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Evaluating Stock Price Volatility: The Case of REITs

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The Case of REITs

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Abstract

One of the most controversial topics in modern financial economics is "excess volatility:" the notion that stock prices move too much to be explained by fundamental economic and firm-specific factors. This article measures the degree of excess volatility in a special class of equities: real estate investment trusts (REITs). The structure of REITs, specifically, the constraints on dividend payout, the passive approach to asset management and the detailed data available on REIT composition, make them ideal for this investigation. The tests are conducted using the Shiller-West variance bounds methodology and by estimating the volatility of the underlying assets. We find that despite the absence of dividend smoothing behavior, REITs exhibit approximately the same level of excess volatility as determined in previous work in equities. This finding of excess volatility is confirmed in the second part of our analysis and confirms that dividend smoothing cannot explain excess volatility. Furthermore, it suggests that prices of securitized real estate vehicles like REITs follow a stochastic process that is very different from the process driving the underlying real assets.

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I. Introduction

One of the most debated issues in current financial economics is "excess volatility." Simply put, it is the notion that prices move too much to be explained by changes in fundamental factors, such as dividends, discount rates and basic supply/demand considerations. This issue has important implications for market efficiency, market microstructure and asset pricing.

The majority of the econometric tests are based on the simple present value relationship that forms the basis of the valuation of financial and real assets:

$$P_t^* = \sum_{i=1}^{\infty} \beta^i d_{i+t}$$

where P_t^* is the "rational" price at time t, β^i is the discount rate for cash flows *i* periods in the future and d_{i+t} is the payoff *i* periods from time *t*. The intuition is that, in an efficient market, the stock price is the discounted value of the future dividend stream.

Researchers (generally but not universally) have found that the variance of P_t^* is approximately five times the variance of the dividend series. This excess volatility puzzle, has a wide variety of possible economic explanations in addition to a broad range of econometric issues. One of the major economic explanations is that the excess volatility is an artifact of the relative smoothness of dividends. That is, because of market reactions to dividend changes, firms are very reluctant to cut dividends or to raise dividends unless they believe the increase is unlikely to be reversed in the short-term. This has been documented by many researchers, beginning with Lintner (1956). As will be noted below, tests of the relationship between dividend and price volatility assume a specific dividend process.[1] If dividends are exogeneously set by managers[2] a small change in dividends can have a large impact of future returns. By focusing on REITs a cleaner test of the dividend-price volatility relationship can be accomplished.

A different strand of literature attempts to explain the empirical results by refining the econometric approaches, in particular, to account for time-varying volatility and other possible sources of non-stationarity; these are described in the following section. In addition, there has been significant evidence that small sample tests are biased toward accepting excess volatility.[3] Finally, a number of researchers have shown that learning by rational agents plays a role in increasing volatility.[4]

This article adopts two unique approaches to assessing "excess" stock price volatility by focusing on a special class of equities: real estate investment trusts (REITs).[5] These are closed-end funds that own real estate assets of many different types. These equities are unique in that they are restricted to relatively passive management of their assets and have very little control over their dividend payouts. REITs, in contrast to regular corporations, are legally obligated to pay out at least 95% of their income as dividends.[6] This essentially removes the firm's discretion

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[1] For example, West (1988) assumes dividends follow an AR(q) process.
[2] See the extensive literature dealing with dividends as a signal of firm quality.
[3] See Flavin (1983) and Kleidon (1985, 1986).
[4] See Timmermann (1993). Related work is Spiegel (1996), which shows that, in an overlapping generations model, relatively small supply shocks can lead to very large price shocks.
[5] Other studies of excess volatility typically use market indices.
[6] See Appendix A for a overview of the organizational structure of REITs.

over the dividend payout and should make the above present value relationship a better fit than for typical equities or equity indices.

The second approach uses a unique data base to determine the key components of each REIT's holdings. Viewing the REIT as a portfolio of real estate assets lets us compare the volatility of the underlying assets to the REIT's volatility. REITs are the best type of equity for this type of test because of the transparency of their assets and the passive nature of their management. This work is related to emerging research that tries to link fundamentals to asset prices in an attempt to further assess concepts of "market rationality."[7]

These investigations into REIT volatility, we believe, will generate several benefits. Most important is the additional insight into the excess volatility phenomenon: By virtually eliminating the firm's dividend payout flexibility, we expect the basic present value relationship between expected dividends and prices to be a better fit than in previous studies. Our approach removes a major econometric problem, allowing us to focus on other factors that may cause excess volatility, for example, time-varying discount rates or other sources of non-stationarity. In addition, by having a precise estimate of the volatility of the underlying properties, we can test the relationship between the underlying asset volatility and REIT price volatility to gauge the extent to which market mechanisms can induce additional noise in prices.

A second set of benefits comes from a reconciliation of the difference in performance of the underlying real estate versus that of the securitized real estate, like REITs. The superior performance of direct investment in real estate can now be studied using transaction-based rather than appraisal-based returns and this performance can now be linked to the factors that influence REITs. In essence, we can isolate factors that affect REITs (as well as security prices in general), but not the underlying real estate.

