estate (NCREIF index). Pagliari et al. (2005) find that after adjusting for leverage, appraisal smoothing and property mix, the differences between the two return series essentially disappear. Riddiough et al, (2005) adjust the return indices for leverage, asset mix and fees and find that a gap still exists between the public and private return series. Both studies are trying to explain differences in risk and returns arising from the real estate holdings and the type of vehicle in which the real estate is held. The implication of these studies is that in the short run, REIT returns are more similar to common stock returns, whereas in the long run and after adjustments are made, REITs behave more like private real estate. Clearly, there is much more to be learned about REIT risk. This study attempts to substantiate more details in the relationship between the property holdings of REITs and their overall risk.

A primary goal of this study is a better understanding of the risk effects of real estate portfolio diversification. A real estate portfolio can be diversified in many ways. Most commonly, analysts look at the geographic distribution of the properties and the property type distribution across the "primary" property types. Geographic distribution can be viewed simply as geo-spatial, such as using the regional classifications of the National Council of Real Estate Investment Fiduciaries (NCREIF), or in a more sophisticated economic-based geographic distribution which groups properties into similar economic regions (see Seiler et al., 1999, for a summary). Research has shown the economics-based methods to be generally superior than using just geography. Real property portfolios can also be diverse across age, size, urban/suburban breakdown and demographic classifications.

Generally, for REITs, diversification across the primary property types has not been found to be positively valued by investors. Rather, when considering primary property types

(office, retail, industrial, etc.), investors seem to prefer a focusing strategy (see Capozza and Lee, 2001; Bers and Springer, 1998; Lewis, Springer and Anderson, 2003). A recent study (Anderson and Springer, 2005) on REIT-held retail property portfolios has shown that the volatility of returns on a retail portfolio increases with diversification across the retail property sub-types (shopping centers, malls, single tenant properties, power centers, outlet centers). Thus, for retail real estate, research shows that investors, seeking to reduce risk, value a focusing strategy not only at the aggregate level, but also at a property sub-type level. For REITs in general, diversifying properties by geography has been shown to yield distinct risk reduction benefits. Thus, research generally shows that investors value a diversifying strategy for geography but prefer a focusing strategy on primary property types. However, property sub-type diversification (or diversifying within a primary property type, rather than across the primary property types) has not been assessed across all of the major property types.

The age of a property portfolio and its demographic characteristics may also affect the magnitude of the risk of a real property portfolio. As properties age, they not only face higher costs associated with maintenance and upkeep, but also a higher probability of obsolescence. Demographically, a real estate portfolio will contain properties located in areas having different population, income, employment and cultural characteristics which may give rise to different risk and return expectations.

Data and Methods

Two data sources are used for this study. First is the SNL REIT Datasource which provides current and historical information on both REITs and on the properties held by individual REITs. From the SNL database, we download specific information on REIT-held

properties, as well as data on the ownership, managerial, and financial characteristics of the REIT. The following property-level characteristics are of most interest: property size, property type, property location (including demographics), and property age. The second data source is the CRSP (Center for the Research of Security Prices) data base. From the CRSP files, we access return data for the subject REITs, as well as market index data.

The final sample drawn from the SNL properties database, current as of January, 2004, yields data on 25,935 individual properties held by 210 REITs. Table 1 summarizes the data on individual properties across the primary property types. Retail properties are most numerous with 6845 properties held by 80 different REITs. Of the property types, the largest number of REITs (161) invest in specialty properties, primarily raw land, restaurants and car dealerships, but also timber, racetracks, cineplexes, parking lots and health clubs, among others. Office properties are held by 107 REITs even though only 32 REITs focus on office property investment. Many REITs own a nominal amount of office property primarily for their own use. By specialization, the largest frequency of REITs are classified as retail (N=42 REITs), followed by hotel (N=34), diversified REITs (N=33), office (N=32), and industrial (N=11).

From the data, we construct variables that may influence the riskiness of a REIT's property portfolio. Constructed variables of this nature include diversification, property age and demographic trend measures.

Diversification Measures: Of primary interest in this study are the diversification/focus metrics. The Herfindahl index (see Capozza and Seguin, 1999) is a standard measure of diversification and basically a weighted average of the components used for diversification. In our case, we are interested in diversification by property type and by geographic location. From

the individual property data, we construct two Herfindahl indexes. The first is based on the sub-types of property held by the REIT and is computed as

$$\textit{Property Type Herfindahl Index} = \Sigma P_i^2, \quad (1)$$

where P_i is the proportion of the property portfolio invested in property sub-type *i*. Each primary property type has a corresponding Herfindahl index computed from the property sub-types (see Panel B of Table 2). The second Herfindahl index is based on the geographic location of the REIT-held properties and is calculated as

$$\textit{Geographic Herfindahl Index} = \Sigma G_i^2, \quad (2)$$

where G_i is the proportion of the portfolio invested in geographic region *i*, where the geographic regions are those specified by the National Council of Real Estate Investment Fiduciaries (NCREIF) as follows: Northeast, Southwest, East-North-Central, Mideast, West-North-Central, Southeast, Pacific, Mountain and Foreign (International). Values of the Herfindahl Index range from 0 to 1. High values of the index indicate focus, or heavy concentration of investment. Lower values suggest greater diversification.

For retail, office, and industrial properties, the investment percentages are calculated using the square footage of the individual properties. For multi-family REITs, the number of apartment units is used. For hospitality properties, the number of rooms per property is used. The construction of the Herfindahl indexes presented several obstacles. Foremost was the presence of missing observations, namely square footage, number of beds, number of rooms, etc.

When possible, we used an average property as a proxy for missing information.[1] Table 2, Panel A, shows the geographic breadth of REIT-held properties.

The distribution of property sub-types is observed in Panel B of Table 2. Panel B-1 shows the healthcare sector to be dominated by Assisted Living Facilities (ALFs). Panel B-2 shows that the hospitality sector is mostly invested in full service or limited service hotels. Industrial properties (Panel B-3) consist mostly of warehouses and general industrial properties. As shown in Panel B-4, over 87% of offices are classified merely as offices. To circumvent a potential problem with the Herfindahl indexes, that being a disproportionate amount of generic "office buildings," we disaggregate this category by size. The dominant size ranges are buildings with less than 50,000 square feet and those with a square footage between 100,000 and 200,000. The most popular category of shopping center (Panel B-5) is shopping center, aka. strip center. Apartments (Panel B-6) are delineated by size. The most common size of REIT-held apartment complex is between 100 and 200 units.

Based on the summary information in Table 2, Panels A and B, we calculate Herfindahl indexes assuming that all properties receive equal weight. These estimates are tabulated in Table 3. By geography, the entire portfolio of REIT-held properties has an index value of 13.1%. By property type, the entire portfolio of REIT-held properties has an index value of 19.5%. Geographically, each region has roughly the same level of property type diversification ($18.7\% < HI < 23.0\%$), except the West-North region which is noticeably less diversified by property type ($HI = 30.1\%$). By property type, the geographic diversity of the portfolio is relatively consistent with values ranging from 12.6% (Hospitality) to 16.8% (Office).

[1] For comparison purposes, in light of the treatment of missing values, we also compute the indexes with every property receiving equal weight. The index values computed using square footage, rooms or apartments proved superior and were ultimately used in estimating the model.

Obsolescence Measures: Another risk factor is the age of the property portfolio. We look at the obsolescence risk of a REIT's property portfolio by looking at variables describing the relative age of the property portfolio and the impacts of renovations on individual properties. A previous study (Anderson and Springer, 2005) on retail properties held by REITs, used a weighted average effective age measure to estimate the aging of the property portfolio. The results associated with these variables were weak and probably a consequence of an abundance of missing observations. As an alternative approach, we choose to construct variables using the percentage of properties in the portfolio having an age or an effective age of either less than 5 years or more than ten years. A property's age is calculated using the date given for being built. The estimated effective age is the lesser of a property's age or the number of years since the property was renovated. Missing observations are excluded. Panel C of Table 2 profiles the age and approximate effective age characteristics of REIT-held properties. The difference between age and effective age is a reflection of the degree of renovation within a property type. This difference is most evident in the hospitality sector, followed closely by the retail sector. The differential is least evident in the healthcare and industrial sectors.

Market Demographics: A REIT's investment strategy may specify the demographic attributes for target markets within which to acquire property.[2] The REIT may have an investment preference for either large or small markets, markets with either high or low population growth, or markets with either high or low income growth. Panel D of Table 2 displays REIT-held properties by certain market demographics. Large markets are those with an MSA population (2004 estimate) of over 2 million. High income markets are those MSAs with estimated household incomes (2004) exceeding $60,000. High population growth markets are

[2] For each REIT property, the forecast demographic data are from the SNL database at the property's MSA level.

those expecting population growth exceeding 7.0% from 2004-2009, whereas low population growth markets expect less than 2% growth over the same period. High income growth markets are those expecting at least 12.5% growth in median household income from 2004-2009, and low income growth markets expect less than 0.1% growth over the same period. The panels, by frequency and percentage, demonstrate the tendency for REITs to hold property in major markets with higher demographic growth expectations.

Other factors: Other factors may affect the risk level or the risk-adjusted performance of a REIT or it's real estate portfolio. The type of management, whether a REIT is self-managed or managed by a third party, may affect the REIT's performance. Both self-management and external management can expose a REIT to agency problems which may diminish the REIT's performance. Sagalyn (1996) identifies several sources of agency problems resulting from internal management. At the same time, self management has been shown to lead to increased efficiency, but to have no effect on REIT performance. With the potential cost saving aspects of self management come potential agency problems. Another factor affecting risk is leases. Net leased REITs invest primarily in net leased properties. Thus, a significant portion of the risk associated with operating expenses is transferred from owner to tenant.

