Real Estate Returns in the Public and Private Markets: A Reexamination Following the Rise of Equity REITs

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I. Introduction

Prior to the 1990s, commercial real estate undoubtedly was the largest business sector in the country that raised almost none of its equity or debt capital in the public markets. As of 1990, the stock market capitalization of the equity real estate investment trust (REIT) universe was barely over $5 billion. And, less than $15 billion of commercial mortgage-backed securities (CMBS) were issued throughout the 1980s, with just $3.4 billion being issued in 1990. Given that the size of the commercial property base is many trillions of dollars[1], this represented a tiny fraction of the income-producing property market.

While the reasons for that situation are interesting in their own right, the relevant point for this research is that there was no liquid exchange for transactions to provide investors information on market prices and returns for commercial real estate. Given the increasing interest in real estate by institutional investors during the 1980s, researchers began to employ a variety of methods to estimate real property returns. These ranged from hedonic-based price estimates based on a small sample of traded properties used to impute prices and returns on properties being held (but not traded) by institutional investors to construct synthetic return series constructed by applying cap rate data to the rental income flows on institutionally owned properties.[2]

Substantial effort also was put into analyzing appraisal-based return series. The most widely known and used series in the real estate industry is that compiled by the

[1] A January 2003 Prudential Real Estate Investors' report, "Sizing Up the US Real Estate Investment Market", estimates a $4.4 billion value for core (i.e., institutional quality) commercial real estate.

[2] For the early attempts to use hedonic techniques to impute prices, see Hoag (1980) and Miles, Cole, and Guilkey (1990). Firstenberg, Ross, and Zisler (1988), Wheaton and Torto (1989), and Liu, et. al. (1990) made the initial efforts to impute market prices of properties using the cap rate methodology. This is a technique peculiar to the real estate industry relating net rents to asset values. Gyourko and Keim (1992) provide an overview of these and other efforts.

National Council of Real Estate Investment Fiduciaries (NCREIF). Since the first quarter of 1978 [1978(1)], NCREIF has produced an index of quarterly returns on commercial properties held for tax-exempt institutional investors by members of that organization. The index is widely studied for a number of reasons. It is carefully compiled under consistent standards, and it represents a large portfolio of properties held or managed by many of the leading institutional investors in the United States. As of the end of 2002, the NCREIF Property Index contained 3,680 properties across all property types and regions, with an appraised value of $121.9 billion.[3]

That said, it has many weaknesses from a financial analyst's perspective. Ross and Zisler (1987a,b) and Geltner (1989b) were among the first to highlight the extremely low volatility of returns on this series and the strong serial correlation evident in the data. While they and others suggested ways to cleanse the returns of appraisal-induced smoothing, the fact remains that information from a series that is not transactions-based, and, therefore, does not represent the results of arms-length trading of properties remains highly suspect to many financial economists and investors.

The early studies of equity REIT returns, which obviously are transactions-based[4], showed there to be no contemporaneous correlation with appraisal-based commercial property returns (e.g., see Hartzell and Mengden (1986)). In fact, equity REIT returns much more closely resembled the broader stock market than they did the NCREIF Property Index. This generated an extensive debate within the real estate industry,

[3] This series is discussed more fully below. The interested reader should see their web site at http://www.ncreif.org/index.phtml for the details.

[4] Of course, it is not the underlying properties owned by the firms that are trading, but fractional interests in the companies.

among institutional investors, and among real estate finance academics about what the true risk and return profile of commercial property looks like.

In a 1992 article, Gyourko and Keim showed that the NCREIF and equity REIT returns series were, in fact, related and reflected at least some of the same fundamentals once one took into account the nature of the appraisal process. Specifically, most institutionally owned properties are appraised only once per year, with the bulk of appraisals occurring in the fourth quarter of the calendar year. That strong seasonal introduces a lag in when information about changes in market fundamentals gets reflected in property values held privately. Because such information can be immediately impounded into real estate company values traded daily on the stock market, the publicly-traded real estate company returns were shown to predict future appraisal-based returns.

Not only is that work now a decade old, but there have been important changes in the real estate industry and the economy since then that warrant a reexamination of those results. First, and foremost, is the rise of equity REITs in the real estate industry. From 58 relatively small firms with $5.55 billion in aggregate equity market capitalization in 1990, the industry grew to 149 equity REITs with $151.27 billion of equity market capitalization in 2002 according to the National Association of Real Estate Investment Trusts (NAREIT).[5] There no longer is any real doubt as to whether equity REITs hold a widely diversified set of properties of comparable quality to those in the NCREIF index. Second, we have now been through another real estate cycle, with the 1991-1992 downturn being especially severe for the commercial property sector. While the time series on real estate returns remains short relative to what is available for the broader stock and bond markets, the added data and the variation introduced by a another

[5] See the NAREIT web site at http://www.nareit.com/researchandstatistics/marketcap.cfm for the details.

complete cycle should increase our confidence in any analysis of real estate returns. Third, the 1990s was a very interesting time for both the equity and bond markets in general. One of the striking aspects of the early studies of equity REIT returns was the very high correlation with stock market returns generally, and small stock returns in particular. The ensuing decade provides new and important data with which we can study this characteristic of real estate returns, as well as offers a fresh opportunity to examine the risks of real estate firms versus those of other types of companies.

