A Risk Adjustment Model for REIT Evaluation

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For many years, there has been a large gap between REIT industry research and academic research. On the industry side, major research efforts have been devoted to analyzing various REIT risk measures such as debt levels, interest rate coverage ratios (EBITDA), lease terms, the volatility of prices, and the variability of FFO in business cycles. While this analysis has generated important insights about REIT risk, we do not know how these risks affect required rates of return. Further, we cannot properly assess the importance the market assigns to these risks since some of them may be diversifiable. As a result, many important questions in REIT asset pricing remain unanswered.

On the academic side, due to the lack of quality data, most studies have analyzed REIT returns using only NAREIT and other REIT index data.[1] While these studies have yielded important insights about the risk properties of REIT indexes, few insights are derived about the risks and pricing of individual REITs.[2]

This article tries to fill this gap in REIT analysis by developing a REIT risk adjustment model (RAM). Using the asset pricing technology in modern finance, we try to address the following questions.

First, what are the most important sources of macro-risk (systematic risk) in the REIT market? How much do these risks affect individual REIT returns? In other words, do rising tides (the overall REIT market, for example) lift all boats (REITs), or do different REITs have different sensitivities toward REIT market movements? Second, if we decompose REIT risk into two parts, systematic risk and firm-specific risk, how does the market price these two risks? In other words, do higher risks lead to higher required returns?

Third, given the various sources of risk and their different impact on returns, can one develop an overall risk index that directly associates REIT risk to required rates of returns? How do required rates of return affect past performance evaluation and future security selection? Finally, how do conventional measures of risk, such as the FFO payout, debt levels, interest rate coverage ratios (EBITDA), and the CAD multiple, relate to systematic risk and firm-specific risk? In the following sections, we present the RAM and some of its major findings.

METHODOLOGY

The economic intuition behind the RAM is quite simple. One can decompose all the factors affecting REIT returns into two major sources: macro-factors (systematic factors) and firm-specific factors. Changes in inflation, interest rates, private real estate market cycles, and other macroeconomic conditions all impact REIT returns. By the same token, changes in firm-specific factors,

such as lease terms, management quality, debt levels, interest rate coverage ratios (EBITDA), and local real estate market conditions, also impact REIT returns. Thus,

$$\text{Total REIT Risk} = \text{Systematic Risk} + \text{Firm-Specific Risk} \quad (1)$$

The difference between systematic risk and firm-specific risk is that systematic risk represents changes in the macroeconomy, which is not diversifiable, while firm-specific risk (unexpected changes) represents changes at the firm level, which can be diversified away. Since macroeconomic factors are too numerous to include in the model, finance researchers have decided to use asset portfolio returns to replace the macro-factors. The idea is that, because macro-factors cannot be diversified away, they should be rather purely reflected, in their net sum total effect, in well-diversified portfolios of liquid assets. Thus, any important changes in macroeconomic factors should get reflected in asset returns, such as bonds, stocks, and publicly traded real estate.

For this reason, we begin our study with a three-factor model, which has been shown by Mei and Lee [1994] to be capable of capturing most of the systematic risk premiums in the returns of REIT and other real estate indexes. The three factors are: a stock market factor (proxied by the S&P 500), a long-term bond market factor (proxied by a long-term bond index taken from Datastream), and a REIT market factor (the NAREIT index). Our objective is to find how the three market factors impact individual REIT returns and how important is the role of firm-specific risks.

Having measured the impact of systematic risks and firm-specific risks in REIT returns, our next objective is to find out how investors assign risk premiums to the systematic risks as well as the firm-specific risks. Assuming Equation (1) provides a good approximation of REIT returns, modern finance suggests the following asset pricing model, which relates risk premium (required rates of return) to various sources of REIT risks:

$$E(R) = a + b\beta + c\sigma \quad (2)$$

where E(R) is the expected return, β is the systematic risk, and σ is the firm-specific risk. It is worth noting here that Equation (2) is more general than the traditional arbitrage pricing model. It does not assume market efficiency, or the arbitrage pricing model will hold. In fact, it allows for the possibility that both systematic risk and firm-specific risk may help determine required rates of return.