Several operating, ownership and financial variables are included in the models partly to control for other sources of risk as we attempt to isolate the property-level real estate risk factors, and partly to assess their influence on the overall risk of the REIT. The degree of ownership by REIT insiders or by institutional investors may be associated with the level of risk. A high level of insider ownership may reveal the risk preferences of REIT management. In the same fashion, the level of institutional ownership may reveal the risk preferences of the institutional investors. Operating and financial factors, such as leverage, the debt structure, the ratio of the REIT's book

value to its market value and the REIT's price-to-FFO ratio may also affect the level of risk. Finally, the size of the REIT has been found to affect its risk and risk-adjusted returns.

The Risk Assessment Model: Using standard linear (OLS) regression techniques, we test several specifications of the following two general models:

$$Risk_i = f\ (risk\ factors,\ portfolio\ characteristics,\ demographic\ trends) \quad (3)$$

and

$$Sharpe's\ Index_i = f\ (risk\ factors,\ portfolio\ characteristics,\ demographic\ trends) \quad (4)$$

The dependent variable is specified as one of several alternative market-driven risk and performance measures. Specifications for $Risk_i$ use the REIT's return volatility measured as the variance or the standard deviation of the CRSP daily or monthly returns. Another specification for $Risk_i$ is the REIT's beta, with the value-weighted CRSP index as the market proxy. The REIT's Sharpe's Index is defined as $[(R_i - r) / \sigma_i]$, where R_i is the average historical rate of return on a portfolio, r is the risk-free rate, and σ_i is the standard deviation of returns on the portfolio (see Levi, 1996). The independent variables include risk factors, such as portfolio concentration indexes and portfolio age measures, and portfolio-specific demographic trend measures. Besides the risk variables discussed above (Herfindahl inexes, age and demographic trend measures), other property and REIT characteristics are included in the models to control for other factors that may affect risk and risk-adjusted performance. Table 4 provides the definitions of the variables used in this study.[3]

By estimating the model using standard regression techniques and controlling for various diagnostic problems, we derive estimates of each variable's effect on risk and whether the risk

[3] One drawback to the measurement of the data that limits the generalization of the results is that the independent variables are computed as of year-end 2003, while the dependent variables are measured over a multi-year time period. It would be highly coincidental if the in dependent variables were invariant across the time period over which returns are measured.

factor is significant. We expect some risk factors are not priced by the market, that is, they are insignificant because the level of information is not assessed by the typical investor. For example, analysts may or may not consider portfolio age or demographic trends to the extent that we did. Also, most investors probably do not have access to this detail of information. On the other hand, we expect to find that other risk factors do matter. Previous research has shown that within REITs, property type focus is a positive attribute and geographic diversification reduces risk. Generally, we expect the strongest property-level results to be associated with diversification measures and a market presence in stronger local economies.

Results

Using 4 years of daily returns to calculate the risk measures, three models are estimated: one for total risk, one for systematic risk and one for risk-adjusted returns.[4] The results for the models are shown in Table 6. For the independent variables, all variables that are not dummy variables are modeled in the logarithmic form.[5]

Total Risk

We measure total risk, or volatility, using the standard deviation of the daily returns. Specifically, we use the log of the standard deviation as the dependent variable.[6]

---

[4] For comparison purposes, two sets of models were estimated. The results for the first set of models, for which the risk measures are calculated using daily returns over 4 years, are shown in Table 6. The results for the second set of models, for which the risk measures are calculated using daily returns over 10 years, are shown in Table A-1. Although the magnitude of the estimated coefficients vary between the short-term and the long-term models, the results are consistent.

[5] For all variables, only the nonzero values were logged with zeroes being left as zeroes. Thus, the variables had a value of zero or the logged value of the variable. An additional variable was included to identify REITs for which the return series was not complete. For the individual models, REITs having a relative portfolio size of less than 10% of the category average were excluded. Thus, REITs having a nominal investment in a property type were excluded from the analysis.

[6] To test for sensitivity between specifications, the variance and the unlogged standard deviation of daily returns were also used. The significance and magnitude of the estimated coefficients vary considerably across the various

For apartment portfolios, shown in Panel 1 of Table 6, the total risk model is significant at better than a 0.01 level. The models adjusted R^2 of 0.90 is the highest of the total risk models, indicating that apartment portfolio total risk is more predictable by the model than the total risk for any of the other primary property types. The results show evidence that total risk is reduced as the level of diversification across apartment sub-types increases and as the size of the apartment portfolio increases. Similarly, the results show that total risk increases with increasing levels of geographic diversification and as the percentage of the properties in the apartment portfolio located in areas with expectations of higher income growth. Total risk also increases with the percentage of older apartment properties held in the portfolio. At a lower level of significance (5%), the results show that the total risk associated with apartment portfolios increases with increases in the percentage of properties located in areas of low expected population growth. Also, the total risk of apartment portfolios decreases when the REIT holding the portfolio manages its own properties. None of the operating, ownership or financial variables have significant coefficients.

For industrial portfolios (Panel 2 of Table 6), the total risk model is statistically insignificant with an adjusted R^2 of 0.38. The results show, at a significance level of 5%, that the total risk associated with industrial property portfolios decreases with increasing levels of diversification by industrial property sub-type. The coefficient for the percentage of institutional ownership is also significant (at a 1% level) suggesting that total risk decreases as the level of institutional ownership increases. Also, the results show total risk to be higher for self-managed REITs holding industrial properties. None of the coefficients for the demographic, age, operating and financial factors are significant.

---

models. It is quickly seen that the choice of risk measure matters. Based on the magnitude of the model's F-statistic and the R^2, for four of the five property types, the log of the standard deviation measured with four years of daily

The results for REIT office portfolios are shown in Panel 3 of Table 6. The total risk model is significant at better than a 1% level and has an adjusted R^2 of 0.75. The results show that total risk decreases as institutional ownership increases, as the debt-to-equity ratio increases and as the ratio of book value to market value increases. Total risk decreases as total market capitalization increases. Notably, the office property total risk model is the only total risk model in which only the non-property-specific risk factors are influential in explaining the variations in risk. That is, for this model of office property risk, total risk is not explained by property portfolio effects, but only by operating, ownership and financial factors of the REIT.

The total risk model for retail portfolios (shown in Panel 4 of Table 6) is significant at the 0.01 level with an adjusted R^2 of 0.68. The results suggest that total risk is reduced as the levels of both retail sub-type diversification and geographic diversification increase. Results from prior research (Anderson et. al, 2005) on REIT retail portfolios are similar for property sub-type diversification, but show the opposite effect for geographic diversification. This contradiction in results suggests the coefficient may be somewhat unstable over time and, perhaps, prone to differences in model specification. Also, whereas the result for the relative size variable is insignificant in the retail total risk model, the Anderson and Springer (2005) paper shows total risk decreasing as the relative size of the retail portfolio increases. The results also show that retail total risk increases with increasing levels of both insider and institutional holdings. Finally, the results show total retail portfolio risk decreasing when more of the portfolio is located in large markets. In the Anderson and Springer (2005) paper, total risk was shown to be less for net-leased and self-managed REITs holding retail property. In this study, both of the corresponding coefficients are insignificant. Also, none of the operating and financial risk factors have significant coefficients.

---

returns proved to be the superior total risk model.

Finally, for REIT hotel portfolios (shown in Panel 5 of Table 6), the total risk model is statistically insignificant and has an adjusted R^2 of 0.40. Only the coefficient for the percentage of properties in the hotel portfolio located in areas of high expected population growth is significant (at 5%). The results show that the total risk for the hotel portfolio decreases as the percentage of the portfolio located in areas of high expected population growth increases.

Systematic Risk

Measuring systematic risk as the REIT's beta, models were estimated for each of the primary property types. It is noted that as the correlation of the individual REIT's returns with the market return approaches unity, the more similar will be the results of the beta (systematic risk) model in comparison to the results of the total risk model.

The systematic risk model for REIT apartment portfolios (Panel 1 of Table 6) is statistically significant and has an adjusted R^2 of 0.67 . The results suggest that the systematic risk associated with REITs holding apartments in their portfolio increases as geographic diversification increases, with increasing institutional ownership and with portfolios holding higher percentages of older properties. Also, beta decreases as the size of the property portfolio decreases. None of the coefficients for the operating and financial factors are significant.

For industrial portfolios, shown in Panel 2 of Table 6, the systematic risk model is significant with an adjusted R^2 of 0.52. The results show that the systematic risk of REITs holding industrial portfolios increases with decreasing diversification across geographic regions, with increasing institutional ownership, with decreasing insider ownership, and with lower percentages of the portfolio located in large MSAs. No operating or financial factors have significant coefficients.

For REIT office portfolios (Panel 3 of Table 6), the systematic risk model is significant and has an adjusted R^2 of 0.47. The results show that systematic risk increases with decreasing diversification across geographic regions, with increasing portfolio size, and with decreasing insider ownership. Additionally, the results suggest that systematic risk decreases if a REIT investing in office properties concentrates on net-leased properties or is self-managed. Beta decreases with larger market capitalizations and as the book-to-market value ratio increases. The results also show beta increasing when REITs hold more office space where population growth is expected to be higher. Thus, unlike the total risk model, many of the property portfolio factors seem to influence the variability of beta across REITs holding office property portfolios.