A brief summary of our key conclusions is as follows. The lead-lag relationship between equity REITs and the NCREIF series remains over the longer time period, with lagged equity REIT returns predicting current period appraisal-based returns. Moreover, there is no evidence the relationship has weakened in the 1990s. While one might have thought that there now would be a stronger contemporaneous correlation between the two real estate series as investors and owners scrutinized both the public and private market return data, this clearly is not the case. The fact that appraisals remain infrequent prevents timely impounding of changes in supply and demand fundamentals into prices and returns. Hence, there is no reason to believe that returns on publicly- and privately-held real estate will become more contemporaneously correlated in the future—absent appraisals being done much more frequently.

Next, the sharp decline in the strength of the positive correlation of publicly-traded real estate returns with those on the broader market and small stocks is consistent with a heightened awareness of the underlying risk profile of commercial real estate. Conceptual and empirical analysis using a simple capital asset pricing model shows that the systematic risk of commercial properties is relatively low, with betas for most

property types being below one. The very steep drop in correlation with small stocks also accords with our view of the different risks faced by owners of diversified property portfolios. Their returns are driven primarily by fairly stable net rental flows, not by the capital gains (or losses) that are the dominant component of small stock returns. Moreover, commercial real estate landlords generally are not trying to bring a new technology, product, or business process to market—making the business risks they face quite different from those borne by the typical small firm that either succeeds (and becomes a big firm) or fails. While one would expect some positive contemporaneous correlation between real estate and broader market indexes because the demand for space ultimately is derived from that of firms, for the reasons just discussed we would expect it to be more akin to the lower levels seen over the past decade.

II. Data Description: Real Estate, Stocks, and Bonds

The two primary real estate series used in this research include the NCREIF Property Index and the NAREIT Equity REIT Index. The former is a widely known, appraisal-based series of quarterly returns beginning in 1978(1). We use data through the final quarter of 2002, which represents an additional twelve years of returns beyond the 1978-1990 period studied by Gyourko and Keim (1992). The NCREIF Property Index represents the returns on a widely diversified set of properties held by institutional investors for their own portfolio or for clients in a tax-exempt environment. As such, these properties are considered 'core' or institutional grade in real estate terms. All property types and regions of the country are represented, with the NCREIF web site [http://www.ncreif.org/indices/npi.phtml] providing much additional detail for the

interested reader.[6] In addition, this series represents unleveraged returns, with returns computed as if the properties were purchased on an all-cash basis. Total return, and its capital gain and income components also are observed.[7]

Our series on publicly-traded real estate is given by the National Association of Real Estate Investment Trusts' (NAREIT) Equity REIT Index. This series represents the value-weighted total return on all equity REITs (capital gain and dividend components can be observed separately and are discussed below) and is maintained by NAREIT.[8] These data are available on a daily or monthly basis. To match with the NCREIF data, which only are available quarterly, we create quarterly returns from the monthly data. NAREIT maintains its return series back to 1971, but we use data from 1978 because that is when the appraisal-based NCREIF series begins.

As noted in the Introduction, the public equity markets in real estate have expanded enormously over time. In 1978, there were 33 firms in NAREIT's equity REIT index, and they were all relatively small as the aggregate equity market capitalization of

[6] For example, at the beginning of 2003, properties in the South census region represented about $27 billion in value, those in the Midwest census region were worth nearly $19 billion, those in the West census region were appraised at just over $42 billion, and those in the East census region were worth about $35 billion. Among properties types, there were 1120 office properties, 544 retail properties, 795 multifamily properties, 1373 industrial/warehouse properties, with a smattering of other property types included.

[7] The total return is gross of any fees paid at the portfolio level. The capital gain or appreciation component is based on appraisals, although sales prices for a small group of properties are included. The income component of the NCREIF series reflects the actual net rental flow at the property level (with no adjustment for portfolio level fees, as discussed just above).

[8] See http://www.nareit.com/nareitindexes/index.cfm for a full description of the index. Mortgage and hybrid REITs are excluded from the analysis. Those firms are not owner-operators of income-producing properties. Rather than invest in buildings, mortgage REITs either make loans or invest in mortgages. Hybrid REITs are a mixture of mortgage and equity REITs. To maintain as close a comparison with the owned properties in the NCREIF series, we restrict our focus to equity REITs. My earlier research in Gyourko and Keim (1992) included a small number of real estate operating companies that were not organized as real estate investment trusts, and, therefore, not part of the NAREIT index. Including those firms does not alter our findings in any material way. Moreover, there are very few non-REIT real estate firms traded in the public markets in the 1990s, as the few operating companies reorganized as trusts for tax reasons. Finally, using this source removes some hotel companies from the series, which is a useful outcome for our purposes. For reasons too complex to go into here, hotel firms cannot readily organize themselves as REITs.

the group was $576 million. The number of firms has since expanded by five fold, with the equity market capitalization just exceeding $150 billion (which is now greater than the combined appraised value of the properties in the NCREIF Property Index).

Indeed, it was the small capitalization figure prior to the 1990s that led some to believe that publicly-traded REITs were not representative of the commercial property universe, with that factor explaining why equity REIT returns were not contemporaneously correlated with private returns per the NCREIF Property Index. However, Gyourko and Keim (1992) then showed that it was the nature of the appraisal process itself that accounted for the lack of contemporaneous correlation across the two commercial real estate series, with infrequent and strongly seasonal appraisals generating a lead-lag relationship between the series. It is to an update of that work that we now turn.