The outline of this paper is as follows. Section II reviews the relevant econometric and real estate literature. Section III describes our data set. Section IV describes the econometrics. The fifth section presents our results and the final section presents conclusions and areas for future research.

II. Background literature

The initial finding of Shiller (1979, 1981) and LeRoy and Porter (1981) was that stock prices appear to be much more volatile than can be explained by the present value of dividend changes. Their techniques assume a present value relationship with a constant discount rate and stationary returns. These results came under criticism for these restrictions and also because of the well-documented tendencies of firms to smooth dividends.[8] Other critiques have been based on the fact that focusing entirely on dividends omits many other important components of return such as share repurchase.[9] The methodological aspects of this are

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[7] A good example is Ng and Pirrong (1994), which tries to link fundamentals of commodity supply and demand, such as the theory of storage, to the volatility of asset prices.

[8] For example, Marsh and Merton (1986).

[9] Ackert and Smith (1993) show that this broader definition of cash flows seems to mitigate the excess volatility problem considerably.

discussed in Section IV. The key result of this research, although not unanimous, is that there appears to be excess volatility in stock prices.[10]

In contrast to the finance literature, the real estate literature has not focused on excess volatility, perhaps because of the lack of adequate data. Controversy also exists as to whether using publicly traded, securitized real estate such as REITs is really representative of the underlying real estate in terms of risk and return. As such, two strands of literature have developed. The first involves studies focusing on the underlying real estate as proxied by commingled real estate funds (CREFs). CREFs are real estate mutual funds established solely for institutional investors that invest in institutional grade properties. Although shares in a CREF are not publicly traded, the CREF will buy back shares at the net asset value (appraised value) in principle.[11] CREF studies have typically focused on the understatement of risk arising from the smoothed nature of appraisal-based returns. Studies that have looked at the understatement of real estate risk arising from the smoothed nature of appraisal-based returns include Giliberto (1988), Firstenberg et al. (1988) and Geltner (1989). This smoothing bias is important not only in terms of portfolio construction, but also in terms of measuring performance. In the former case, if variance is artificially understated, an overweighting of that asset will occur. In the latter case, smoothing bias creates an upward bias in the risk-adjusted performance of real estate funds.

The second set of studies focuses on the systematic components of risk using publicly traded REITs. Studies such as Titman and Warga (1986), and Chan, Hendershott and Sanders (1990), have examined the risk-adjusted performance of equity REITs using an arbitrage pricing framework. More recently, Liu and Mei (1992) examine whether the variation in the expected excess returns on REITs is predictable and if it arises, in part, from movements in the real estate cap rate.[12] In a related paper, Liu and Mei (1994) use a present value model that allows for a time-varying expected discount rate in conjunction with a vector autoregressive process to decompose real estate risk. They find that the variance of unexpected returns accounts for most of the total risk with cash-flow risk accounting for twice as much of the unexplained real estate risk, although discount rate risk is also an important factor. Note that this evidence suggests that dividends are a meaningful predictor of future REIT performance in contrast to some recent studies that indicate that dividends have little predictive power over longer horizons.[13]

This study examines whether the stock market creates excess volatility for securities such as REITs with respect to the volatility of the underlying asset. This excess volatility may be a result of the unobservability of commercial real estate transactions, e.g., prices are not reported on a trade-by-trade basis (see Damodaran and Liu (1993)). On the other hand, the prices of equity REITs, which represent prices of a portfolio of commercial real estate, are publicly observable.

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[10] A related issue is regime shifts in volatility. While earlier studies have shown that option implied volatility does not have predictive power, Christensen and Prabhala (1998), using a longer time series and post-1987 data, show the opposite for index options.

[11] Liquidity problems can arise when CREFs have too many investors wanting to sell their units and there are not enough buyers, not enough cash available and/or the liquidation of properties is not timely.

[12] The cap rate is the ratio of net stabilized earnings to the transaction price (or market value) of a property. Net stabilized means that the income figure used in the numerator of the ratio assumes that the building's vacancy is equal to or less than the vacancy of the market. Alternatively, the cap rate can be viewed as the earnings-price ratio on direct real estate investment.

[13] Benartzi, Michaely and Thaler (1997).

III. The Data

Our data consist of publicly traded equity REITs that satisfy two basic criteria. They must be listed in *The SNL REIT Quarterly (December 1995)* published by SNL Securities in order to allow us to determine the underlying asset base. The REIT must also have data available on both the CRSP daily return and the COMPUSTAT quarterly data bases over the study interval. This selection process yields an initial sample of 125 REITs. For each equity REIT, SNL provides a detailed description of the composition of the REIT portfolio. The data include a property-by-property breakdown of the property type, location, year built, year acquired by the REIT, property size, total historical cost of the property, debt collateralizing the property and accumulated property depreciation. A sample page from The *SNL REIT Quarterly* is included in Appendix B.