The models of systematic risk for REIT retail portfolios (Panel 4 of Table 6) is significant and has an R^2 of 0.45. The results show that systematic risk increases with increasing diversification both across geographic regions and across property sub-types. Beta is also shown to increase as both institutional and insider ownership increase and to decrease for self-managed REITs holding retail properties. No age, operating or financial variables have significant coefficients.

Finally, for hotel portfolios (Panel 5 of Table 6), the model of systematic risk is significant with an adjusted R^2 of 0.62. The results show that systematic risk increases with self-managed REITs and with net-leased REITs. Beta is also shown to increase as the debt-to-equity ratio increases. No property-specific variables had a significant coefficient.

Risk-Adjusted Returns

Risk-adjusted returns are modeled using the REIT's Sharpe's ratio calculated using daily returns measured over four years. As shown below, the office and industrial models have the best results. The remaining three models are not overly revealing.

Previous research on risk-adjusted returns of REITs (Redman and Manakayem, 1995) found only one variable, the size of the REIT, that significantly explained risk-adjusted REIT returns. The overall model was significant. Thus, all of their specified variables jointly explained risk-adjusted returns, but only the single variable had an individual relationship. An additional model found that risk-adjusted returns were higher for REITs holding healthcare properties, with properties on the West coast and holding mortgage securities. This research was done before the so-called "New REIT Era," which began around 1992, but does indicate a paucity of results that explain REIT risk-adjusted returns.

The apartment portfolio model for risk-adjusted returns is not statistically significant and has an adjusted R^2 of 0.22. The results, shown in Panel 1 of Table 6, suggest that risk-adjusted returns decrease as the percentage of the REIT's apartment portfolio located in large MSAs increases. All other coefficients are not significant.

The model for REIT industrial portfolios is significant with an adjusted R^2 of 0.58. The results (Panel 2 of Table 6) show that risk-adjusted returns for REITs holding industrial properties increase with decreasing diversification across geographic regions, with larger portfolios, for net-leased REITs, with increasing institutional ownership, and with higher percentages of the portfolio located in MSAs where low population growth is expected. Risk-adjusted returns are also shown to increase when a portfolio consists of a high percentage of properties in high income markets and for higher levels of institutional ownership.. Risk-adjusted returns are also shown to increase with increasing property sub-type diversification and when the portfolio holds fewer older properties.

The model for REIT office portfolios has an adjusted R^2 of 0.52. For office portfolios (Panel 3 of Table 6), the results suggest that risk-adjusted returns increase with increasing

diversification across both geographic regions and property sub-types, when the REIT holds more properties in MSAs having expectations of higher income growth, and when the REIT has a higher percentage of properties located in higher income areas. Risk-adjusted returns also increase for net-lease REITs and decrease when the REIT holds more office property in MSAs with either lower or higher expected population growth. For the same model, risk-adjusted returns decrease with increasing debt-to-equity ratios and book-to-market ratios. Also, risk-adjusted returns increase with increasing market capitalization.

The retail risk-adjusted return model is significant, but has no variables with a significant coefficient. The hospitality property risk-adjusted return model is insignificant. However, the results show that risk-adjusted returns increase when the property portfolio has more properties with an effective age less than 5 years and decrease as the REIT's debt-to-equity ratio increases.

Risk and Diversification

The various models show mixed results for the two diversification metrics. Total risk decreases with more property sub-type diversification for REIT apartment, industrial and retail portfolios and with more geographic diversification for retail portfolios. Total risk decreases with more of a regional focus for apartment portfolios. For offices and hotels, both diversification metrics are insignificant.

More diversification across geography is shown to decrease systematic risk for REIT industrial portfolios, but to increase systematic risk for apartments, hotels and retail portfolios. The results also show that more diversification across property sub-types increases systematic risk for retail portfolios, but has no effect on systematic risk for any other property type. Again, for hospitality properties, neither diversification metric has a significant coefficient.

Finally, the models show that, for industrial and office property portfolios, risk-adjusted returns increase with more diversification across property sub-types. However, the results suggest that geographic diversification of the two property types has opposing effects. For office portfolios, geographic diversification increases risk adjusted returns, but, for industrial portfolios, geographic diversification decreases risk adjusted returns. Risk-adjusted returns are unaffected by both measures of diversification for apartment, retail and hospitality portfolios.

Panel 1 of Table 7 shows the diversification strategy implied from the model results. For REIT apartment portfolios, the models show that diversifying across property sub-types reduces total risk, but has no impact on betas or risk-adjusted returns. A focusing strategy geographically reduces total risk and beta, but has no impact on returns. For apartments, the basis of diversification was the size of the complex. Given any correlation between complex size and population density, the property sub-type diversification measure may actually proxy for urban/suburban diversification or some other micro-geographical diversification. This may also be true for office portfolios as well. For offices, diversification across property sub-types has no effect on risk, but is associated with increased risk-adjusted returns.

For REIT industrial portfolios, diversification across property sub-types leads to reduction of the levels of both total and systematic risk, and increased risk-adjusted returns. However, for geographic diversification, a focusing strategy increases risk-adjusted returns, but also increases systematic risk, with no effect on total risk. Thus, although risk is increased, there is an associated increase in return. For retail portfolios, there are no return effects for diversification. For the risk measures, diversification has opposite effects. Either focusing or diversifying across both diversification measures, leads to an increase in one type of risk with a corresponding decrease in the other.

One issue with geographic diversification is the measurement. With our measurement, using NCREIF regions, a geographically-focused REIT operates in a single region and may still be well-diversified within the region. The use of a more refined basis, such as the number of MSAs in which the REIT holds property, might better measure geographical diversity.

Risk and Portfolio Age

As shown in Panel B of Table 7, age effects are not pervasive across the property types. The results suggest that a larger percentage of older properties (obsolescence risk) increases total risk and systematic risk only for apartment portfolios. However, despite the higher risk, there is no corresponding effect on the risk-adjusted returns. Thus, for apartment portfolios, the results suggest that obsolescence is more of an issue than with the other property types. It is also possible that market forces compel the owners of the other property types (namely, office and retail) to manage the effective age of the property portfolio in order to remain competitive. The impact of more "younger" properties in a portfolio is a decrease in the risk-adjusted return for industrial portfolios and an increase in risk-adjusted returns for hotels. The results suggest benefits of rehabilitation and new development in the hospitality sector.

Risk and Ownership

Bearing in mind that the results in no way show any causality, but perhaps suggest investment preferences or investor sentiment, as shown in Panel D of Table 7, the level of insider and institutional ownership affects the risk of REIT property portfolios, but not the risk-adjusted returns. Higher levels of institutional ownership increase total risk for retail portfolios and decrease total risk for office and industrial portfolios. Higher levels of institutional ownership are associated with increased betas for four of five property types, suggesting an institutional investment preference for REITs with returns more strongly correlated with the market. For

insider ownership, the results aren't as strong, but show that higher levels of insider ownership correspond to higher risk (of both types) in retail portfolios. The results further show that higher percentages of institutional ownership decrease systematic risk for apartment and industrial portfolios.

Risk and Demographic Trends

As shown in Panel C of Table 7, the results for the demographic and demographic trend variables are sporadic. A large presence in areas with high projected population growth is associated with reduced total risk for hotels and increased systematic risk combined with decreased risk-adjusted returns for offices. A large presence in areas expecting lower population growth shows increased total risk for apartments, decreased risk-adjusted returns for offices and increased risk-adjusted returns for industrial property portfolios.

The results show that a presence in major metropolitan areas reduces the total risk of REIT retail portfolios and reduces the systematic risk of REIT industrial portfolios. For apartments, more big city locations decrease risk-adjusted returns.

Risk and Size

Two size effects were tested in the models. The first measured the size of the property portfolio relative to other portfolios of the same property type. The results (Panel E of Table 7) show that larger apartment portfolios reduce both types of risk measures. Larger office portfolios are associated with increased systematic risk. Larger industrial portfolios show increased risk-adjusted returns for the REIT.

The second size effect is the size of the REIT. Only office portfolios show any effect associated with market capitalization. Larger REIT capitalizations show reductions in both types of risk and increases in the risk-adjusted returns for REITs holding office property portfolios.

Conclusions

This study looks at the risk characteristics of property portfolios held by publicly-traded REITs. The results show that many of the posited variables affect risk, but the outcomes vary considerably between property types. The results are similar whether the daily returns are measured over 4 years or twelve years. Overall, the diversification and ownership measures are more influential in explaining risk. Portfolio age and demographic trend measures inconsistently explain risk and risk-adjusted returns. Further refinements of the models may serve to stabilize the relationships. A plausible extension of this research would be an accounting for the time variability of many of the variables.

Bibliography

Anderson, R.I. and T.M. Springer. 2005. "Investor Perception of Retail Property Risk: Evidence from REIT Portfolios," Journal of Shopping Center Research 12:1, 104-120.

Bers, M. and T.M. Springer. 1998. "Differences in Scale Economies Among Real Estate Investment Trusts: More Evidence," Real Estate Finance (Fall), pages 37-44.

Capozza, D.R. and S. Lee. 2001. "Property Type, Size and REIT Value," Journal of Real Estate Research, Vol. 10:4, pages 7-15.

Capozza, D.R. and P.J. Seguin. 1999. "Focus, Transparency and Value," Real Estate Economics, Vol. 27:1, pages 7-15.