Table 1 reports means and standard deviations for excess quarterly returns (i.e, measured net of the returns to 90-day Treasury bills) on our two commercial real estate series, various stock and bond indexes[9], and the Freddie Mac Repeat Sales Appreciation Index. Returns on short-term Treasuries and the growth in the Consumer Price Index (urban workers) also are provided for comparison purposes. While we will focus below in the regression analysis on the entire 1978-2002 time period to take advantage of the precious added degrees of freedom provided by the passage of time, this table also reports summary statistics for two sub-periods: 1978-1991 and 1992-2002. Not only does the initial period almost match the time period studied by Gyourko & Keim, but the

[9] The non-real estate, stock and bond indexes are the S&P500 Index, a small stock index that represents the returns on the bottom 20% of all stocks in terms of equity market capitalization, and a 20-year government bond index. These return series were provided by Jeremy Siegel and are identical to those used in his book, *Stocks for the Long Run* (Third Edition, 2002)

end of 1991 saw the Kimco Corporation go public in a REIT format. The Taubman Company soon followed with its umbrella REIT structure that was copied many other firms, so that 1992 generally is considered the beginning of the modern REIT era. Hence, this particular split of the data allows us to see if there are any materially different return patterns in this so-called 'modern era'.

With respect to the nature of commercial real estate returns and variances, there are no significant changes over time. The first row of Table 1 documents that excess equity REIT returns average just over 1.75 percent on a quarterly basis in both time periods. Privately held real estate returns as represented by the NCREIF Property Index (row 2) are higher in the latter period. The difference in mean returns across these two series is explained largely by leverage—which had a positive effect throughout most of this period. Recall from above that the NCREIF series are unleveraged, while the average REIT has leverage ranging from 40-50+ percent depending upon the specific time period. Finally, it also is the case that equity REITs experience somewhat greater capital gains over time.

The stock and bond returns are well known from other sources. The high returns and high volatility of small stocks over this time period is evident in these data, as is the great bond market rally of the mid- to late-1990s. One also should not be mislead by the negative mean return on the Freddie Mac Repeat Sales Price Index for 1978-1991 and 1978-2002. Only the appreciation component of owner-occupied housing is measured. The implicit rent is a substantial component of return to that asset and including it would generate a positive overall return to housing. The fact that the Freddie Mac appreciation

component has exceeded the return on 90-day Treasuries since 1992 reflects the housing boom that occurred in the latter half of the 1990s.

All that said, the most important feature of this table for this research is reflected in the very different volatilities in returns of the traded stock and bond series relative to the appraisal-based NCREIF Property Index. With the standard deviation on the NCREIF series barely being above one and those on the NAREIT Equity REIT Index, S&P500 Index, the small stock index, and the long-term government bond series being at least four times larger, it is clear that the variance of the traded stock and bond series is much wider. For example, the interquartile range in excess quarterly returns on the NCREIF Property Index runs only from -0.11% to 1.48%. For equity REITs, the analogous figures are -2.37% and 6.13%. There is a very similar range for the S&P500, while that for our small stock index is much wider (its 25th percentile excess quarterly return is -4.30%; its 75th percentile excess quarterly return is 10.78%). Even long-term government bonds have a relatively wide interquartile range of returns compared to non-traded commercial properties (from -2.72% to 5.15%). In sum, there is relatively large volatility in the traded stock and bond series, whether they are real estate-based or not, with the appraisal-based real estate series exhibiting relatively little variance.

Tables 2a-c then report simple correlations across our real estate, stock, and bond series. The first column of Table 2a illustrates the lack of contemporaneous correlation between the stock market-based and appraisal-based real estate series that has been documented in previous work (ρ=0.01; second row of column one).[10] Table 2b then shows that the modern REIT era also did not exhibit significant contemporaneous

[10] Gyourko & Keim (1992) reported a slightly larger simple correlation of 0.10, but it was not close to being significantly different from zero. The differences are due to the inclusion of 1991 data and a slightly different sample that is restricted to equity REITs.

correlation between the two commercial real estate series. In fact, there is a slight negative correlation over the 1992-2002 period (ρ=-.11, but one cannot reject the null of zero at standard confidence levels). Table 2c then reports results for the full 1978-2002 sample period.

While there clearly is no meaningful contemporaneous correlation between the NAREIT and NCREIF series over any time period, there are some interesting changes in how commercial real estate returns correlate with the broader stock markets in particular. For example, the 1978-1991 period finds excess equity REIT returns very strongly correlated with the S&P500 and small stock index returns (ρ=0.76 and 0.82, respectively; see Table 2a). There still is a statistically significant correlation over 1992-2002, but equity REIT returns are much less strongly related to broader stock market returns, with the correlation with the S&P500 falling to 0.25 and that with small stocks falling to 0.39. The correlation of equity REITs with the bond market also has weakened considerably over time, and the relationship with housing appreciation has become negative in the past decade. While these changes will not turn out to have a material impact on the lead-lag relationship between the NAREIT and NCREIF series, they do have potentially interesting implications for how perceived real estate risk in the public markets is changing over time, and we return to that issue later in the paper.