Returns on the underlying commercial real estate are obtained from the *National Real Estate Index (NREI)*, published by the Liquidity Financial Group. The NREI value-weighted indices[14] possess several advantages over real estate indices used in previous studies. Most importantly, the indices are transaction-based and as such do not suffer from appraisal smoothing bias.[15] The indices are available for 56 Metropolitan Statistical Areas (MSAs) and consist of four property types per MSA: office, industrial warehouse, retail and apartment. The NREI data series is semi-annual from 1985[16] until 1994, when it becomes quarterly. The data used to construct the indices are drawn from 150 of the largest financial institutions, pension funds, life insurance companies and real estate brokers.

IV. Methodology

In this research, we will examine REIT volatility in two distinct ways:

- Using the variance bounds approach to see how REIT volatility is related to future dividends and discount rates; the methodology is based on Shiller (1981), West (1988) and Cochrane (1991).
- Using the variation in the components of the REIT to measure the relationship between REIT volatility and the volatility of the REIT components.

The first segment of our study tests for excess volatility using econometric techniques based on the fundamental present value relationship. A brief summary of our approach and some of the relevant issues follows.[17]

This literature, at least from a methodological perspective, begins with the Shiller (1979, 1981) and LeRoy - Porter (1981) variance bounds tests. These models begin with the relationship (using the notation from section I):

[14]Indices are value-weighted using local market property stock weights from the *F.W. Dodge/McGraw-Hill* building stock data base and reflect the value of Class A properties.

[15] Appraisal smoothing bias arises from the timing of appraisals. Most firms have property appraised on an annual basis. The appraisal results in a large adjustment to value in the same quarter each year, distorting variance measures.

[16]Not all MSAs have return data starting in 1985.

[17]An excellent reference is Gilles and LeRoy (1991), from which some of this section is drawn.

$$P_t^* = \sum_{i=1}^{\infty} \beta^i d_{i+t}$$

In a rational expectations setting, the market price should then be

$$P_t = E(P_t^* | I_t)$$

with I_t representing the investor's information set[18] at time t. Under stationarity assumptions, letting $Var\ (r)$ be the variance of the excess return, this leads to

$$Var\,(P^*) = Var(P) + \frac{\beta^2\, Var\,(r)}{1 - \beta^2}$$

This important characterization leads to a number of inequalities. Very simply we obtain the basic bounds test

$$Var\,(P^*) \geq Var\,(P)$$

If we now restrict the information set at time t to only current and past dividends (denoted H_t) and let $\hat{P}_t$ be the corresponding price, then

$$Var(\hat{P}_t) \leq Var(P)$$

These so-called first-generation models, in general, have indicated that the volatility of prices is much higher than the volatility of dividend and discount rate changes. However, these conclusions have been criticized on a number of econometric dimensions. The two criticisms most important to our analysis concerns the apparent smoothing of dividends that has been empirically observed since the 1950s,[19] and the fact that taking a broader characterization of payoffs than just dividends seems to mitigate the excess volatility.[20]

The "second generation" models address the stationarity problem. For example, West (1988) creates an upper bound by considering the restricted information set H_t. Using the definition of $\hat{P}_t$ and letting $P(\ |\ )$ denote the projection, let

$$P_{t,H} \equiv \lim_{j \to \infty} P\left(\sum_{i=0}^{j} \beta^{i+1} D_{t+1} | H_t \right)$$

and

$$P_{t,I} \equiv \lim_{j \to \infty} P\left(\sum_{i=0}^{j} \beta^{i+1} D_{t+1} | I_t \right)$$

West shows that

$$E\left[P_{t,H} - P(P_{t,H} | H_{t-1})\right]^2 \geq E\left[P_{t,I} - P(P_{t,I} | I_{t-1})\right]^2$$

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[18] More specifically, I_t is the linear space spanned current and past observable variables (including dividends); $I_t \subset I_{t+1}$ as in the usual filtration.

[19] See, i.a., Fama and Babiak (1968) and Lintner (1956).

[20] See Kleidon (1986), Marsh and Merton (1986) and Ackert and Smith (1993).

This inequality means that the variance of the price is greater under the less informative filtration. It provides a test of excess volatility that does not assume stationarity.

In the second section of our analysis, we view the REIT as a portfolio of the underlying real estate assets. As such, we construct a portfolio that mimics the holdings of each REIT using NREI returns on office, industrial, retail and apartment properties for 56 MSAs. This procedure assumes that the return on a given REIT is highly correlated to the appropriate NREI property type for a given MSA. The initial cost of each property is used as the weight in calculating the return on each mimicking portfolio. Using this procedure, we kept all REITs in which we were able to mimic/replicate at least 75% of their holdings. We estimate the variation of the assets from the variation in the return index. Note that because of the relatively stickiness of the NREI cap rate series (essentially local discount functions on real estate returns), our volatility estimates are driven by the volatility of the capital gains return series. Using standard portfolio theory approaches, we then aggregate the asset returns to estimate the overall REIT portfolio return.