Chiang, K.C.H., M. Lee and C.H. Wisen. 2005. "On the Time-Series Properties of Real Estate Investment Trust Betas," Real Estate Economics 33:2, 381-396.

Clayton, J., and G. MacKinnon. 2001. "The Time-varying Nature of the Link Between REIT, Real Estate and Financial Asset Returns," Journal of Real Estate Portfolio Management 7:1, 43-54.

Goldstein, A. and E.F. Nelling. 1999. "REIT Return Behavior in Advancing and Declining Stock Markets," Real Estate Finance 15: 68-77.

Liang, Y. and W. McIntosh. 1999. "Measuring the Overall and Diversification Benefits of an Investment," Real Estate Finance (Fall), pages 55-63.

Lewis, D., T.M. Springer and R.I. Anderson. 2003. "The Cost Efficiency of Real Estate Investment Trusts: An Analysis with a Bayesian Stochastic Frontier Model," Journal of Real Estate Finance and Economics, 26:1, pages 65-80.

Litt, J., J.P. Mei and the Paine Webber REIT Team. 1999. "A Risk-Adjusted Model for REIT Valuation," Real Estate Finance (Fall), pages 9-20.

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

Pagliari, J.L., K.A. Scherer and R.T. Monopoli. 2005. "Public Versus Private Real Estate Equities: A More Refined, Long-Term Comparison," Real Estate Economics 33:1, 147-187.

Redman, A.L. and H. Manakayem.. 1995. "A Multivariate Analysis of REIT Performance by Financial and Real Asset Portfolio Characteristics," Journal of Real Estate Finance and Economics, 10:2, pages 169-175.

Riddiough, T.J., M. Moriarty and P.J. Yeatman. 2005. "Private Versus Publicly Held Asset Investment Performance," Real Estate Economics 33:1, 121-146.

Sagalyn, L. 1996. "Conflicts of Interest in the Structure of REITs," Real Estate Finance 13: (Summer).

Seiler, M.J., J.R. Webb and F.C.N. Myer. 1999. "Diversification Issues in Real Estate Investment," Journal of Real Estate Literature 7:2, 163-179.

Shilling, J. 2003. "Is There A Risk Premium Puzzle in Real Estate," Real Estate Economics, 31:4, pages

Table 1: Summary of the REITs Included in the Study

	Number of REITs Specializing	Number of REITs Investing	Number of Properties
Office	32	107	5,163
Retail	42	80	6,845
Specialty	6	161	2,200
Hotel	34	49	2,009
Multi-Family	26	53	4,204
Industrial	11	53	5,566
Health Care	15	60	2,148
Manufactured Home	5	6	738
Self-storage	6	27	1,268
Diversified	33	-	-
Total	210	-	30,141
Total in Sample	-	-	25,935

Table 2: Summary of the Composition of Individual Properties

Panel A-1: Individual Properties by Geographic Region – Numbers

Region	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
NorthEast	258	1258	276	409	513	1059	3773
SouthEast	386	672	389	818	964	1418	4647
EastNorth	291	358	217	567	1126	934	3493
PacificCoast	202	997	245	606	711	628	3389
SouthWest	314	354	199	601	737	907	3112
MidEast	293	1051	287	668	500	883	3682
Mountain	241	219	146	313	327	458	1704
WestNorth	128	34	113	7	384	148	814
Other	40	220	137	135	304	410	1246
	2153	5163	2009	4124	5566	6845	

Panel A-2: Individual Properties by Geographic Region - Percentage of Property Type

Region	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
NorthEast	12.0%	24.4%	13.7%	9.9%	9.2%	15.5%	14.6%
SouthEast	17.9%	13.0%	19.4%	19.8%	17.3%	20.7%	18.0%
EastNorth	13.5%	6.9%	10.8%	13.7%	20.2%	13.6%	13.5%
PacificCoast	9.4%	19.3%	12.2%	14.7%	12.8%	9.2%	13.1%
SouthWest	14.6%	6.9%	9.9%	14.6%	13.2%	13.3%	12.0%
MidEast	13.6%	20.4%	14.3%	16.2%	9.0%	12.9%	14.2%
Mountain	11.2%	4.2%	7.3%	7.6%	5.9%	6.7%	6.6%
WestNorth	5.9%	0.7%	5.6%	0.2%	6.9%	2.2%	3.1%
Other	1.9%	4.3%	6.8%	3.3%	5.5%	6.0%	4.8%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Panel A-3: Individual Properties by Geographic Region - Percentage of Region

Region	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
NorthEast	6.8%	33.3%	7.3%	10.8%	13.6%	28.1%	100.0%
SouthEast	8.3%	14.5%	8.4%	17.6%	20.7%	30.5%	100.0%
EastNorth	8.3%	10.2%	6.2%	16.2%	32.2%	26.7%	100.0%
PacificCoast	6.0%	29.4%	7.2%	17.9%	21.0%	18.5%	100.0%
SouthWest	10.1%	11.4%	6.4%	19.3%	23.7%	29.1%	100.0%
MidEast	8.0%	28.5%	7.8%	18.1%	13.6%	24.0%	100.0%
Mountain	14.1%	12.9%	8.6%	18.4%	19.2%	26.9%	100.0%
WestNorth	15.7%	4.2%	13.9%	0.9%	47.2%	18.2%	100.0%
Other	3.2%	17.7%	11.0%	10.8%	24.4%	32.9%	100.0%
	8.3%	20.0%	7.8%	15.9%	21.5%	26.5%	100.0%

Table 2, continued

Panel B: Distribution Across Property Sub-types

Panel B - 1: Distribution Across Property Sub-types - Healthcare

Property Sub-type	Frequency	Percentage
Assisted Living	1,324	61.5%
Medical Office	248	11.5%
In-Patient	140	6.5%
HealthCare	288	13.4%
Rehabilitation	143	6.6%
Psychology	2	0.1%
Outpatient	8	0.4%
Total	2,153	100.0%

Panel B - 2: Distribution Across Property Sub-types – Hospitality

Property Sub-type	Frequency	Percentage
Budget	46	2.3%
Extended Stay	368	18.3%
Full Service	868	43.2%
Hotels	48	2.4%
Limited Service	679	33.8%
Total	2,009	100.0%

Panel B - 3: Distribution Across Property Sub-types - Industrial

Property Sub-type	Frequency	Percentage
Warehouse	2,771	49.8%
Manufacturing	93	1.7%
Industrial Park	84	1.5%
Industrial	1,771	31.8%
Flex Space / Service Center	670	12.0%
Cold Storage Facility	177	3.2%
Total	5,566	100.0%

Table 2, continued

Panel B - 4: Distribution Across Property Sub-types – Office

Property Sub-type	Frequency	Frequency	Percentage	Percentage	Percentage
Suburban R&D	2	-	0.0%	-	0.0%
Suburban Office Building	172	-	3.3%	-	3.3%
Suburban Office Park	7	-	0.1%	-	0.1%
R&D Facility	174	-	3.4%	-	3.4%
Office Park	184	-	3.6%	-	3.6%
Office	4,521	-	87.6%	-	-
- greater than 600,000 sf	-	149	-	3.3%	3.3%
- 200,000 to 599,999 sf	-	618	-	13.7%	13.7%
- 100,000 to 199,999 sf	-	1,656	-	36.6%	36.6%
- 50,000 to 99,999 sf	-	779	-	17.2%	17.2%
- less than 50,000 sf	-	1,319	-	29.2%	29.2%
CBD Office Park	2	-	0.0%	-	0.0%
CBD Office Building	101	-	2.0%	-	2.0%
Total	5,163	4,521	100.0%	100.0%	100.0%

Panel B - 5: Distribution Across Property Sub-types – Retail

Property Sub-type	Frequency	Percentage
Single Tenant	1,673	24.4%
Shopping Center	3,622	52.9%
Other	656	9.6%
Regional Mall	680	9.9%
Power Center	113	1.7%
Outlet Center	101	1.5%
Total	6,845	100.0%

Panel B - 6: Distribution Across Property Sub-types - Multi-Family

Property Sub-type	Frequency	Percentage
400+ Units	576	13.7%
300-399 Units	586	13.9%
200-299 Units	1,429	33.9%
100-199 Units	983	23.3%
less than 100 Units	640	15.2%
Total	4,214	100.0%

Table 2, continued

Panel B - 7: Distribution Across Property Sub-types - Specialty

Property Sub-type	Frequency	Percentage
Timber	18	0.8%
Single-Family Homes	32	1.5%
Restaurants	922	41.9%
Recreation	1	0.0%
Prison	12	0.5%
CarDealers	291	13.2%
Parking Lots	30	1.4%
Land	764	34.7%
Health Club	32	1.5%
Golf Course	2	0.1%
Cineplex	90	4.1%
Casino	3	0.1%
Bowling	3	0.1%
Total	2,200	100.0%

Panel C: Individual Properties by Age

Panel C - 1: Individual Properties by Age – Frequency

	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
Age < 5 yrs	55	321	84	310	272	496	1,538
Effective Age < 5 Yrs	57	384	223	358	279	733	2,034
Age > 10 yrs	913	2,746	877	3,086	2,206	3,527	13,355
Effective Age > 10 yrs	898	2,546	667	2,906	2,172	3,089	12,278
Age Not Available	635	1,413	754	301	2,467	1,796	7,366
Average Year Built	1985	1986	1985	1985	1987	1987	