The methodology used in estimating the RAM is similar to the two-step regression approach used by Fama and French [1992].[3] However, unlike Fama and French, the "risk factors" we examine for REITs are represented by our stock, bond, and NAREIT portfolios. Another difference is that our second-step regression is performed on mean excess returns rather than monthly excess return over time. This is because we have a different number of time series observations for different REITs. As a result, it might be difficult to aggregate the risk premiums estimated from different REITs over time. Also, this enables our second-stage regression results to be interpreted directly as indications of "risk premiums," or as average or expected returns per unit of factor risk (the "betas" associated with each of our three factors).

While Equation (2) provides empirical estimates of required rates of return based on the previously described RAM model, we also make use of *normalized forecasted total returns* derived in a different manner from Paine Webber's analyses. The normalized forecasted total return is based on REIT yield and growth potential, and is computed as indicated in Equation (3)

$$F(R) = d/P + g \quad (3)$$

where d is annual dividend, P is stock price, and g is expected growth in dividends. As we can see from Equation (3), the normalized forecasted total return is calculated by using a modified simple dividend plus growth (the "Gordon") model, where the growth rate, g, is estimated by the average of the last year's actual cash flow growth rate and the estimated growth rate for the next two years.

It is easy to see that, while this return projection has reflected REIT valuation levels and cash flow growth potential, it has not adjusted for risks. The normalized forecasted total return based on Equation (3) represents a reasonable best-guess forecast of what the return will actually be. In contrast, the RAM-based required total return from Equation (2) represents, in some sense, what the return "should be," considering risk (and equilibrium expectations).[4] Comparing these two measures, the difference yields a "risk-adjusted rating" for each stock.

DATA COLLECTION

To avoid sample biases, we have constructed our REIT data set to include all REITs (a total of 145) that existed between 1993 and 1997. In the final analysis, twenty REITs were dropped from the sample due to lack of enough monthly observations (less than twenty months). We collected data on monthly prices, dividend yields, and quarterly data such as FFO payout ratio, EBITDA, CAD growth,[5] and market capitalization. In order to compute monthly excess returns,[6] we use data on monthly returns on ninety-day Treasury bills. The returns in our study include capital gains as well as dividend yields, which are derived from the annual dividend yield.

ESTIMATION OF THE RAM

Using data for 145 individual REITs from the 1993-1997 time period, we proceed with our estimation process. In the first stage of our estimation, monthly excess returns of each REIT are regressed onto excess returns of the stock, bond, and NAREIT portfolios across time.[7] This is to derive the estimates of the three betas (systematic risk) and of the firm-specific risk measures (the non-systematic or idiosyncratic risk component of the volatility of each firm). In the second stage, we regress the time series (historical) mean excess returns onto the betas and firm-specific risks. This is the cross-sectional regression (across firms) used to derive the parameter estimates for Equation (2).

Our first empirical result is that the stock and bond market factors appear to have no direct impact on individual REIT returns in the presence of the NAREIT index.[8] Thus, our three-factor model reduces to a one-factor model, which is the REIT market factor. Using the one-factor model, we break total risk into its market (NAREIT beta) and firm-specific (idiosyncratic)

EXHIBIT 1
REITs with the Highest and Lowest NAREIT Beta

REIT	NAREIT Beta	R^2	Firm-Specific Risk	97 PW Forecast for 98 Average Total Return	97 PW Forecast for 98 Required Return
Highest Beta					
Koger Equity	1.88	38%	8%	15.1%	22.8%
Crescent R.E.	1.66	55%	5%	40.8%	17.0%
Mfd. Home Comm.	1.63	50%	5%	27.9%	18.1%
American Gen'l Hosp.	1.55	54%	5%	22.5%	18.2%
Sunstone Hotels	1.52	46%	5%	23.0%	17.8%
Starwood Hotels	1.46	23%	8%	45.0%	22.1%
Patriot American	1.44	37%	6%	27.6%	18.9%
Meridian Ind.	1.44	45%	5%	18.6%	17.7%
Summit Prop.	1.43	62%	3%	15.8%	15.0%
Chelsea GCA	1.42	58%	4%	18.6%	15.6%
Lowest Beta					
Mid-Atlantic	0.48	25%	5%	16.0%	17.5%
Capstone Capital	0.46	15%	3%	14.3%	15.1%
Universal Health	0.46	16%	4%	11.1%	15.3%
Hospitality Prop.	0.46	12%	4%	15.3%	15.6%
Essex Property	0.44	10%	4%	17.3%	15.9%
Storage USA	0.43	12%	4%	17.0%	15.3%
First Washington	0.41	15%	3%	15.5%	14.2%
Health Care REIT	0.33	4%	6%	15.1%	18.8%
U.S. Restaurants	0.22	2%	5%	23.6%	17.7%
Malan Realty	0.13	30%	4%	7.7%	16.4%