V. Empirical Analysis

The first test for REIT volatility involves constructing a REIT index. This creates a number of difficulties not present in previous studies. For example, since REITs only began actively trading in the early 1970s, we have a relatively short time span for testing. Also, since the majority of REITs were created in the 1980s, we have a varying number of REITs in our index. Thirdly, especially in the early years of our sample, there are some missing observations. The constructed index gives quarterly rates of return on all available REITs from June 1974 to June 1996. The rates of return include capital gains and all cash distributions. Recall that Ackert and Smith (1993) suggest that a major problem with volatility tests is that the definition of dividends includes only cash dividends. They include all distributions to shareholders and find that the variance inequalities of Shiller and West are not violated for their sample. Therefore, our definition of dividends includes all cash and share distributions to shareholders from ordinary dividends, special dividends and mergers.

The index is a value-weighted index of all REITs traded in the NYSE, AMEX and NASDAQ. In case of missing returns, we interpolate returns for the missing period using the end points.[21] The price index is deflated by the quarterly producer price index,[22] which is the benchmark used in most studies of stock price volatility. The index is constructed similar to the S&P index, with the divisor being adjusted for addition of new companies and delisting of companies.

We perform Shiller's and West's volatility tests on our REIT index data. The tests using Shiller's methodology are conducted on a deflated and detrended price series while the tests using West's methodology are conducted on the deflated price series and the first difference of the dividend series. More specifically, for the first set of tests, the price series and total dividends series in a quarter are constructed using CRSP data. Both are deflated by dividing by the producer price index for that quarter. Define γ as the one period discount rate and r as the real interest rate.

[21] Note that this would cause a slight downward bias in our estimates of REIT volatility. However, interpolation is used in less than .01% of the observations.

[22] The details of the procedure can be found in Shiller (1981).

Then $\gamma = \frac{1}{1+r}$. Let $\lambda = 1 + g$ where g is the growth rate. This growth rate is obtained by regressing the log of the real price series on a constant and time. We set $\lambda = exp(b)$ where b is the slope coefficient in the above regression. The price series is detrended by dividing the price at t by λ^t and the dividend paid in year t by λ^{t+1}.

The real discount rate, $\bar{r}$, is the average detrended dividend divided by the average detrended price. Note that this detrending is nonlinear. $\bar{\gamma}$ is the real discount factor for the detrended series. The terminal value of p^* is taken as the average level of p, the detrended real price. Since $P_t = E(p_t^*)$, we expect that $var(p_t^*) > var(p_t)$. This is the main inequality tested in Shiller and it is grossly violated in our data set.

Figure 1 shows the comparison of the perfect foresight price and the actual price index. Clearly, a casual inspection reveals that variance bounds are grossly violated. Table 1 reports further results. The variance of the perfect foresight price is less than one-fifth the variance of the actual price. Other figures are shown for comparison. This is a very important result: even in the absence of any ability to smooth dividends, prices show far too much volatility to be accounted for in dividend changes. Figure 2 shows the data with other cash distributions included. The results are nearly exactly the same as the data presented in Table 1 and Figure 1, showing that adding these distributions does not explain excess volatility. This result is in contrast to Ackert and Smith's (1993) finding.

For the second part of this analysis, note that the key idea in West's paper is that variance of the price based on a smaller information set has to be larger than the variance of the price based on a larger information set. The actual market price of any security is based on the market's information set which is clearly larger than that on any specific instrumental variables that could be used. This is captured in the inequality:

$$E\left[x_{tH} - P(x_{tH} | H_{t-1})\right]^2 \geq E\left[p_t + d_t - E(p_t + d_t | I_{t-1})\right]^2$$

Here the left-hand-side is the innovation in the present value of dividends based on a restricted information set; the right-hand-side is the expected innovation in the present value of dividends based on the market's information set. Since the market's information set cannot be directly observed, we use an instrumental variables approach to estimate the discount model

$$p_t = b(p_{t+1} + d_{t+1}) + u_{t+1}$$

using Hansen and Singleton's two-step, two-stage least squares with lagged differences in dividends as instruments. The left-hand-side

$$\Delta^2 d_{t+1} = \mu + \phi_1 \Delta^s d_t + \ldots + \phi_q \Delta^s d_{t-q-1} + v_{t+1}$$

is estimated assuming that dividends follow an *ARIMA(q, s, 0)* process, where $s = 1$, using ordinary least squares with parameter estimates adjusted for heteroscedasticity. The parameter vector to be estimated is $\theta = (b, \mu, \phi_1, \ldots, \phi_4)$.[23]

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[23] The lag length q for dividends was chosen to be four as in West. In his case, a lag length of two for the differenced process is sufficient to capture the dynamics of the dividend process. However, in our data, the dividend process has significant first and fourth order autocorrelations and therefore we conduct tests with $q = 4$.