Panel C - 2: Individual Properties by Age - Percentage of Property Type

	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
Age < 5 yrs	2.6%	6.2%	4.2%	7.4%	4.9%	7.2%	5.9%
Effective Age < 5 yrs	2.7%	7.4%	11.1%	8.5%	5.0%	10.7%	7.8%
Age > 10 yrs	42.5%	53.2%	43.7%	73.4%	39.6%	51.5%	51.5%
Effective Age > 10 yrs	41.8%	49.3%	33.2%	69.1%	39.0%	45.1%	47.3%
Age Not Available	29.6%	27.4%	37.5%	7.2%	44.3%	26.2%	28.4%

Table 2, continued

Panel D: Individual Properties by Market Demographics

Panel D - 1: Individual Properties by Market Demographics - Frequency

Market type	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
Large	685	3,246	929	2,280	3,431	3,039	13,61
High Income	151	911	222	488	495	481	2,748
Low Pop. Growth	392	547	270	492	417	1,006	3,124
High Pop. Growth	676	1,629	678	1,886	1,925	2,420	9,214
High Inc. Growth	702	2,497	722	1,643	2,190	2,250	10,00
Low Inc. Growth	365	528	261	744	486	1,161	3,545

Panel D - 2: Individual Properties by Market Demographics - Percentage of Property Type

Market type	Healthcare	Office	Hospitality	Multi-Family	Industrial	Retail	Total
Large	31.9%	62.9%	46.2%	54.2%	61.6%	44.4%	52.5%
High Income	7.0%	17.6%	11.1%	11.6%	8.9%	7.0%	10.6%
Low Pop. Growth	18.2%	10.6%	13.4%	11.7%	7.5%	14.7%	12.0%
High Pop. Growth	31.5%	31.6%	33.7%	44.9%	34.6%	35.4%	35.5%
High Inc. Growth	32.7%	48.4%	35.9%	39.1%	39.3%	32.9%	38.6%
Low Inc. Growth	17.0%	10.2%	13.0%	17.7%	8.7%	17.0%	13.7%

Table 3: Diversification Measures of the Entire Property Sample

Panel A: Herfindahl Indexes Measuring Property Sub-Type and Geographical Diversification

	Herfindahl Indexes	
	By Property Sub-Type	By Geography
Healthcare	41.8%	13.0%
Hospitality	33.6%	12.6%
Industrial	36.5%	13.3%
Office	77.1%	-
Office	27.3%	16.8%
Retail	35.9%	13.7%
Multi-Family	23.0%	14.4%
Specialty	31.6%	-
Total	-	13.1%

Panel B: Herfindahl Indexes Measuring Property Type Diversification

	Herfindahl Index by Property Type
NorthEast	23.0%
SouthEast	20.2%
EastNorth	22.3%
PacificCoast	20.6%
SouthWest	20.6%
MidEast	20.3%
Mountain	18.7%
WestNorth	30.1%
Other	22.4%
Total	19.5%

Table 4: Description of Variables

Risk and Risk Adjusted Return Measures (Dependent Variables)

Standard deviation – a measure of a REIT's total risk, the square root of the variance of the daily CRSP total returns over a 4-year (2000 – 2003) period.

Beta – a measure of a REIT's systematic risk with the general stock market

Sharpe's Ratio – a risk-adjusted return measure, the ratio of a REIT's risk premium (expected return minus risk free rate) to its risk (standard deviation).

Independent Variables

Property Type Herfindahl Index (**HIPT**) – the portfolio's Herfindahl index based on property sub-types, weighed by square footage, or the number of units, rooms or beds.

Geographic Herfindahl Index (HIG) – the portfolio's Herfindahl index, based on geographic regions (as defined by NCREIF), weighed by square footage, or the number of units, rooms or beds.

Relative Portfolio Size – the size of the portfolio divided by the average portfolio size

Net Leased – a binary variable with 1 indicating the REIT primarily owns net-leased properties.

Self-managed – a binary variable with 1 indicating a self-managed REIT, and 0 otherwise

Effective Age less than 5 – the percentage of properties in the REIT's portfolio with an effective age of less than 5 years. Effective age is the lesser of the reported age or the years since renovation.

Effective Age more than 10 – the percentage of properties in the REIT's portfolio whose effective age is greater than 10 years.

Large Markets – the percentage of a REIT's properties located in MSAs having more than 2 million people (2004)

High Income Market – the percentage of a REIT's properties located in MSAs with median household income above $60,000 (2004)

Low Income Growth – the percentage of a REIT's properties located in areas with projected income growth less than 0.10 percent from 2004 to 2009.

High Income Growth – the percentage of a REIT's properties located in areas with projected income growth more than 12.5 percent from 2004 to 2009.

Low Population Growth – the percentage of a REIT's properties located in areas with projected population growth of less than 2.0 percent from 2004 to 2009.

High Population Growth – the percentage of a REIT's properties located in areas with projected population growth of more than 7.0 percent from 2004 to 2009.

Incomplete Data (dummy) – a binary variable indicating whether the return series is incomplete.

Debt/Equity Ratio – the ratio of the REIT's total debt to its equity.

Price/FFO – the current common stock price as a multiple of annualized current quarter Funds From Operations (FFO) per share.

Variable-to-Fixed Rate Debt – the ratio of the REIT's variable rate debt to its fixed rate debt.

Total Market Capitalization – the total market capitalization of the REIT as of year end 2003.

Book Value/Market Value – the ratio of the book value of the REIT's assets to its market value

Table 5: Summary Statistics of the Variables

Panel 1: Apartment Properties Held by REITs

Variable	N	Mean	Std Dev	Minimum	Maximum
Incomplete data	48	0.10	0.31	0.00	1.00
Geographic Herfindahl Index	48	0.54	0.36	0.00	1.00
Property Type Herfindal Index	48	0.43	0.31	0.00	1.00
Relative Portfolio Size	48	107.34	206.71	0.00	1040.26
Self Managed	48	0.83	0.38	0.00	1.00
Insider ownership	46	21.98	23.51	2.10	86.10
Institutional ownership	47	52.34	32.14	0.08	91.09
Effective Age less than 5 years	48	7.19	9.55	0.00	38.00
Effective Age greater than 10 years	48	63.38	159.81	0.00	894.00
Percent of property in high population growth areas	48	39.93	32.77	0.00	100.00
Percent of property in low population growth areas	48	10.30	15.82	0.00	59.26
Percent of property in low income growth areas	48	37.84	27.90	0.00	100.00
Percent of property in high income growth areas	48	17.53	18.70	0.00	85.71
Percent of property in large markets	48	46.40	35.38	0.00	100.00
Percent of property in high income markets	48	10.18	22.87	0.00	100.00
Debt/Equity ratio	48	2.94	2.34	1.01	10.53
Price/FFO	48	14.98	2.56	10.46	20.33
Variable/fixed debt ratio	48	0.35	0.43	0.00	2.31
Total Market Capitalization	48	3807.26	4461.63	323.60	18359.90
Book/market ratio	48	277.64	78.34	67.31	413.26
Standard deviation of returns (4-years of returns)	48	1.48	1.44	0.86	10.81
Sharpe's Ratio (4-years of returns)	48	0.06	0.06	-0.10	0.25
Beta (4-years of returns)	48	0.26	0.15	-0.07	0.51
Standard deviation of returns (1992 - 2004)	48	1.37	0.95	0.93	5.82
Sharpe's Ratio (1992 - 2004)	48	0.04	0.01	0.01	0.07
Beta (1992 - 2004)	48	0.22	0.09	-0.05	0.38

Table 5: Summary Statistics of the Variables (Continued)

Panel 2: Industrial Properties Held by REITs

Variable	N	Mean	Std Dev	Minimum	Maximum
Incomplete data	113	0.15	0.36	0.00	1.00
Geographic Herfindahl Index	113	0.36	0.42	0.00	1.00
Property Type Herfindal Index	113	0.39	0.42	0.00	1.00
Relative Portfolio Size	113	110.44	462.10	0.00	4342.38
Net Leased	110	0.20	0.40	0.00	1.00
Self Managed	112	0.85	0.36	0.00	1.00
Insider ownership	106	16.76	19.27	0.83	86.10
Institutional ownership	111	61.62	28.14	0.08	96.85
Effective Age less than 5 years	113	3.98	14.22	0.00	125.00
Effective Age greater than 10 years	113	26.96	83.86	0.00	654.00
Percent of property in high population growth areas	59	36.07	32.67	0.00	100.00
Percent of property in low population growth areas	59	9.20	18.50	0.00	100.00
Percent of property in low income growth areas	59	38.97	35.19	0.00	100.00
Percent of property in high income growth areas	59	9.19	17.28	0.00	100.00
Percent of property in large markets	59	52.56	35.67	0.00	100.00
Percent of property in high income markets	59	11.94	25.19	0.00	100.00
Debt/Equity ratio	59	1.54	1.50	0.00	9.23
Price/FFO	59	13.66	2.18	9.48	18.30
Variable/fixed debt ratio	59	0.19	0.11	0.00	0.40
Total Market Capitalization	59	3937.10	3739.56	60.60	16603.80
Book/market ratio	59	379.86	140.21	185.61	805.38
Standard deviation of returns (4-years of returns)	113	1.34	0.56	0.86	5.18
Sharpe's Ratio (4-years of returns)	113	0.07	0.06	-0.10	0.35
Beta (4-years of returns)	113	0.35	0.28	-0.07	2.45
Standard deviation of returns (1992 - 2004)	113	1.43	0.65	0.89	4.53
Sharpe's Ratio (1992 - 2004)	113	0.03	0.09	-0.49	0.13
Beta (1992 - 2004)	113	0.26	0.11	0.04	0.47