III. *Transactions-Based and Appraisal-Based Real Estate Returns: The Role of the Appraisal Process*

Previous research in Gyourko & Keim (1992) has shown the lack of a contemporaneous correlation between the transactions-based returns (equity REITs) and the appraisal-based returns on properties held by many institutional investors (NCREIF)

is misleading because the appraisal process causes the privately-held property series to lag changes in property values—at least through 1990. The underlying reasoning is straightforward. While appraisals could be done frequently, they generally occur only once or twice a year. After all, if you are an institutional investor and see yourself as a long-term holder of commercial property, it can be quite expensive to pay someone to continually value an asset you have no intention of selling in the near or intermediate term. Consequently, even if appraisers are absolutely accurate in their valuations, changes in market fundamentals affecting property prices will only be incorporated into the NCREIF series when the appraisal is completed. This suggested that lagged real estate-related stock returns might predict current period appraisal returns.

The influence of the appraisal process is clear from even a cursory examination of the NCREIF data. While annual or semi-annual appraisals are the norm for institutional portfolios, there is heightened appraisal activity in the fourth quarter because many entities have fiscal years or reporting periods that match the calendar year. This introduces a very pronounced seasonal effect that is evident in Table 3. This table reports mean quarterly returns (in excess of the Treasury Bill return, as above) and the variance about those returns by quarter. The return pattern on the NCREIF Property Index looks very similar for the first three quarters of any given year. Returns in excess of short-term Treasuries range from 0.51% to 0.64%, with the variance being very close to one. In the fourth quarter, the pattern clearly changes. The mean rises (to 0.84%), but more relevant is the sharp jump in variance about the mean—by about fivefold to 5.56%.

With relatively few appraisals occurring in the first three quarters of the calendar year, the capital appreciation component of total return is not changing very much from

January-September in the typical year. Thus, the total return is being driven almost exclusively by the net rental flow, which tends to be fairly stable on well-leased, core properties like those typically owned by institutional investors. Changes in market fundamentals affecting commercial real estate tend to be impounded in the index via appraisals at the end of the calendar year.[11] That this is the case is supported by the fact that it is the capital appreciation component, not the rental income component, whose volatility spikes in the fourth quarter. The variance in the appreciation component of total return on the NCREIF Property Index is about six times higher in the fourth quarter than it is in any of the other three quarters over our 25 years of data. Moreover, there is no significant difference in mean return or variance about the mean by quarter for the rental income component of total return on the NCREIF Property Index.

In sum, this series exhibits strong persistence and has a pronounced seasonal. The persistence occurs for two reasons—infrequent appraisals that leave capital values unchanged across many quarters and the relatively stable net rental flows on well leased buildings. The fourth quarter seasonal is due largely to the appraisal process.

Controlling for both persistence and the lag in incorporating changes in property market fundamentals is important for understanding the true nature of the relationship between the returns on commercial real estate owned by equity REITs versus those for properties owned directly by large institutions. The former is relevant because it is relatively easy to predict a persistent series for well understood reasons. Consequently, before we examine the lead-lag relationship between equity REIT returns and NCREIF Property Index returns, we purge the latter of its persistence.

[11] On average, these shocks to fundamentals were positive over the 1978-2002 period as reflected in the higher mean return in the fourth quarter for the NCREIF Property Index.

Gyourko and Keim (1992) reported that the first and fourth lags were very influential in predicting current period returns on the NCREIF Property Index over the 1979-1990 period. A reexamination of the persistence of this series over the expanded time period for which data are now available reaches the same conclusion. For example, regressing the current period NCREIF Property Index return on its first and fourth lags explains 57 percent of the variation in the return and leaves the residuals largely purged of the strong positive autocorrelation evident in the raw data.[12,13] These lags are included in all future regressions examining the relationship between stock market-based and appraisal-based real estate returns, but we suppress their coefficients as they are always positive and highly statistically significant.

The top panel of Table 4 reports our baseline regression comparing equity REIT returns to NCREIF returns. Given the correlation coefficients reported above, it is not at all surprising to find that current period returns on publicly-traded firms that own and operate properties are not related to those on properties held directly by institutional investors for themselves or clients.

While we will generally focus on the entire 1978-2002 time period for which we have complete data, we have examined this relationship (and others) over different time periods and report findings as warranted. In this particular case, if we split the sample into the pre- and post-modern REIT era (i.e., 1978-1991 and 1992-2002), the results are very similar across periods. The point estimate on the equity REIT index is 0.0101 in the

[12] Durbin-Watson statistics are only slightly below two when this is done. Explicitly controlling for the second and third lags does not change these or any other findings reported below in any meaningful manner. The adjusted-R^2 over the longer time period examined here is about 15 points higher than that found by Gyourko & Keim (1992) for the 1979-1990 period.

[13] It also is noteworthy that the equity REIT quarterly return series does not exhibit any significant persistence. The adjusted-R^2's from regressions of current period equity REIT returns on any lag or combinations of lags always is negative.

early period and 0.0149 in the latter period, with both t-statistics being below one. At the least, this suggests that the lack of contemporaneous correlation between the two real estate series found in previous research was not due to equity REITs owning properties dissimilar to those in the NCREIF Property Index. While one might credibly argue about the lack of representativeness in the early period when the equity REIT market was much smaller, this is much less germane in later years. Something else is a work, and as we have intimated above, it is the nature of the appraisal process.