The variance- covariance matrix of θ is calculated following Hansen (1982) with the Newey-West procedure to ensure positive semidefiniteness of the resulting matrix. Table 2 reports the results of applying West's approach. This test is conducted on the deflated price series and a first differenced dividend series. The autocorrelation coefficients for u and v are insignificant, thus we can safely accept the null hypothesis of no serial correlation. The instrument residual orthogonality condition has a value of 7.94, which is insignificant at the 5% level.

In addition, the sample was split into two subsamples of equal size and the analysis was carried out in the subsamples to check for stability of the coefficients. The Wald statistic for stability .0038, which is highly insignificant. Thus, the parameter estimates of b are quite stable. Therefore, there is no gross expectational error in the residuals. The discount rate b is plausible and quite precise. West's inequalities (given above) are grossly violated. The asymptotic z-statistic (ratio of the parameter estimate to the standard error) is 2.23. Thus, the rejection is significant at the 5% level.

The final part of the empirical analysis uses data on the composition of REITs to measure the relationship between the volatility of the underlying assets and the volatility of the REIT. The data displayed in Table 3 refer to the analysis for residential REITs. From the original sample of 41 residential REITs, we eliminated those for which we could not match at least 75% of the dollar-value of properties to the NREI data.[24] For the remaining REITs, we treated the REIT as a portfolio of the underlying real estate index returns, summing the capital gain return and the "cap rate" return to generate a quarterly return figure for each MSA from 1992 to 1996. Using dollar-value weights, these returns were then aggregated to create a proxy for the REIT. In effect, we are looking at the volatility of the underlying non-traded assets versus the volatility of the traded, securitized asset. Again, the assumption of excess market volatility would suggest that the REIT volatility exceeds the volatility of the underlying assets. Table 3 summarizes these results. Consistent with the Shiller-West analysis shown above, it provides further evidence of excess volatility. The average REIT volatility was 2.775 times the volatility of the underlying asset base. In only one of the 11 cases did the underlying asset volatility exceed the REIT volatility.

[24] The remaining proportion of the REIT was essentially assumed to have the same volatility as the proportion that could be matched to NREI data.

VI. Conclusions

By examining this restricted class of equities, we have been able to focus more precisely on the issues of excess market volatility and noise trading. This research develops some strong and perhaps surprising facts. Firstly, despite the lack of dividend smoothing in REITs, we find that the REIT volatility is approximately five times the volatility of the underlying dividend series - a figure roughly comparable with the initial Shiller findings. This suggests very strongly that dividend smoothing does not play a major role in explaining excess volatility. This result holds equally strongly when the definition of dividends is expanded to include other forms of cash distributions, such as share repurchase. Applying West's second-generation models we again find the excess volatility of the REIT index corresponds very closely to the excess volatility found for the S&P500 index. Finally, when examining the volatility of the underlying asset base, we find that REIT volatility is almost three times greater than the underling asset volatility: further evidence of excess market volatility.

The results of this analysis suggest that the structure and mechanism of domestic equity markets contribute to volatility. The fundamental variables examined here simply do not explain the observed magnitudes of stock price movement. In addition to the implications for market efficiency, this result also has some practical implications for real estate investment. In particular, it shows that investment in securitized real estate vehicles like REITs may not be a good proxy for direct investment in real estate.

Table 1: Excess volatility estimates: Shiller and REITs

	Shiller's S&P500 results (annual data)	REIT index results (monthly data)
Expected index value	145.5	2.616
Expected dividend (%)	6.989	1.698
$\bar{r}$ related to the discount function via $\bar{\gamma} = \frac{1}{1+\bar{r}}$	.048	.0192
b the exponent of the power function used to de-trend the data series	.0148	.0179
$\sigma(p)$ Standard deviation of index	50.12	36.215
$\sigma(p^*)$ Standard deviation of perfect foresight series	8.968	7.1562

Table 2: Regression results

Parameter	Value	Standard error
b	0.944	.0152
μ	.03398	.0217
ϕ_1	.48336	.0875
ϕ_2	--.1332	.0646
ϕ_3	-.1049	.1319
ϕ_4	.3614	.0920
σ_u^2	53.1362	19.5849
σ_v^2	.04900	.0180