Table 5: Summary Statistics of the Variables (Continued)

Panel 3: Office Properties Held by REITs

Variable	N	Mean	Std Dev	Minimum	Maximum
Incomplete data	90	0.18	0.38	0.00	1.00
Geographic Herfindahl Index	90	0.67	0.31	0.15	1.00
Property Type Herfindal Index	90	0.59	0.28	0.22	1.06
Relative Portfolio Size	90	145.08	289.60	2.07	1840.33
Net Leased	88	0.16	0.37	0.00	1.00
Self Managed	90	0.86	0.35	0.00	1.00
Insider ownership	86	20.19	21.48	1.60	86.10
Institutional ownership	88	60.55	30.19	0.08	95.51
Effective Age less than 5 years	90	3.82	7.91	0.00	45.00
Effective Age greater than 10 years	90	27.49	56.57	0.00	269.00
Percent of property in high population growth areas	90	37.18	34.45	0.00	100.00
Percent of property in low population growth areas	90	12.74	25.11	0.00	100.00
Percent of property in low income growth areas	90	46.51	34.53	0.00	100.00
Percent of property in high income growth areas	90	10.28	22.38	0.00	100.00
Percent of property in large markets	90	64.02	35.07	0.00	100.00
Percent of property in high income markets	90	17.53	27.02	0.00	100.00
Debt/Equity ratio	90	2.15	2.47	0.00	14.07
Price/FFO	90	13.57	2.23	9.48	19.46
Variable/fixed debt ratio	90	0.28	0.34	0.00	2.31
Total Market Capitalization	90	5148.21	7249.15	131.10	34250.40
Book/market ratio	90	365.91	155.87	94.04	908.44
Standard deviation of returns (4-years of returns)	90	1.30	0.48	0.81	3.80
Sharpe's Ratio (4-years of returns)	90	0.07	0.05	-0.10	0.26
Beta (4-years of returns)	90	0.32	0.19	-0.07	0.94
Standard deviation of returns (1992 - 2004)	90	1.50	0.75	0.92	5.82
Sharpe's Ratio (1992 - 2004)	90	0.04	0.04	-0.15	0.13
Beta (1992 - 2004)	90	0.27	0.12	0.03	0.77

Table 5: Summary Statistics of the Variables (Continued)

Panel 4: Retail Properties Held by REITs

Variable	N	Mean	Std Dev	Minimum	Maximum
Incomplete data	67	0.16	0.37	0.00	1.00
Geographic Herfindahl Index	67	0.56	0.33	0.00	1.00
Property Type Herfindal Index	67	0.78	0.23	0.00	1.00
Relative Portfolio Size	67	111.44	231.06	0.00	1378.85
Net Leased	66	0.21	0.41	0.00	1.00
Self Managed	67	0.84	0.37	0.00	1.00
Insider ownership	64	18.28	19.75	1.40	86.10
Institutional ownership	66	53.86	28.66	0.08	96.85
Effective Age less than 5 years	67	7.84	12.61	0.00	56.00
Effective Age greater than 10 years	67	42.87	91.02	0.00	587.00
Percent of property in high population growth areas	67	28.33	28.23	0.00	100.00
Percent of property in low population growth areas	67	14.60	20.62	0.00	100.00
Percent of property in low income growth areas	67	34.50	28.06	0.00	100.00
Percent of property in high income growth areas	67	13.24	16.57	0.00	100.00
Percent of property in large markets	67	48.53	32.54	0.00	100.00
Percent of property in high income markets	67	11.89	23.05	0.00	100.00
Debt/Equity ratio	67	2.06	1.81	0.39	9.48
Price/FFO	67	13.47	1.90	10.46	18.47
Variable/fixed debt ratio	67	0.25	0.20	0.00	0.73
Total Market Capitalization	67	5544.94	7696.19	320.00	34250.40
Book/market ratio	67	318.73	120.48	94.04	719.69
Standard deviation of returns (4-years of returns)	67	1.27	0.56	0.67	5.18
Sharpe's Ratio (4-years of returns)	67	0.09	0.05	-0.10	0.28
Beta (4-years of returns)	67	0.31	0.33	-0.60	2.45
Standard deviation of returns (1992 - 2004)	67	1.33	0.67	0.89	4.99
Sharpe's Ratio (1992 - 2004)	67	0.05	0.02	0.01	0.09
Beta (1992 - 2004)	67	0.25	0.07	0.07	0.38

Table 5: Summary Statistics of the Variables (Continued)

Panel 5: Hotel Properties Held by REITs

Variable	N	Mean	Std Dev	Minimum	Maximum
Incomplete data	42	0.19	0.40	0.00	1.00
Geographic Herfindahl Index	42	0.44	0.32	0.13	1.00
Property Type Herfindal Index	42	0.79	0.21	0.38	1.00
Relative Portfolio Size	42	104.17	148.25	1.36	544.92
Net Leased	39	0.36	0.49	0.00	1.00
Self Managed	39	0.64	0.49	0.00	1.00
Insider ownership	38	21.21	23.95	1.76	86.10
Institutional ownership	41	61.58	30.84	0.09	100.73
Effective Age less than 5 years	42	4.43	7.14	0.00	36.00
Effective Age greater than 10 years	42	4.43	7.14	0.00	36.00
Percent of property in high population growth areas	42	30.77	27.05	0.00	100.00
Percent of property in low population growth areas	42	13.82	21.87	0.00	100.00
Percent of property in low income growth areas	42	35.76	28.76	0.00	100.00
Percent of property in high income growth areas	42	12.27	17.64	0.00	100.00
Percent of property in large markets	42	50.45	31.82	0.00	100.00
Percent of property in high income markets	42	15.75	26.61	0.00	100.00
Debt/Equity ratio	42	2.21	3.70	0.41	18.41
Price/FFO	42	13.63	4.88	5.07	29.29
Variable/fixed debt ratio	42	1.15	3.02	0.00	14.58
Total Market Capitalization	42	3863.25	5328.25	120.30	16725.00
Book/market ratio	42	422.62	164.86	42.76	735.83
Standard deviation of returns (4-years of returns)	42	1.81	0.93	0.34	5.69
Sharpe's Ratio (4-years of returns)	42	0.04	0.09	-0.34	0.35
Beta (4-years of returns)	42	0.43	0.34	-0.02	1.61
Standard deviation of returns (1992 - 2004)	42	2.01	0.74	1.10	4.09
Sharpe's Ratio (1992 - 2004)	42	0.02	0.02	-0.01	0.07
Beta (1992 - 2004)	42	0.41	0.24	0.05	0.98

Table 6: Results of Models Explaining REIT Portfolio Risks: 4-Year Daily Returns

Panel 1: Apartment Portfolios

	Risk or Risk Adjusted Return Measure					
Variables	**Log of Standard Deviation**		**Sharpe's Ratio**		**Beta**	
Intercept	-0.272		0.293		-0.018	
Incomplete Data (dummy)	-0.371	***	0.198	**	-0.151	
Geographic Herfindahl Index	-0.756	***	-0.040		-0.392	*
Property Type Herfindahl Index	1.885	***	-0.198		0.353	
Relative Portfolio Size	-0.018	***	-0.032		-5.51 E-3	**
Self Managed	-0.215	*	0.096		-0.085	
Insider Ownership	0.070		0.061		0.039	
Institutional Ownership	0.081		0.054		0.136	**
Effective Age less than 5	0.085		0.104		-0.073	
Effective Age more than 10	0.087	***	0.025		0.112	**
High Population Growth	0.028		0.073		0.051	
Low Population Growth	0.051	**	-0.074		0.054	
Low Income Growth	0.088		0.058		0.033	
High Income Growth	0.079	***	0.034		0.061	
Large Markets	0.023		-0.089	***	-0.017	
High Income Markets	0.068		0.100		-0.063	
Debt/Equity Ratio	0.703		-0.178		0.042	
Price/FFO	4.09 E-3		-0.017		-0.010	
Variable-to-Fixed Rate Debt	0.238		0.043		-0.164	
Total Market Capitalization	-8.03 E-3		2.79 E-3		1.20 E-3	
Book Value/Market Value	0.127		-0.041		-3.36 E-3	
R^2	0.90		0.22		0.67	
F	11.77	***	1.33		3.33	***

Table 6 (cont.):

Panel 2. Industrial Portfolios

	Risk or Risk Adjusted Return Measure					
Variable	**Log of Standard Deviation**		**Sharpe's Ratio**		**Beta**	
Intercept	0.435		-0.091		0.152	
Incomplete Data (dummy)	-0.042		-0.072		-0.053	
Geographic Herfindahl Index	-0.094		0.199	***	0.417	**
Property Type Herfindahl Index	0.639	**	-0.065	**	0.194	
Relative Portfolio Size	-0.124		0.105	**	-0.121	
Net Leased	0.152		0.142	**	-0.041	
Self Managed	0.310	*	0.134		0.130	
Insider Ownership	0.165		0.214		-0.064	**
Institutional Ownership	-0.091	***	0.156	***	0.120	*
Effective Age less than 5	0.196		0.131		-0.160	
Effective Age more than 10	-0.078		-0.138	*	0.075	
High Population Growth	-0.060		0.106		0.120	
Low Population Growth	-0.148		0.181	***	0.092	
Low Income Growth	0.073		0.147		-0.069	
High Income Growth	-0.178		0.108		0.042	
Large Markets	-0.191		0.162		-0.198	*
High Income Markets	-0.088		0.075	**	0.041	
Debt/Equity Ratio	-0.129		0.017		0.067	
Price/FFO	0.011		-0.006		0.017	
Variable-to-Fixed Rate Debt	0.311		0.024		-0.030	
Total Market Capitalization	3.11 E-4		9.63 E-5		5.04 E-4	
Book Value/Market Value	-0.010		1.14 E-3		-6.52 E-3	
R^2	0.38		0.58		0.52	
F	1.89		3.03	***	2.59	***

Table 6 (Cont.)