components. Analyzing the movements of individual stocks relative to the NAREIT index allows us to estimate betas for individual REITs as well as firm-specific risk factors. The resulting quantitative estimation for Equation (2) is presented as Equation (4):

$$E(R^i) = 0.099 + 0.003\beta_i + 1.474\sigma_i \qquad (4)$$

where $E(R_i)$ is the expected return to REIT "i," β_i is REIT i's beta with respect to the NAREIT index, and σ_i is REIT i's firm-specific (idiosyncratic) risk volatility (based on the residuals from the time series regression of firm i's average return onto the NAREIT index). Thus, Equation (4) is our empirically based implementation of the previously described RAM.

In the first column of Exhibit 1, we list the stocks with the highest and lowest NAREIT betas as well as the portion of total risk explained by beta (R^2).[9] For example, Crescent's beta is among the highest at 1.66. Exhibit 2 presents the stocks with the highest and lowest firm-specific risks. Keep in mind, however, that market risk (β_i) is only part of the equation. Some of each stock's variability, or risk, cannot be explained by movements in the market alone. Firm-specific risk (σ_i) identifies that portion of the variability in each firm's returns not explained by market movements. Exhibit 2 highlights the REITs in our universe with the highest and lowest firm-specific risk based on our analysis of historical returns.

The effect of the two types of risk is seen in the last column of Exhibits 1 and 2, based on Equation (4). For example, although Crescent had one of the highest betas (at 1.66), its required total return is just 17.0% because its firm-specific risk is relatively low. On the other hand, Starwood has a lower beta (1.46) but a higher required return (22.1%), because it has a higher firm-specific risk. The R^2 shown in the second column of the tables represents the portion of the firm's total risk

EXHIBIT 2
REITs with the Highest and Lowest Firm-Specific Risk

REIT	NAREIT Beta	R^2	Firm-Specific Risk	97 PW Forecast for 98 Normalized Return	97 PW Forecast for 98 Required Return
Highest Firm-Specific Risk					
Parkway Property	0.49	3%	9%	29.1%	24.5%
FAC Realty	0.62	5%	8%	8.3%	23.2%
Koger Equity	1.88	38%	8%	15.1%	22.8%
Starwood Hotels	1.46	23%	8%	45.0%	22.1%
Bedford Property	1.37	26%	8%	20.3%	22.2%
Crown American	0.55	5%	7%	8.4%	21.7%
New Plan Realty	0.70	5%	5%	15.5%	21.4%
Horizon Group	0.89	13%	7%	-8.6%	21.0%
Vornado Realty	1.09	23%	6%	42.1%	19.8%
Macerich Company	0.93	13%	6%	18.4%	19.8%
Lowest Firm-Specific Risk					
Sun Communities	0.87	40%	3%	16.2%	14.8%
CBL & Associates	0.84	40%	3%	15.9%	14.8%
Sovran Self Stor.	1.08	53%	3%	16.5%	14.6%
Simon DeBartolo	0.91	44%	3%	16.3%	14.6%
Charles E. Smith	0.99	49%	3%	16.3%	14.6%
Amli Residential	0.76	36%	3%	15.2%	14.4%
First Washington	0.41	15%	3%	15.5%	14.2%
Mid-America Apartments	1.03	52%	3%	15.5%	14.3%
JP Realty	0.88	48%	3%	14.4%	14.3%
Colonial Property	0.74	45%	2%	16.7%	13.5%

explained by the (presumably undiversifiable) market component (as represented by the NAREIT beta). For example, 55% of Crescent's total risk comes from the NAREIT index, while only 22% of Starwood's total risk derives from NAREIT. The portion of total risk (firm volatility) not explained by beta is firm-specific risk (σ_i).