To get at this issue, Gyourko and Keim (1992) used the cumulatively compounded return on the equity REIT index over the previous calendar year as a right-hand side regressor and found that it had a statistically and economically significant ability to explain NCREIF returns (see their Table 2). They used that particular variable because of the need to economize on the number of regressors given the short-time series they had. With the additional twelve years of data now available, we examined the influence of different individual lags of the equity REIT index, in addition to estimating specifications with their lagged cumulatively compounded return variable.

Because even 25 years of quarterly data is not an especially long time series for analytical purposes, one should be cautious about interpretations of the details of the lag structure. That said, our investigation never found the first lag of NAREIT's equity REIT returns to have any statistically significant explanatory power with respect to the appraisal-based returns in NCREIF's Property Index. The estimated coefficient always is positive, as one would anticipate from infrequent appraisals causing information to be reflected in the NCREIF data with a lag, but the first lag never is significant at even the 10 percent level in any model estimated. Looking at the first and second lags of quarterly

equity REIT returns yielded similar results. The individual coefficients on the lagged variables were not individually statistically significant, but the Joint-F statistic for the null of both being zero was significant at the 9 percent level.[14]

Estimating a model with four quarterly lags of the equity REIT variable does yield significant predictive power for the lagged variables, with the second and fourth lags being individually significant at the 6 percent level or better and the relevant F-statistic strongly suggesting that the four lags jointly have predictive power with respect to the appraisal-based return series.[15] In sum, including lagged equity REIT returns does provide evidence in favor of a lead-lag relationship induced by infrequent appraisals. The coefficients on the lagged variables always are positive, different lags are individually statistically significant in various specifications (although never the first lag at standard confidence levels), and the lags are jointly highly significant if one goes out to the fourth lag.

Given that we cannot determine much more about the details of the lag structure without additional data (i.e., more quarters from the passage of time), we now turn to models with the cumulatively compounded return variable used in Gyourko and Keim (1992). This variable (denoted $NAREIT_{year(t-1)}$) is defined to be the return over the four quarters constituting the calendar year immediately preceding the current quarter t. Rather than trying to identify differential impacts across individual quarters, this variable is useful in determining whether higher (lower) returns on equity REITs in the year

[14] That is, there is only a nine percent probability of having a larger F-statistic under the null that the coefficients on both lagged return variables are zero. This particular result is from a model that adds only the first and second lags of the equity REIT index return to the specification in Panel 1 of Table 4.

[15] The coefficients on the individual lags, when added to the specification in Panel 1 of Table 4, are as follows (standard errors in parentheses): $NAREIT_{t-1}$: .0205(.0138); $NAREIT_{t-2}$: .0262(.0138); $NAREIT_{t-3}$: .0158(.0144); $NAREIT_{t-4}$: .0442(.0138). All are positive with t-statistics above one. The Joint-F statistic indicates that the probability of all four having no explanatory power is barely above zero.

preceding current quarter can help explain whether today's returns on institutionally owned properties held in the private market also are higher (lower).

Panel 2 of Table 4 shows that the answer is 'yes', as the coefficient on the lagged equity REIT index is positive and highly statistically significant with a t-statistic of 3.9. Given the units in which the variables are measured, a one standard deviation change of 14.4 percent in the compounded quarterly equity REIT return over the previous calendar is associated with a 0.38 increase in the excess quarterly NCREIF Property Index return. This represents an economically meaningful impact, as Table 2 reported a mean excess quarterly return on the NCREIF series of 0.65% with a standard deviation of 1.49%.

This result is statistically and economically similar to what Gyourko and Keim (1992) found over a decade ago. And, we could find no evidence that the impact of lagged equity REIT returns has changed over time. When we divide the sample into two periods demarked by the modern REIT era discussed above (1978-1991 and 1992-2002), lagged REIT returns are highly statistically significant in both periods, and we cannot reject the null that both coefficients are the same.

Given the relatively strong correlation of equity REIT returns with the returns on other stock series in particular, the remaining panels of Table 4 report results from specifications that include various stock and bond series in addition to the equity REIT returns. Note that current or lagged returns on the S&P500, our small stock series, and the long-term government bond index never have significant explanatory power (conditional on current and lagged equity REIT returns). More importantly for the purposes of this research, lagged equity REIT returns retain their statistical and economic

significance after controlling for the influence of stock and bond series with which they are correlated.[16]

Thus, the lead-lag relationship whereby past returns on publicly-traded real estate companies explain current returns on properties owned directly by institutional investors holds in the modern REIT era and over the full 1978-2002 period now available for study. While one might have expected publicly- and privately-owned real estate series to have become more contemporaneously correlated over time, especially with the much increased visibility of the public markets, the reason this has not happened almost certainly has to do with the essentially unchanged nature of the appraisal process. Even if institutional investor managements were confident that public market real estate returns always accurately reflected changes in property market fundamentals, those changes simply cannot be immediately input into private real estate series such as the NCREIF Property Index as long as appraisals are performed relatively infrequently. Thus, not only do we know the return series is smoothed by the infrequent appraisals, but their returns continue to lag changes in real estate fundamentals and this pattern should persist into the future unless appraisals become more frequent.