Figure 1: REIT index versus perfect foresight model

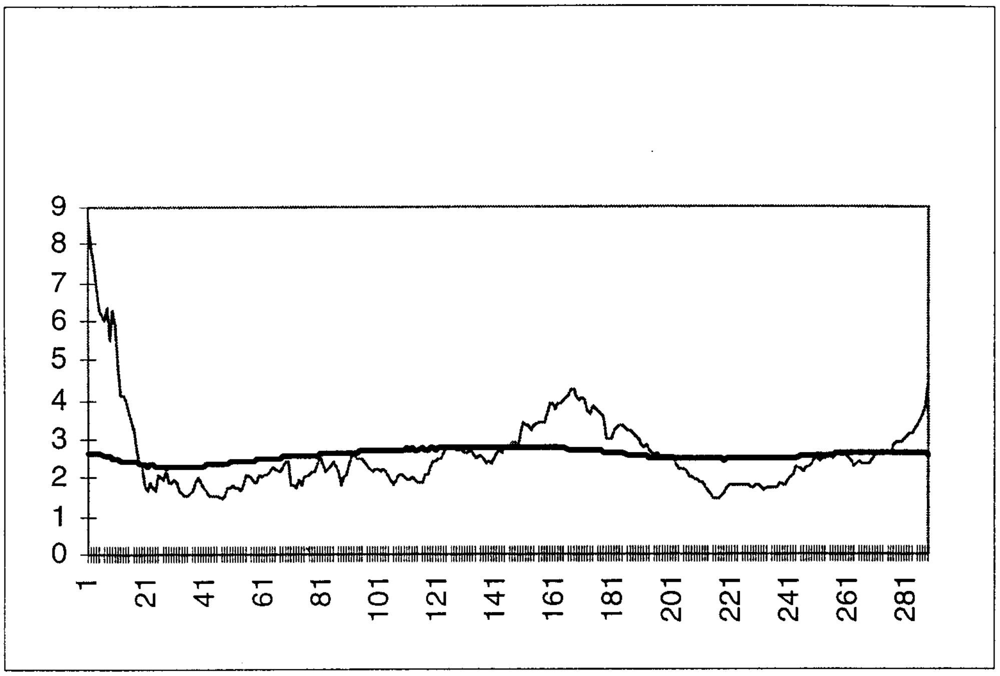

Figure 2: REIT index with other distributions versus perfect foresight model

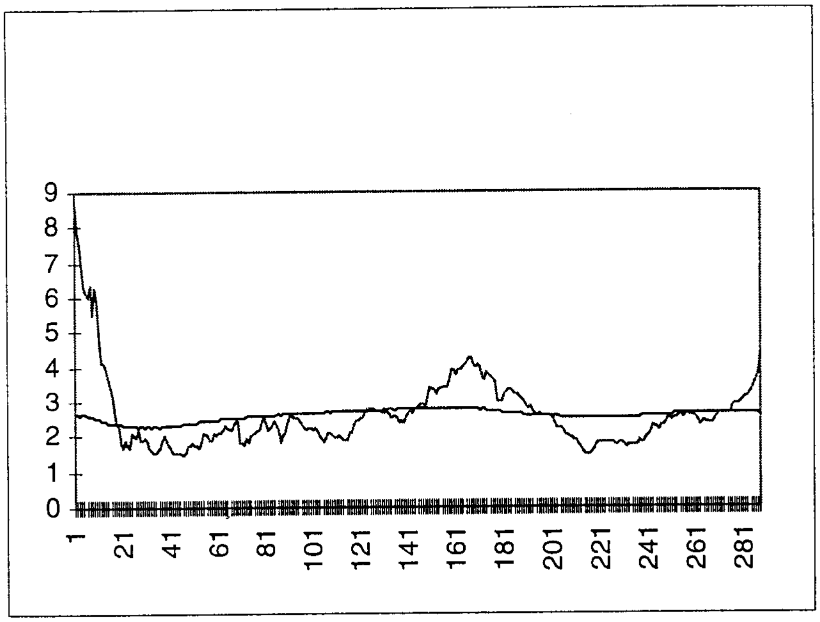

Table 3: REIT volatility versus volatility of asset base

REIT	Size ($-millions)	% of assets matched	REIT volatility (%)	Asset volatility (%)	*REIT volatility* / *Asset volatility*
AMLI Residential	485.4	94.3	9.67	9.16	1.056
Berkshire Realty	410.9	83.3	12.15	6.42	1.900
Columbus Realty Trust	304.9	91.5	12.39	11.44	1.083
Continental Mortgage	178.0	76.1	23.58	4.79	4.923
Columbia Dock and Canal	77.1	87.7	26.26	3.77	6.966
Equity Residential	2003.3	80.7	12.52	3.54	3.537
Irvine Apartment	848.1	100.0	14.28	5.96	2.400
Merry Land & Investment	869.7	76.8	23.56	6.29	3.746
Oasis Residential	458.3	99.5	6.09	5.25	1.160
Post Properties	783.8	100.0	6.81	11.45	0.595
South West Property	330.4	90.5	24.94	7.87	3.169
Average	613.6	89.1	15.659	6.904	2.775

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Appendix A: The REIT Structure

Real estate investment trusts (REITs) were created to give small investors the opportunity to invest in a diversified real estate portfolio. They are analogous to common stock mutual funds. Ownership in a REIT is evidenced by shares of beneficial interest which are similar to shares of common stock. REITs typically trade on a national stock exchange although some private REITs exist. Three major types of REITs exist. Equity REITs are REITs that take an equity position in the real estate. Mortgage REITs, in contrast, invest in a pool of mortgages while hybrid REITs invest in either the debt or equity of the underlying real estate.