We see in Exhibit 2 that Starwood has one of the highest firm-specific risk estimates (8%), with 78% (=100%-R^2) of its total risk explained by firm-specific factors. Crescent, on the other hand, has an average firm-specific risk of 4.5%, and only 45% of its total risk is explained by firm-specific factors.

The fourth column in Exhibits 1 and 2 present the PaineWebber normalized forecasted total return for 1998 for each stock, based on *end of 1997 information*, based on Equation (3).

To obtain a more intuitive understanding of the results, we sort all REITs according to their expected excess return levels and put them into high and low expected excess return groups, with sixty-three and sixty-two REITs in each group. We then compute various risk and return averages for each group. This comparison is presented in Exhibit 3. Note that the high expected return group had a higher monthly volatility of 6.16%, compared to 5.38% for the low return group. The systematic risk (β) for the high return group was 1.16, compared to 0.74 for the low return group. The firm-specific risk (σ) was also higher for the high return group (4.82% versus 4.70%). On average, the high expected return group was smaller in firm size as represented market capitalization ($1,290 million versus $1,648 million).

Exhibit 3 also suggests that ex post results are roughly in line with ex ante expectations based on our RAM. The high expected return (high-risk) group outperforms the low expected return (low-risk) group, with a mean return in excess of Treasury bills of 1.47% versus 1.00% per month during the 1993-1997 period. The risk-adjusted required rates of return for the two groups based on Equation (4) are 1.70% and 0.78%, respectively. As a result, the high return group on average actually did not meet its required rates of return based on our RAM during the sample period (1.47%-1.70% = -0.23%), despite the fact that it beat the performance of the NAREIT index (1.07% per month during the sample period). The opposite is true for the low risk group. It underperforms the NAREIT index but manages to outperform its required rates of return during the sample period (1.00%-0.78%=0.22%).

WHAT IS RELATED TO FIRM-SPECIFIC RETURNS, FIRM-SPECIFIC RISKS, AND BETAS?

One interesting question for REIT investors is how REIT valuation levels, such as CAD and FFO multiples, are related to risk levels (both systematic and firm-specific risks). In principle, such valuation levels should be related to both risk and growth expectations, with higher multiples associated with lower risk and/or greater growth. From a REIT management perspective, managers would like to know how to change their capital structure or payout policy to lower their risk levels perceived in the market and thus lower their required rate of total return (cost of capital). To address these questions, it might be helpful to examine the relationship between risks and various firm variables, such as debt/equity ratio, FFO payout ratio, and interest expense coverage ratios (EBITDA). Exhibit 4 provides estimates of these simple correlations. Only the boldface numbers in the Exhibit are statistically significant.

For firm-specific risk, we see in Exhibit 4 that only firm size has a significant correlation, and that is negative. In other words, small firms tend to have high firm-specific risk. This result makes sense, as smaller firms would typically have fewer individual properties, therefore less diversification of idiosyncratic property risk. The -40% correlation in the second column of

EXHIBIT 3

Comparison between High and Low Expected Return Groups 1993-1997

	High Return Group	Low Return Group
Monthly Volatility	6.16%	5.38%
Systematic Risk (Beta)	1.16	0.74
Firm-Specific Risk	4.82%	4.70%
Firm Size (Market Cap)	$1290 M	$1648 M
Monthly Excess Return	1.47%	1.00%
Required Excess Return	1.70%	0.78%
Outperformance (5-6)	-0.23%	0.22%

EXHIBIT 4
What Explains Firm-Specific Risk and Beta

Correlations	Firm-specific Risk	Beta
Debt/Equity	-0.05	-0.06
FFO Payout	-0.18	**-0.40**
EBITDA	-0.06	-0.13
FFO Multiple	-0.15	-0.13
CAD Multiple	-0.01	**0.32**
Size (market cap)	**-0.41**	-0.16
Dividend Yield	-0.07	-0.08
% Insider Equity	0.19	-0.09

Due to lack of observations, data for the CAD multiple, FFO payout, and debt/equity ratio are taken from 1997. The highlighted numbers are statistically significant.