IV. Some Thoughts on the Nature of Commercial Real Estate Risk

We close the paper with a largely conceptual analysis of what these data tell us about the nature of commercial real estate risk. More specifically, we first consider whether the risk to commercial real estate, as measured by return volatility, can be as low

[16] Controlling for small stock returns has the biggest impact on the role of lagged equity REITs. This is not surprising given how strongly correlated those variables (see Tables 2a-c). However, the data are not fine enough for us to conclude that the true impact really is smaller with high confidence. In addition, the lagged REIT return variable itself remains significant at better than the 95% confidence level.

as the NCREIF data suggest. We then turn our attention to the much lower correlation that equity REITs exhibit with respect to the stock market in recent years, asking whether this change is consistent with what data and theory suggest is the true risk profile of commercial properties.

The former issue is the easiest to deal with—conceptually, at least. The very low volatility of real estate returns as measured by the NCREIF index clearly reflects measurement error. While is it quite reasonable to believe that the net rental flows on a widely diversified portfolio of well-leased, institutional quality properties could be very stable from quarter to quarter, the absence of appraisals each period obviously biases down the volatility of the capital gain component of total return. The dramatic jump in the variance in total return on the appraisal-based series reported in Table 3 provides some indication of the empirical importance of this factor.

If we break down NCREIF's total return into its net rent (i.e., dividend equivalent for stocks) and appreciation (i.e., capital gains/losses for stocks) components, the point is even clearer. The mean of the net rental income component only varies from 1.93%-1.95% across the four quarters of the year.[17] The standard deviation about this return is 0.19 in each quarter, implying extremely low variation about those means. This is not surprising, as if one diversifies with many properties and staggers lease terms appropriately, net rents should be fairly stable over time. It also is noteworthy that this component of return is not subject to any appraisal bias. The net rents on the buildings in the NCREIF Property Index should be (and are) measured accurately.

The mean return on the capital appreciation component of the total NCREIF Property Index return in the fourth quarter is almost double that of the next higher quarter

[17] The returns discussed in this section are gross, not net, of the Treasury bill return.

(0.52% in the fourth quarter versus 0.30% and 0.28% in the third and first quarters, respectively). The standard deviation in the fourth quarter is 2.69, versus 1.1-1.2 in the other three quarters. This implies a variance about the mean that is about six times higher in the fourth quarter.

With volatility in capital values effectively only being introduced in the fourth quarter, and statistical analyses of this series generally weighting each observation equally, the volatility of the NCREIF series is quite low compared to virtually any traded asset (including Treasury bills; see Table 2). With mean returns being decidedly positive, this leads to some very favorable portfolio implications, as the covariance of this real estate series with stocks and bonds is very low due to the smoothing introduced by the appraisal process. In a standard asset allocation model, adding appraisal-based real estate to a diversified stock and bond portfolio generally results in a 35%+ share for real estate.[18] With commercial real estate's share of the investible universe estimated at about 8%-10%, one does not have to be a committed believer in the efficient markets model to conclude that a 35% allocation to real estate is too high. The real estate investment industry appears to understand that just because you cannot accurately measure the risk via appraisals does not mean it does not exist, as the industry deals with this problem by imposing artificial constraints on their asset allocation models that limit investment shares for real estate.[19]

Of course, the fact that one does not believe all the asset allocation implications of appraisal-based real estate series does not mean that the true risk and return profile is

[18] Those are the figures one gets from the standard problem sets we give to Wharton MBA students in our real estate finance classes.

[19] See the article "Connecting the Disconnect: Asset Allocation" (May 2003) by Bernard Winograd, President of Prudential Investment Management, for a discussion from the investment industry's perspective.

given by equity REITs. The 1990s have shown that stock markets are subject to fads, and we have seen fairly dramatic changes in how equity REIT returns correlate with stocks in particular. It is to the latter issue that we now turn—namely, whether the decline in correlation with the broader market makes sense from a risk and return perspective.

Prior to the modern REIT era (i.e., 1978-1991), one could use the broader market, and small stocks in particular, to account for how equity REITs perform. For example, if one regresses the return on equity REITs on the return on the S&P500 Index using data from 1978-1991, the R^2=.57. The variation in small stocks could account for an even higher 67% of the variation in equity REIT returns.[20] Things were markedly different since then (1992-2002), with the analogous regression using the S&P500 yielding a R^2=0.07 and a point estimate that is barely significant at the 10% level (the adjusted R^2=.04). Our small stock index can account for only 15% of the variation in equity REIT returns since 1992(1).

The question is whether it makes sense for real estate returns not to mimic the stock market's returns and small stock returns in particular. The answer is 'yes', and an important reason for this is the business risks facing commercial landlords are different from those facing 'the market'. Conceptually, one should expect the returns on a well-diversified portfolio of commercial properties to have a beta below one. This can be more readily understood via the following mental experiment. Assume you are an office landlord (you could own an office REIT or the office portfolio in the NCREIF Property Index) with a large number of properties across many major markets. For simplicity alone, further assume that the S&P500 firms represent 'the market' and that they rent space in your office portfolio *pro rata* to their share in the stock index. Given these

[20] Of course, these bivariate results are simply the square of the simple correlations reported in Table 2a.

assumptions, we know that the beta of your tenant base is one. The question is whether your beta as the office landlord is greater than, equal to, or less than one.