REITs came into existence on January 1, 1961, as an amendment to the Internal Revenue Code (Sections 856-858). Under this amendment, a REIT is not taxed on distributed taxable income if it satisfies certain provisions. These requirements include:

(1) at least 95 percent (90 percent prior to 1980) of net annual taxable income must be distributed to shareholders
(2) at least 75 percent of annual gross income must come from rents, mortgage interest, gains from selling real estate, and dividends from investing in other REITs
(3) at least 75 percent of all assets must consist of real estate, mortgages on real estate, shares of other REITs, cash or government securities
(4) at least 95 percent of the REIT's gross income must come from items qualifying under the 75 percent income test, dividends and interest income, and gains from the sale of stock and other securities[25]
(5) at least 100 shareholders must exist with no more than 50 percent of the shares held by five or fewer shareholders
(6) it must elect to be treated as a REIT
(7) real property must not be held primarily for sale in the ordinary course of business (gains from the sale of property held for less than four years must comprise less than 30 percent of gross income)
(8) trustees, directors, or employees of a REIT are restricted from actively managing or operating REIT property, although they are permitted to make property decisions if such decisions relate to the business of the REIT itself.

These regulations are designed to ensure that REITs will be passive investment vehicles. If these provisions are met, then income is taxed only at the shareholder level. However, the trust is prohibited from passing through any operating losses to shareholders as a tax credit.[26]

[25]For the 95 percent test of income, an additional 20 percent of income must be either passive or qualified under the 75 percent rule.
[26]The unique characteristics associated with REITs have allowed researchers to use REITs as a controlled alternative to the standard corporation in investigating a variety of issues. Chiang, Ling, and Venkatesh (1989) use the 95 percent taxable income payout requirement to test whether an information asymmetry cost exists for REITs when earnings and dividend announcements are separated from each other. Howe and Shilling (1988) use the fact that REITs do not pay any corporate taxes to examine several hypotheses concerning the market reaction to announcements of new security issues. Allen and Sirmans (1987) examine whether REIT mergers exhibit the same pattern of wealth distribution as corporate mergers given that the 75 percent passive income restriction for REITs rules out some classic corporate merger motives such as production synergy and monopolistic power. Palmon and Seidler (1978a, 1978b) and Hite, Owers, and Rogers (1984) investigate if market inefficiencies exist with respect to the current value reporting of real estate companies and real estate spin-off announcements, respectively. More recently, Damodaran and Liu (1993) use REITs that choose to reappraise themselves to show that insiders trade on appraisal information in the time that elapses between the appraisal and its public announcement. Damodaran, John, and Liu (1996) look at the determinants associated with why real estate firms change their organizational form to and away from a REIT structure.

Appendix B

Sample Page from the SNL REIT Quarterly, 1995 Edition

PROPERTY LISTINGS

Crescent Real Estate Equities Company (CEI)