Panel 3. Office Portfolios

	Risk or Risk Adjusted Return Measure					
Variable	**Log of Standard Deviation**		**Sharpe's Ratio**		**Beta**	
Intercept	0.284		0.196		0.355	
Incomplete Data (dummy)	0.167		0.107		0.126	
Geographic Herfindahl Index	0.216		-5.57 E-3	*	0.289	*
Property Type Herfindahl Index	0.400		-0.040	*	-0.015	
Relative Portfolio Size	0.097		-0.130		0.146	***
Net Leased	-0.151		0.231	**	-0.108	**
Self Managed	0.219		0.231		-0.021	*
Insider Ownership	0.092		-0.113		-0.133	*
Institutional Ownership	-0.106	***	0.164		0.159	*
Effective Age less than 5	0.111		0.074		0.176	
Effective Age more than 10	-0.182		-0.116		-0.104	
High Population Growth	-0.068		-0.108	**	0.169	*
Low Population Growth	0.106		-0.098	**	0.120	
Low Income Growth	0.115		0.103		-0.154	
High Income Growth	0.124		0.154	***	0.090	
Large Markets	0.104		0.193		-0.123	
High Income Markets	-0.075		0.071	**	0.132	
Debt/Equity Ratio	0.130	***	-0.030	**	-4.73 E-3	
Price/FFO	-0.022		5.95 E-3		0.025	
Variable-to-Fixed Rate Debt	0.042		0.024		0.024	
Total Market Capitalization	-2.37 E-3	***	5.15 E-4	***	-9.46 E-4	*
Book Value/Market Value	7.02 E-3	*	-1.96 E-3		-8.02 E-3	*
R^2	0.75		0.52		0.47	
F	8.26	***	3.69	***	3.15	***

Table 6 (Cont.)

Panel 4. Retail Portfolios

	Risk or Risk Adjusted Return Measure					
Variable	**Log of Standard Deviation**		**Sharpe's Ratio**		**Beta**	
Intercept	-0.876		0.252		-0.696	
Incomplete Data (dummy)	-0.129		0.154		0.204	
Geographic Herfindahl Index	1.875	**	-0.080		-0.890	**
Property Type Herfindahl Index	2.371	**	-0.066		-0.732	*
Relative Portfolio Size	-0.082		0.171		-0.102	
Net Leased	1.305		-0.137		0.207	
Self Managed	-0.040		0.094		-0.373	*
Insider Ownership	0.593	**	-0.137		0.169	**
Institutional Ownership	0.809	***	0.049		0.200	***
Effective Age less than 5	0.153		0.193		0.125	
Effective Age more than 10	-0.018		-0.120		0.108	
High Population Growth	0.176		-0.130		0.098	
Low Population Growth	0.150		-0.106		0.086	
Low Income Growth	0.096		0.109		0.115	
High Income Growth	-0.137		0.117		0.135	
Large Markets	-0.098	*	0.119		0.049	
High Income Markets	0.027		0.104		0.151	
Debt/Equity Ratio	0.351		-0.025		-2.56 E-3	
Price/FFO	-0.025		0.014		-8.26 E-4	
Variable-to-Fixed Rate Debt	0.198		0.023		3.00 E-3	
Total Market Capitalization	-7.78 E-3		3.33 E-4		1.71 E-3	
Book Value/Market Value	0.068		-1.68 E-3		3.14 E-3	
R^2	0.68		0.41		0.45	
F	2.77	***	2.01	***	2.23	***

Table 6 (Cont.)

Panel 5. Hotel Portfolios

	Risk or Risk Adjusted Return Measure		
Variable	**Log of Standard Deviation**	**Sharpe's Ratio**	**Beta**
Intercept	1.368	0.076	0.920
Incomplete Data (dummy)	-0.445 *	-0.060	-0.206
Geographic Herfindahl Index	-0.621	0.137	-0.422
Property Type Herfindahl Index	-0.172	-0.119	0.214
Relative Portfolio Size	-0.087	-0.024	0.036
Net Leased	0.302	-0.036	0.342 **
Self Managed	0.284	0.045	0.308 *
Insider Ownership	0.104	0.074	-0.027
Institutional Ownership	-0.038	0.065	-0.070
Effective Age less than 5	0.159	0.082 *	-0.021
High Population Growth	-0.044 **	-0.034	-0.011
Low Population Growth	0.088	-0.073	-0.077
Low Income Growth	0.071	-0.025	-0.100
High Income Growth	0.048	0.071	-0.048
Large Markets	0.107	0.055	0.023
High Income Markets	-0.047	0.012	-0.043
Debt/Equity Ratio	0.163	-0.043 *	0.268 **
Price/FFO	-0.074	3.60 E-3	0.078
Variable-to-Fixed Rate Debt	0.179	3.66 E-3	0.051
Total Market Capitalization	-2.42 E-4	7.93 E-4	5.65 E-3
Book Value/Market Value	-0.063	-3.89 E-3	-9.10 E-3
R^2	0.40	0.17	0.62
F	1.84	1.02	3.04 ***

Table 7: Summary of the Results

Panel 1: Diversification Strategies Suggested by the Results (whether focusing on a single property sub-type or geographic area, or diversifying, has the effect of increasing risk-adjusted returns or decreasing risk)

	Implied Diversification Strategy	
To Minimize Total Risk	**Property Sub-Type**	**Geographic**
Apartments	**Diversify**	**Focus**
Offices	**---**	**---**
Industrial	**Diversify**	**---**
Retail	**Diversify**	**Diversify**
Hospitality	**---**	**---**
To Minimize Beta		
Apartments	**---**	**Focus**
Offices	**---**	**Focus**
Industrial	**---**	**Diversify**
Retail	**Focus**	**Focus**
Hospitality	**---**	**---**
To Maximize Risk-Adjusted Returns		
Apartments	**---**	**---**
Offices	**Diversify**	**Diversify**
Industrial	**Diversify**	**Focus**
Retail	**---**	**---**
Hospitality	**---**	**---**

Panel B: Age Effects Implied by the Models (the impact on risk and risk-adjusted returns of a higher percentage of properties in the designated category)

	Effect on Risk or Risk-Adjusted Return		
	Total Risk	**Beta**	**Sharpe's Index**
More Older Properties			
Apartments	**Increases**	**Increases**	**---**
Offices	**---**	**---**	**---**
Industrial	**---**	**---**	**---**
Retail	**---**	**---**	**---**
More Newer Properties			
Apartments	**---**	**---**	**---**
Offices	**---**	**---**	**---**
Industrial	**---**	**---**	**Reduces**
Retail	**---**	**---**	**---**
Hospitality	**---**	**---**	**Increases**

Table 7: (cont.)

Panel C: Demographics and Demographic Trend Effects Implied by the Models (the impact on risk and risk-adjusted returns of a higher percentage of properties in the designated category)

	Effect on Risk or Risk-Adjusted Return		
	Total Risk	Beta	Sharpe's Index
High Projected Population Growth			
Apartments	---	---	---
Offices	---	**Increases**	**Decreases**
Industrial	---	---	---
Retail	---	---	---
Hospitality	**Reduces**	---	---
Low Projected Population Growth			
Apartments	**Increases**	---	---
Offices	---	---	**Decrease**
Industrial	---	---	**Increases**
Retail	---	---	---
Hospitality	---	---	---
High Projected Income Growth			
Apartments	**Increases**	---	---
Offices	---	---	**Increases**
Industrial	---	---	---
Retail	---	---	---
Hospitality	---	---	---
Low Projected Income Growth			
Apartments	---	---	---
Offices	---	---	---
Industrial	---	---	---
Retail	---	---	---
Hospitality	---	---	---
Large (high population) Markets			
Apartments	---	---	**Decreases**
Offices	---	---	---
Industrial	---	**Reduces**	---
Retail	**Reduces**	---	---
Hospitality	---	---	---
High Income Markets			
Apartments	---	---	---
Offices	---	---	**Increases**
Industrial	---	---	**Increases**
Retail	---	---	---
Hospitality	---	---	---

Table 7: (cont.)