Comparing cash flows over the cycle readily shows that the beta of the office landlord is less than one. On the upside of the cycle, your tenants' cash flows are rising, some by a lot (e.g., the durables producers) and others by less. To a first approximation, your cash flows as their landlord are not changing. You have multi-year lease contracts at fixed terms, and you do not share in the operating risk of your tenants. Just because they are doing better does not mean they have to pay you higher rent. Practically, your cash flows are rising somewhat, as some of your tenants' leases expired during the boom times and you can charge them higher rent to remain in your buildings in this environment. In addition, your vacancy rate probably has fallen. Still, your cash flows as the landlord did not increase as much as they did for your tenants because most of them are still paying the same rent until their lease expires.

Over the downside of the cycle, it is almost certainly the case that your cash flows do not fall as much as they do for your tenants. The landlord represents a fixed cost to the tenant. This is why firms layoff employees before they lay off their landlord. Nonpayment of rent is a strong signal that the firm may go out of business. Absent massive bankruptcy risk, the cash flows for office landlords will not suffer as much on the downside of the cycle—for reasons analogous to those just discussed when considering the upside of the cycle.

The circumstances we have just described--in which the landlord's cash flows do not go up as much as 'the market's' cash flows on the upside and do not go down as much on the downside—characterizes a low beta firm. The same type of analysis, and

conclusions, apply to most other property types, including multifamily, industrial facilities, and warehouses.[21] Retail landlords (i.e., mall and shopping center owners) sometimes use leases in which they effectively participate in the operating risk of their store owner tenants, so their betas should be somewhat higher.[22] Recent research in real estate finance has confirmed these conclusions, showing that the betas of most publicly-traded real estate firms are well below one.[23]

There is no doubt that commercial property returns should covary positively with the broader stock market. After all, the demand for income-producing property is a derived demand from firms wanting to employ real estate as a factor of production in making their product.[24] However, the basic risk analysis described above suggests that commercial real estate should not trade exactly like the market, and recent empirical research confirms that it does not. As public market investors have become more familiar with commercial properties and their risk characteristics, one would not expect there to be an extremely high correlation with the broader market.

This conclusion seems to hold especially strongly with respect to small stocks. Even though equity REIT returns have been extremely strongly positively correlated with small stock returns in the past, they seem to be very different types of firms. Publicly-

[21] Multifamily product may not appear to fit the description of the office landlord because that sector generally has short-term leases of a year or less. However, the relatively stable nature of the demand base—young and very old households, whose numbers are very stable over the cycle—is what leads to their having relatively low betas.

[22] Some retail leases contain what is called a percentage rent clause. In this case, the landlord typically receives some minimum fixed rent and a percentage rent that entitles the landlord to a some percentage of revenue above some agreed upon sales figure called the 'breakpoint' in industry jargon. Effectively, if store sales are strong and rise above the breakpoint, the mall or shopping center owner receives higher rent payments. It is in this way that this type of landlord shares directly in the operating risks of its tenants.

[23] See Gyourko and Nelling (1996) for the details. Working with publicly-traded equity REITs and real estate operating company data, they estimate equity betas of 0.3-0.6, with retail REITs having the highest betas.

[24] Indeed, the fact that appraisal-based returns such as those on the NCREIF Property Index have zero or even negative correlations with the broad stock market indices is another reason to be suspicious of using that type of real estate return data for risk analysis and investment allocation purposes.

traded landlords tend to own large portfolios of a one type of property (e.g., office, shopping center, apartments, etc.) in different markets, with their total returns driven largely by the size of their dividend flows. Just looking at quarterly mean returns since 1978 finds that the dividend component constitutes over 60% of the total return on equity REITs, and we know that this materially helps stabilize returns.[25]

The situation is very different for the firms in the S&P500 and for small stocks in general. While dividend yields on the broader market fell below 2% in the 1990s, they have not approached the level seen on equity REITs in past decades. In terms of beta, Jeremy Siegel's *Stocks for the Long Run* (3rd Edition) reports betas for stocks in the two smallest deciles of the NYSE/AMEX/NASDAQ exchanges to be over 1.3., with the compound (geometric) annual return on small stocks being over 600 basis points above that for stocks in the largest size decile.[26] When one thinks about small stocks in particular, one envisions a firm trying to bring some new technology, product, or business application to the market. Small stocks tend to become big stocks (i.e., they are successful) or they fail. In any event, almost all the return comes in the form of capital gain (or loss).[27]

This is not the case for landlords. They own assets about which there is little doubt regarding the basic functionality of the properties. And, there is relatively little

[25] Quarterly returns on NAREIT's equity REIT index averaged 3.4 percent over the 1978-2002 period, with the dividend component being responsible for 2.1 percentage points of that amount (2.1/3.4=.62).
[26] See his Table 8-1 (p. 133 of the 3rd Edition) and the accompanying discussion in the text for those details.
[27] Over a recent thirty year period, Gyourko and Siegel (1994) showed that about one-third of the nominal return on the S&P500 Index arose from dividends, with the analogous figure being under 20 percent for small stocks (defined as those in the two smallest sizes deciles of the NYSE, AMEX, and NASDAQ). These compare to the 60%+ figure for equity REITs.

technological change—at least, relative to many other business sectors.[28] Property-level cash flows should be and are procyclical to some extent, but we have identified various reasons why they should not covary all that strongly with the cash flows of the firms occupying space in the buildings.