Exhibit 4 suggests that high FFO payout firms tend to have lower betas. This is typical of non-real estate stocks and bonds as well, in which we observe that high-yield assets tend to have lower betas than growth stocks.

The +32% correlation between the CAD multiple and beta indicates that high-multiple REITs tend to have high betas. Thus, high-CAD multiple firms tend to be riskier in terms of systematic risk, but not firm-specific risk. In general, high-multiple firms tend to be those regarded as having greater growth prospects, and these tend also to be the largest firms. Thus, this result is consistent with the two previous results. Unlike high-yield assets, growth firms tend to be more risky in the stock market in general, not just among real estate assets. Yet we would expect large REITs to have larger numbers of individual properties, and therefore greater property-level diversification, helping to eliminate idiosyncratic risk.

Finally, Exhibit 4 indicates that other firm variables, such as debt/equity ratio, EBITDA, FFO multiple, size, dividend yield, and percent of insider holdings, show no significant correlation with systematic risks during the sample.

One implication may be that REITs can reduce their perceived level of systematic risk by increasing FFO payout.[10] However, one needs to be aware that increasing FFO payout may reduce CAD growth and thus lower future cash flows. As a result, one needs to strike a fine balance between risk exposure and cash flow growth.[11]

ADJUSTING RETURN EXPECTATIONS FOR RISK

Using both market- and firm-specific risk factors, we can compute the required total returns for each of the stocks in our universe, based on the previously described RAM. This required return for a given stock is the ex ante (going-in expected) total return that adequately compensates the investor for the risk taken on by owning the stock. This is given by Equation (2), as quantified by Equation (4). By comparing these required total returns to PaineWebber's normalized forecasted total returns based on Equation (3), the difference yields a "risk-adjusted rating" for each stock.

Exhibit 5 shows the stocks forecast to outperform their required return by the largest margin and the stocks forecast to underperform by the widest margin for 1998 based on end of 1997 information. For example, shareholders of Starwood Hotels should require an annual return of 22.1% (appreciation plus dividend) in order to be adequately compensated for the above-average risk associated with Starwood, according to our RAM. However, Starwood is projected to return 45%, more than double its required return. Thus, the projected risk-adjusted return for Starwood is 22.9%, placing it near the top of the list in Exhibit 5. Stocks at the bottom of the list are not expected to generate returns above what investors should require (see also columns 4 and 5 of Exhibits 1 and 2). While the 1998 return forecasts were off due to the bear market of 1997 in REITs, some of the high beta stocks have been particularly hard hit.

In addition to the individual stock analysis shown in Exhibit 5, we aggregate the individual company data by property type to look at historical returns and risk across different sectors. As shown in Exhibit 6, the mixed office and industrial category led the pack over the 1993-1997 period in terms of both risk and reward, with an average annual return of 47.4% versus a required annual return of 30.6%. The high hurdle for the mixed office/industrial stocks was a function of the highest average NAREIT beta (1.27) and highest firm-specific risk (6.8%) in the REIT universe.

The lowest-risk stocks were, not surprisingly, in the Healthcare and Triple Net sectors, both of which had average NAREIT betas of 0.70. The Healthcare sector proved to be the least risky of all sectors, with below-average firm-specific risk (4.0%) as well as a low NAREIT beta. Looking forward, the strongest performance on a risk-adjusted basis is being forecast for the Hotel and