Property Name	City/County	ST	Percent Owned	Year Built	Year Acquired	Size	Occupancy Rate (%)	Average Rent ($)	Unit Type	Encumbrance ($000)	Enc. Type	Total Cost ($000)	Values As Of
Retail Properties						*(Size given in Owned GLA)*							
Woodlands Retail Properties	The Woodlands	TX	75.00	1996	1996	.	87.00	12.29	Y	0	.	30,288	12/31/96
Shopping Center Properties						*(Size given in Owned GLA)*							
Crescent Atrium	Dallas	TX	100.00	1985	1994	88,623	.	.	.	239,000	C	230,651	12/31/96
Las Colinas Plaza	Irving	TX	100.00	1986	1994	.	93.00	14.65	Y	161,000	C	10,994	12/31/96
Office Properties						*(Size given in Sq. Ft.)*							
North 24th Street 6225	Phoenix	AZ	100.00	1980	1996	85,451	.	.	.	0	.	7,359	12/31/96
Two Renaissance Square (6)	Phoenix	AZ	100.00	1990	1994	476,373	74.00	22.97	Y	161,000	C	57,168	12/31/96
Chancellor Park	San Diego	CA	100.00	1988	1996	195,733	90.00	18.19	Y	0	.	31,463	12/31/96
Spear Street 160 (6)	San Francisco	CA	100.00	1984	1996	276,420	20.00	20.48	Y	0	.	35,656	12/31/96
AT&T	Denver	CO	100.00	1982	1997	170,000	92.00	12.32	Y	.	.	.	12/31/96
Citadel	Denver	CO	100.00	1987	1994	130,652	98.00	16.75	Y	239,000	C	22,468	12/31/96
Cook 44	Denver	CO	100.00	.	1997	123,000	.	.	.	.	.	.	02/28/97
MCI Tower (6)	Denver	CO	100.00	1982	1996	550,807	97.00	17.21	Y	63,500	C	56,672	12/31/96
Madison 55	Denver	CO	100.00	.	1997	125,000	91.00	16.27	Y	.	.	.	12/31/96
Ptarmigan Place	Denver	CO	100.00	1982	1996	418,566	65.00	13.93	Y	161,000	C	32,277	12/31/96
Regency Plaza One	Denver	CO	100.00	1985	1994	309,862	97.00	18.73	Y	239,000	C	33,042	12/31/96
Miami Center	Miami	FL	100.00	1983	1997	782,686	78.00	1.74	Y	0	.	131,500	06/30/97
Poydras 1615 (6)	New Orleans	LA	100.00	1984	1996	508,741	74.00	14.55	Y	0	.	37,188	12/31/96
Central Park Plaza	Omaha	NE	100.00	1982	1996	409,850	98.00	14.17	Y	0	.	25,853	12/31/96
Albuquerque Plaza (6)	Albuquerque	NM	100.00	1990	1995	365,952	90.00	17.83	Y	161,000	C	36,987	12/31/96
Bank One Tower (6)	Austin	TX	100.00	1974	1995	389,503	99.00	14.55	Y	0	.	39,310	12/31/96
Barton Oaks Plaza One	Austin	TX	100.00	1986	1995	99,792	94.00	18.51	Y	161,000	C	10,137	12/31/96
Congress Avenue 301	Austin	TX	50.00	1986	1996	418,338	86.00	23.85	Y	26,000	M	45,260	12/31/96
Frost Bank Plaza	Austin	TX	100.00	1984	1996	433,024	68.00	16.35	Y	0	.	36,019	12/31/96
Aberdeen	Dallas	TX	100.00	1986	1996	320,629	100.00	15.82	Y	239,000	C	26,766	12/31/96
Bank One Tower-Dallas	Dallas	TX	50.00	1987	1997	1,500,000	.	19.52	Y	.	.	.	08/31/97
Carter Crowley-Far N. Dallas A	Dallas	TX	100.00	.	1997	494,496	98.00	12.67	Y	.	.	.	12/31/96
Carter Crowley-Far N. Dallas B	Dallas	TX	100.00	.	1997	40,525	100.00	10.75	Y	.	.	.	12/31/96
Carter Crowley-LBJ Freeway A	Dallas	TX	100.00	.	1997	213,915	89.00	13.08	Y	.	.	.	12/31/96
Carter Crowley-LBJ Freeway B	Dallas	TX	100.00	.	1997	244,879	92.00	9.61	Y	.	.	.	12/31/96
Carter Crowley-Las Colinas A	Dallas	TX	100.00	.	1997	74,861	99.00	11.95	Y	.	.	.	12/31/96
Carter Crowley-Stemmons Fway A	Dallas	TX	100.00	.	1997	634,381	92.00	12.54	Y	.	.	.	12/31/96
Carter Crowley-Turtle Creek A	Dallas	TX	100.00	.	1997	485,088	79.00	12.20	Y	.	.	.	12/31/96
Crescent Office Tower	Dallas	TX	100.00	1986	1994	1,210,899	97.00	24.91	Y	239,000	C	230,651	12/31/96
Fountain Place (1)	Dallas	TX	100.00	1986	.	1,200,000	94.00	17.15	Y	.	.	.	12/31/96
Lee Parkway 3333	Dallas	TX	100.00	1983	1996	233,484	62.00	17.04	Y	0	.	14,708	12/31/96
Liberty Plaza I, II	Dallas	TX	100.00	1981	1994	218,813	96.00	13.63	Y	161,000	C	17,718	12/31/96
Park Central 12404	Dallas	TX	100.00	1987	1995	239,103	98.00	15.94	Y	161,000	C	16,133	12/31/96
Spectrum Center	Dallas	TX	100.00	1983	1995	598,250	93.00	16.00	Y	0	.	46,133	12/31/96
Stanford Corporate Centre (6)	Dallas	TX	100.00	1985	1995	265,507	97.00	14.34	Y	161,000	C	17,479	12/31/96
Trammell Crow Center (6)	Dallas	TX	100.00	1984	1997	1,133,000	80.00	21.83	Y	.	.	.	02/28/97
Continental Plaza	Fort Worth	TX	100.00	1982	1994	954,895	78.00	17.12	Y	239,000	C	85,662	12/31/96
Three Westlake Park	Houston	TX	100.00	1984	1996	414,251	100.00	13.59	Y	0	.	29,462	12/31/96
U.S. Home Building (1)	Houston	TX	100.00	1982	.	400,000	87.00	.	.	.	.	.	08/28/97
Caltex House	Irving	TX	100.00	1982	1994	445,993	97.00	24.89	Y	239,000	C	51,671	12/31/96
MacArthur Center I, II	Irving	TX	100.00	1982	1994	294,069	100.00	16.47	Y	161,000	C	20,164	12/31/96
Carter Crowley-Central Exp. B	Richardson	TX	100.00	.	1997	413,721	85.00	11.04	Y	.	.	.	12/31/96
Carter Crowley-Richardson A	Richardson	TX	100.00	.	1997	418,234	100.00	13.23	Y	.	.	.	12/31/96
Greenway I & IA	Richardson	TX	100.00	1983	1996	146,704	100.00	12.31	Y	0	.	17,013	12/31/96