Panel D: Ownership Effects Implied by the Models (the impact on risk and risk-adjusted returns of a higher percentage of ownership by either insiders or institutions)

	Effect on Risk or Risk-Adjusted Return		
	Total Risk	Beta	Sharpe's Index
More Institutional Ownership			
Apartments	---	**Increases**	---
Offices	**Reduces**	**Increases**	---
Industrial	**Reduces**	**Increases**	---
Retail	**Increases**	**Increases**	---
Hospitality	---	---	---
More Insider Ownership			
Apartments	---	**Reduces**	---
Offices	---	---	---
Industrial	---	**Reduces**	---
Retail	**Increases**	**Increases**	---
Hospitality	---	---	---

Panel E: Size Effects Implied by the Models (the impact on risk and risk-adjusted returns of a larger market capitalization or larger relative portfolio size)

	Effect on Risk or Risk-Adjusted Return		
	Total Risk	Beta	Sharpe's Index
Larger Market Capitalization			
Apartments	---	---	---
Offices	**Reduces**	**Reduces**	**Increases**
Industrial	---	---	---
Retail	---	---	---
Hospitality	---	---	---
Larger Property Portfolio			
Apartments	**Reduces**	**Reduces**	---
Offices	---	**Increases**	---
Industrial	---	---	**Increases**
Retail	---	---	---
Hospitality	---	---	---

Table A-1: Results of Models Explaining REIT Portfolio Risks with Risk Measures Calculated Using a Longer Series of Daily Returns

Panel 1: Apartment Portfolios

	Log of Standard Deviation		Sharpe's Ratio		Beta	
Intercept	-0.363		0.242		-6.43E-03	
Incomplete data (dummy)	-0.393	***	0.118	**	-0.185	
Geographic Herfindahl Index	-0.841	***	-0.040		-0.408	*
Property Type Herfindal Index	1.861	***	-0.240		0.289	*
Relative Portfolio Size	-0.075	***	4.25E-03		-0.044	**
Self Managed	-0.243	*	0.053		-0.138	
Insider ownership	0.033		0.013		-4.34E-03	
Institutional ownership	0.030		7.87E-03		0.075	**
Effective Age less than 5	0.018		0.010		0.011	
Effective Age more than 10	0.053	***	0.010		0.039	*
High Population Growth	1.9E-03		5.24E-04		-4.30E-05	
Low Population Growth	9.1E-03	**	6.88E-03		1.09E-04	
Low Income Growth	0.015		4.36E-03		5.89E-03	
High Income Growth	0.018	***	-4.35E-03		0.011	
Large Markets	-8.14E-03		0.013	**	7.81E-03	
High Income Markets	-0.013		-2.44E-03		1.67E-05	
Debt/Equity Ratio	-0.107		-1.62E-03		7.09E-03	
Price/FFO Ratio	0.218		-1.65E-04		0.057	
Variable/Fixed Rate Debt Ratio	1.261		1.06E-03		0.133	
Total Market Capitalization	-0.011		9.84E-04		-6.03E-04	
Book/Market Ratio	-0.024		3.17E-04		-0.013	
R^2	0.868		0.706		0.604	
F	12.919	***	4.812	***	3.508	***

Table A-1: (cont.)

Panel 2: Industrial Portfolios

	Log of Standard Deviation		Sharpe's Ratio		Beta	
Intercept	0.287		-0.017		0.039	
Incomplete data (dummy)	-0.084		-0.014		-0.113	
Geographic Herfindahl Index	-0.039		0.073	**	0.249	*
Property Type Herfindal Index	0.569	**	-0.081	**	0.092	
Relative Portfolio Size	0.015		-2.76E-04	*	-0.012	
Net Leased	0.035		0.027	**	-0.046	
Self Managed	0.174	*	0.018		0.024	
Insider ownership	3.53E-03		-2.30E-03		-0.022	**
Institutional ownership	-0.074	***	0.016	**	0.018	*
Effective Age less than 5	0.027		8.88E-04		-7.01E-03	
Effective Age more than 10	-0.010		-7.97E-03	**	6.32E-03	
High Population Growth	-8.87E-03		0.017		1.65E-03	
Low Population Growth	0.015		0.012	**	-1.35E-03	
Low Income Growth	3.77E-03		-3.97E-03		5.33E-03	
High Income Growth	-7.81E-03		6.72E-03	*	4.78E-03	
Large Markets	-0.011		-3.95E-03		-5.81E-03	**
High Income Markets	4.00E-03		9.36E-03	**	9.97E-05	
Debt/Equity Ratio	-0.107		-1.62E-03		7.09E-03	
Price/FFO Ratio	0.218		-1.65E-04		0.057	
Variable/Fixed Rate Debt Ratio	1.261		1.06E-03		0.133	
Total Market Capitalization	-0.011		9.84E-04		-6.03E-04	
Book/Market Ratio	-0.024		3.17E-04		-0.013	
$\mathbf{R^2}$	0.470		0.544		0.517	
F	2.72	***	3.31	***	3.07	***

Table A-1: (cont.)

Panel 3: Office Portfolios

	Log of Standard Deviation		Sharp Ratio		Beta	
Intercept	0.140		0.060		0.156	
Incomplete data (dummy)	0.052		-0.012		0.045	
Geographic Herfindahl Index	0.115		-0.144	*	0.181	*
Property Type Herfindal Index	0.275		-0.098	*	-0.087	
Relative Portfolio Size	3.93E-03		5.34E-03		7.22E-03	**
Net Leased	-0.024		0.090	**	-0.187	**
Self Managed	0.084		0.122		-0.134	*
Insider ownership	0.016		-0.012	*	-5.09E-03	*
Institutional ownership	-0.074	***	5.32E-03		0.027	
Effective Age less than 5	0.010		-5.70E-04		4.15E-03	
Effective Age more than 10	-0.022		7.89E-03		5.39E-03	
High Population Growth	-2.09E-03		0.014	**	0.011	*
Low Population Growth	0.015		-4.14E-03	**	0.011	
Low Income Growth	5.99E-03		-9.16E-04		7.83E-03	
High Income Growth	0.011		4.74E-03	**	1.37E-03	
Large Markets	7.21E-03		-2.49E-05		-7.32E-03	
High Income Markets	-8.01E-03		5.03E-03	**	4.55E-03	
Debt/Equity Ratio	-0.107		-1.62E-03	***	7.09E-03	
Price/FFO Ratio	0.218		-1.65E-04		0.057	
Variable/Fixed Rate Debt Ratio	1.261	***	1.06E-03		0.133	
Total Market Capitalization	-0.011	***	9.84E-04	***	-6.03E-04	*
Book/Market Ratio	-0.024		3.17E-04		-0.013	
$\mathbf{R^2}$	0.380		0.309		0.386	
F	3.202	***	2.635	***	3.131	***

Table A-1: (cont.)

Panel 4: Retail Portfolios

Panel 4. Retail Portfolios	Log of Standard Deviation		Sharp Ratio		Beta	
Intercept	-1.025		0.162		-0.785	
Incomplete data (dummy)	-0.164		0.054		0.144	
Geographic Herfindahl Index	1.770	*	-0.042		-0.987	*
Property Type Herfindal Index	2.197	**	-0.071		-0.893	*
Relative Portfolio Size	-0.061	*	-3.04E-03		-8.88E-03	
Net Leased	1.151		-0.017		0.098	
Self Managed	-0.041		0.038	*	-0.499	*
Insider ownership	0.405	***	-8.42E-03		0.042	**
Institutional ownership	0.664	***	1.31E-04		0.071	***
Effective Age less than 5	0.028		4.86E-03		0.017	
Effective Age more than 10	-0.036	*	-7.29E-03		9.43E-03	
High Population Growth	7.87E-04		4.92E-03		0.020	
Low Population Growth	0.017		4.70E-03		-3.67E-03	
Low Income Growth	2.19E-03		-2.34E-03		0.012	
High Income Growth	-4.27E-03		1.39E-03		7.00E-03	
Large Markets	-0.043	*	4.56E-03		0.015	
High Income Markets	-0.010		-4.17E-03		0.018	
Debt/Equity Ratio	-0.107		-1.62E-03		7.09E-03	
Price/FFO Ratio	0.218		-1.65E-04		0.057	
Variable/Fixed Rate Debt Ratio	1.261		1.06E-03		0.133	
Total Market Capitalization	-0.011		9.84E-04		-6.03E-04	
Book/Market Ratio	-0.024		3.17E-04		-0.013	
$\mathbf{R^2}$	0.595		0.306		0.3512	
F	2.901	***	1.968	***	2.23	***

Table A-1: (cont.)

Panel 5: Hotel Portfolios

Panel 5. Hotel Portfolios	Log of Standard Deviation		Sharpe's Ratio		Beta	
Intercept	1.307		0.037		0.848	
Incomplete data (dummy)	-0.503	*	-0.094		-0.285	*
Geographic Herfindahl Index	-0.710		0.065		-0.502	*
Property Type Herfindal Index	-0.216		-0.141		0.138	
Relative Portfolio Size	0.011		-1.05E-03		0.015	
Net Leased	0.273		-0.015		0.337	*
Self Managed	0.267		0.023		0.281	
Insider ownership	0.052		0.010		-0.049	
Institutional ownership	-0.031		4.11E-03		-0.112	*
Effective Age less than 5	0.113		0.039	*	-5.34E-03	
High Population Growth	-9.44E-04		0.014		9.30E-03	
Low Population Growth	1.98E-03		-1.26E-03		1.34E-03	
Low Income Growth	2.42E-03		4.17E-03		1.30E-03	
High Income Growth	0.013		0.014		2.23E-03	
Large Markets	-0.004		-6.01E-03		0.011	
High Income Markets	2.78E-03		1.01E-03		0.129	
Debt/Equity Ratio	-0.107		-1.62E-03		7.09E-03	
Price/FFO Ratio	0.218		-1.65E-04		0.057	
Variable/Fixed Rate Debt Ratio	1.261		1.06E-03		0.133	
Total Market Capitalization	-0.011		9.84E-04		-6.03E-04	
Book/Market Ratio	-0.024	***	3.17E-04	***	-0.013	***
R^2	0.381		0.211		0.382	
F	2.117	**	1.840		2.075	***