EXHIBIT 5

Top and Bottom Ten REITs — Normalized Projected Return versus Required Return

REIT	NAREIT Beta	R^2	Firm-Specific Risk	1997 PW Forecast for 1998 Normalized Return	Required Return	Difference
Greatest Outperformance						
Crescent R.E.	1.66	55%	5%	40.8%	17.0%	+23.8%
Starwood Hotels	1.46	23%	8%	45.0%	22.1%	+22.9%
Vornado Realty	1.09	25%	6%	42.1%	19.8%	+22.3%
Mfd. Home Comm.	1.63	50%	5%	27.9%	18.1%	+9.8%
Patriot American	1.44	37%	6%	27.6%	18.9%	+8.7%
AIMCO	0.82	23%	5%	24.0%	17.0%	+7.0%
Equity Inns	0.68	16%	5%	24.0%	17.0%	+7.0%
Mack-Cali	1.17	44%	4%	22.5%	16.2%	+6.3%
U.S. Restaurants	0.22	2%	5%	23.6%	17.7%	+5.9%
FelCor Suites	0.87	19%	5%	24.4%	18.5%	+5.9%
Greatest Underperformance						
Western Investment	0.63	21%	4%	11.5%	16.0%	-4.5%
Lexington Corp. Prop.	0.78	23%	4%	12.0%	16.6%	-4.6%
Town & Country	0.86	26%	4%	11.7%	16.7%	-5.0%
Mark Centers	0.57	1%	5%	12.9%	18.2%	-5.3%
New Plan Realty	0.70	5%	7%	15.5%	21.4%	-5.9%
Koger Equity	1.88	38%	8%	15.1%	22.8%	-7.7%
Malan Realty	0.13	30%	4%	7.7%	16.4%	-8.7%
Crown American	0.55	5%	7%	8.4%	21.7%	-13.3%
FAC Realty	0.62	5%	8%	8.3%	23.2%	-14.9%
Horizon Group	0.89	13%	7%	-8.6%	21.0%	-29.6%

the Opportunity REIT sectors, both of which are forecast to exceed the required return in 1998 based on end of 1997 information.

CAVEATS AND CONCLUSIONS TO DATE

For many years, risk analysis based on modern financial economic theory and methods has not been an important part of REIT security analysis due to its complexity. This article develops a REIT risk adjustment model (RAM). This RAM represents state-of-the-art equilibrium asset pricing "technology" from the mainstream of the academic investments literature. This has led to several important empirical results about the REIT market.

First, high returns are often achieved with assumptions of extra risk. As a result, risk adjustments are absolutely essential in REIT security analysis. When we divide REITs into high-risk and low-risk groups, the high-risk group had a mean return in excess of Treasury bills of 1.47% per month, while the low-risk group had a mean excess return of 1.00% during the 1993-1997 period. Yet, on a risk-adjusted basis, the latter group may have outperformed the former.

Second, individual REIT risk can be decomposed into two parts: systematic risk and firm-specific risk. Contrary to classic academic theory (which says that diversifiable risk should not be priced), both parts of REIT risk are found to impact the required rate of returns of REIT. On average, systematic risk explains about 34% of REIT excess returns while firm-specific risk explains about 66% of REIT excess returns. While we cannot rule out the possibility that the use of some other macro-factors may reveal more systematic risk, it is worth noting that, on average, at least over 60% of REIT risks are not correlated with the systematic factors used here.

Exhibit 6
Sector Averages

	(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)		(9)	(10)
					1993-1997			1998 PW Forecast				
REIT	PW Risk Index	NAREIT Beta	R^2	Firm-Specific Risk	Average Annual Return	Required Annual Return	Out/Under Perf.	Average Forcasted Total Return	Required Return	Out/Under Perf.	1997 Market Cap ($M)	Number of Observations
REIT Average	**100**	**0.95**	**35%**	**5%**	**20.5%**	**20.5%**	**0.0%**	**17.4%**	**17.4%**	**0.0%**	**$1,470**	**43**
Malls	88	0.89	30%	4%	14.3%	18.1%	-3.8%	15.5%	16.6%	-1.1%	2,770	52
Shopping Centers	87	0.76	25%	5%	13.2%	17.9%	-4.7%	14.3%	17.1%	-2.8%	843	54
Factory Outlets	110	1.06	32%	5%	5.4%	22.7%	-17.2%	10.6%	17.7%	-7.1%	921	50
Hotel	110	0.99	24%	5%	30.2%	22.6%	+7.6%	23.3%	18.3%	+5.0%	1,950	36
Apartment	99	1.01	36%	4%	17.1%	20.4%	-3.3%	16.4%	16.1%	+0.2%	1,535	49
Mfd Homes	112	1.12	37%	4%	22.0%	23.0%	-1.0%	21.1%	16.8%	+4.2%	1,080	52
Self-Storage	86	0.86	31%	4%	21.9%	17.8%	+4.1%	15.5%	15.9%	-0.5%	1,567	42
Triple Net	81	0.70	19%	5%	23.3%	16.6%	+6.7%	15.7%	17.1%	-1.5%	866	47
Diversified	100	0.99	35%	4%	25.8%	20.6%	+5.2%	17.8%	16.6%	+1.2%	936	50
Opportunity	114	1.13	38%	5%	30.9%	23.4%	+7.5%	30.0%	17.0%	+12.9%	4,5.6	54
Office	126	1.09	29%	6%	41.1%	25.9%	+15.3%	20.8%	19.9%	+1.0%	1,626	60
Industrial	113	1.06	38%	5%	24.0%	23.3%	+1.4%	23.5%	18.2%	+3.0%	1,401	45
Mixed Office/Ind.	149	1.27	35%	7%	47.4%	30.6%	+16.8%	19.5%	21.2%	-1.6%	1,927	48
Healthcare	76	0.70	25%	4%	19.9%	15.5%	+4.4%	14.0%	16.1%	-2.1%	1,103	57

Column Definitions

Terms:

(1) PW Risk Index = (REIT Required return/Average required return) × 100.

(2) NAREIT Beta = Estimated coefficient from linear regression of REIT total excess return on the NAREIT Index.

(3) Represents the proportion of total risk explained by systematic risk (NAREIT Beta).

(4) The portion of total risk unexplained by systematic (NAREIT Beta).

(5) Historic total return price appreciation plus dividend yield.

(6) Required annual return = A + B × NAREIT Beta + C × Idiosyncratic risk.

(7) Dividend plus FFO growth; growth is calculated as the average of 1997 actual FFO growth and the estimated growth rate for 1998 and 1999.

(8) See (6) above. But B is based on forecasted REIT market premium.

(9) Total market capitalization, end of 3rd quarter 1997 (expect for HOT, which included the contribution from the ITT merger); values in $ millions.

(10) Maximum observations is 60 (5 year period × 12 months).

Third, our RAM provides several important clues to help investors understand risk-adjusted excess returns (outperformance) and risk exposures. We discover that only firm size has a significant negative correlation with firm-specific risk. Our results also suggest that high FFO payout firms tend to have lower systematic risk (beta). But high CAD multiple REITs tend to have high betas. Thus, high CAD multiple firms tend to be riskier and/or higher growth.

Finally, using estimates of required rates of returns for individual REITs, RAM advances *a new system for performance evaluation*. We find that many companies, such as Starwood, outperformed their risk-adjusted required returns while some other companies did not meet their risk-adjusted required returns during the 1993-1997 sample period.

Unfortunately, the RAM presented here is only a first step in our pursuit to understand risk and return relationships in the REIT market. It is certainly not a perfect risk measure. The NAREIT beta in the RAM is just a simple, easy-to-understand measure of REIT market sensitivity. It undoubtedly has its weaknesses. The actual relationship between beta and rate of return does not appear to be stable over a long time period, so constant updates of the model are required.[12] Moreover, beta itself appears to be time-varying and the risk-return relationship may fail to work for individual REITs due to M & A or other structural changes in the firm. Finally, betas can be very sensitive to the particular REIT market index against which they are measured. As a result, some analysts doubt if betas may be useful predictors of future required returns (see endnote 3).

We agree that the RAM presented here has not solved all our problems in measuring the variety of systematic and firm-specific risks that influence individual REITs and their portfolios. REIT returns are probably sensitive to general stock market swings, to changes in interest and inflation rates, to changes in national income, and, undoubtedly, to changes in local and national real estate markets. As a result, a single-factor model with NAREIT as the only systematic risk may not be able to capture all the systematic risks that REITs are exposed to. But this model has managed to capture a significant portion of the variation in REIT mean returns and the results appear to make good economic sense. Above all, our model underlines the crucial principle that the only way for investors to obtain higher long-run investment returns is to accept greater risk. And these risks can be quite heart-burning, as investors saw many of their favorite REITs, such as Crescent, take large plunges during the REIT bear market of 1998.

ENDNOTES

We are very grateful to David Geltner, the Managing Editor, for his many helpful comments. The usual disclaimer applies.

[1]See, for example, Chan, Hendershott, and Sanders [1990], Ling and Naranjo [1997], Liu and Mei [1992], Liu and Mei[1994a, 1994b], Mei and Lee [1994], Geltner and Mei [1995], and Peterson and Hsieh [1997].

[2]Major exceptions include Gyourko and Nelling [1996] and Redman and Manakyan [1995]. The first examines the relationship between firm diversification benefits and geographic location, while the latter examines the relationship among REIT risk-adjusted returns with financial and property characteristics. Also, Ling and Naranjo [1997a, 1998] have recently put forth an equilibrium pricing model that may in principle be applied at the individual REIT level.

[3]This is the famous article that demonstrated that, if you control for firm size and firm book equity-to-market equity ratio (BE/ME), then the traditional stock market "beta" (that is, the firm's normalized covariance with the stock market, the classical CAPM-based measure of systematic risk) has virtually no relation to stock returns. The two-stage procedure referred to here in fact has a long history, going back some twenty years earlier than the Fama-French study of 1992 (e.g., Black-Jensen-Scholes [1972] and Fama-MacBeth [1973]. In essence, you first run time series regressions to estimate the historical relationships between each firm (or portfolio) and the posited risk factors. This is the estimation of the so-called "factor loadings" (such as the traditional "beta") of each asset. Then, in the second stage, you perform cross sectional regression, regressing the asset returns (each period, or the mean of the returns across time) onto the factor loadings (e.g., onto the betas) just estimated in stage 1. This second-stage regression produces the estimates of the relationship between the risk factors and the stock returns. If one is using mean returns as the dependent variable, one can interpret the second-stage regression as estimating the risk premiums, or expected returns on the individual assets (or portfolios), as a function of the risk factor loadings (e.g., the relationship between a stock's beta and its average or expected return). The studies in the early 1970s found a positive relationship between beta and return. The 1992 Fama-French study found no such relationship for beta, but did find a positive relationship between BE/ME and returns, and negative relationship between firm size and returns. Both of these variables are correlated with beta so that the earlier findings regarding beta could have been caused by the BE/ME and size-effects. BE/ME and firm size are not "risk factors" them-

selves per se, but they may proxy for underlying risks such as business cycle risk.

[4]Our three-factor model in Equation (2) has not been developed from an explicit asset market equilibrium theory, but is similar in format to equilibrium models.

[5]CAD is PaineWebber's cash flow estimates adjusted for depreciation. It is computed as FFO minus 1) recurring capital expenditure, 2) net gains from land sales, and 3) straight-lined rents (pass-through properties only).

[6]We use excess returns over the Treasury bill for the regressions and then add back the Treasury bill to derive total expected returns, which is directly comparable to forecasted total returns.

[7]The term "excess returns" refers to the difference between the return and the T-bill return.

[8]Note that the average R-squared from estimation regressions of Equation (2) using the S&P only is 0.11; using bonds only it is 0.09; using NAREIT only it is 0.35; and using all three factors it is 0.38. Thus, the S&P and bond factors have very little independent explanatory power for the REITs. In previous asset pricing studies (see Mei [1993]), a single-factor model usually explains between 20%-40% of excess returns on U.S. individual stocks.

[9]The R^2 represents the proportion of total risk explained by market, or systematic, risk. In our example, CEI's R^2 of 55% indicates that 55% of CEI's risk can be explained by movements in the NAREIT index. The stock-'s sensitivity to these movements are reflected by beta. In statistical terms, the R^2 indicates how well the regression line (of which beta is the slope) "fits" the data.

[10]Our study also discovers that office REITs tend to have higher betas.

[11]It is not necessarily the objective of firm management to reduce the firm's risk, but rather to increase the firm's share value. Holding all else equal, reductions in the firm's risk will increase share value, but only if this is done without reducing present and future equity cash flow expectations and growth opportunities. The direction of the flow of causality (if any) is unclear in the relationship between payout and risk observed in Exhibit 4.

[12]For example, we have estimated the model for an earlier sample period of 1987 - 1992. We found that both the beta and the risk premiums are different from the later sample due to a change of REIT composition as a result of an explosion in REIT market capitalization in 1993.

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