In sum, the relatively low volatility of commercial real estate returns seems well justified by property market fundamentals, even though this aspect of return is mismeasured (i.e., made too smooth) by the nature of the appraisal process in the widely-used NCREIF data. Betas for most property types should be and are below one.[29] Thus, the fundamental risk of most commercial real estate is different from that of the overall market, and markedly different from that associated with small firms. From this perspective, the lower correlations of equity REIT returns with those on the S&P500 and small stocks in the 1990s are consistent with investors coming to a better understanding the different types of risks faced by these firms. As such, going forward we would not expect variation in a standard small stock index to be able to explain two-thirds of the variance in equity REITs returns, as it did prior to the 1990s.

V. Summary and Conclusions

The lead-lag relationship whereby past returns on publicly-traded real estate companies help explain current period returns on privately-held properties valued by appraisal, even after controlling for the persistence of the private series, continues to hold in the 1990s. Market fundamentals affecting properties are first reflected in the prices of

[28] New information technology has affected real estate, rendering 'hard to rewire' office buildings less valuable. However, the technological changes buffeting real estate owners clearly are much less severe than those faced by managements in many other sectors.

[29] Hotels are the exception, but they are not relevant for our analysis because they tend not to organize themselves are real estate investment trusts.

equity REITs, and are only slowly reflected in private portfolios when appraisals are performed. While one might think that the thriving nature and high visibility of both the public and private markets in real estate would lead to the series being positively correlated on a contemporaneous basis, the nature of the appraisal process prevents this convergence. As long as shocks to market fundamentals do not occur immediately prior to appraisals and as long as appraisals continue to be done infrequently (no more than once or twice a year as is the current practice for institutional investors), the public markets in real estate will continue to 'lead' the private markets.

While there are good reasons to believe that the public markets need not perfectly reflect the true risk profile of commercial real estate, it clearly is the case that appraisal-based series such as the NCREIF Property Index understate the return volatility of commercial properties, particularly for asset allocation purposes. In addition, the lower correlation in recent years of equity REIT returns with those on the broader market and with small stocks seems consistent with the nature of the underlying risk-return profile of commercial real estate. Both conceptual and empirical results suggest low betas for most properties types, indicating that one should not expect real estate returns to follow the market all that precisely over a given cycle.

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Table 1: Summary Statistics

Quarterly Excess Returns on Real Estate, Stocks, and Bonds
(Standard deviation of returns in parentheses)

	1978-1991*	1992-2002**	1978-2002***
Equity REITs-NAREIT	1.79 (7.11)	1.77 (6.58)	1.78 (6.85)
NCREIF Property Index	0.46 (1.61)	0.89 (1.30)	0.65 (1.49)
S&P 500	2.05 (8.21)	1.56 (8.15)	1.84 (8.15)
Small Stocks	2.57 (12.02)	2.01 (11.60)	2.33 (11.79)
20-yr Gov't Bonds	0.71 (7.44)	1.35 (4.69)	0.99 (6.36)
Freddie Mac Repeat Sales Price Index	-0.6 (1.15)	0.16 (0.67)	-0.27 (1.06)
Treasury Bills	2.08 (0.63)	1.06 (0.32)	1.63 (0.73)
Inflation	1.44 (1.02)	0.63 (0.49)	1.07 (0.91)

NAREIT, NCREIF, S&P500, Small Stock, Long-Term Government Bond, and Freddie Mac returns are net of the 90-day Treasury Bill return; the Treasury Bill and Inflation series are unadjusted

* 1978-1991: 56 Observations

** 1992-2002: 44 Observations

*** 1978-2002: 100 Observations

Table 2A: Simple Correlations, 1978-1991*

Excess Quarterly Returns on Real Estate, Stocks, and Bonds

	Equity REITs-NAREIT	NCREIF Property Index	S&P 500	Small Stocks	30-yr Gov't Bonds	Freddie Mac Repeat Sales Price Index	Treasury Bills	Inflation
Equity REITs-NAREIT	1.00							
NCREIF Property Index	0.01	1.00						
S&P 500	0.76	-0.11	1.00					
Small Stocks	0.82	-0.15	0.83	1.00				
20-yr Gov't Bonds	0.41	-0.24	0.40	0.24	1.00			
Freddie Mac Repeat Sales Price Index	0.19	0.18	0.17	0.27	-0.14	1.00		
Treasury Bills	-0.18	0.23	-0.25	-0.16	-0.14	-0.60	1.00	
Inflation	-0.18	0.27	-0.19	-0.03	-0.42	0.04	0.52	1.00

*1978-1991: 56 Observations

Table 2B: Simple Correlations, 1992-2002*

Excess Quarterly Returns on Real Estate, Stocks, and Bonds

	Equity REITs-NAREIT	NCREIF Property Index	S&P 500	Small Stocks	30-yr Gov't Bonds	Freddie Mac Repeat Sales Price Index	Treasury Bills	Inflation
Equity REITs-NAREIT	1.00							
NCREIF Property Index	-0.11	1.00						
S&P 500	0.25	0.06	1.00					
Small Stocks	0.39	-0.14	0.75	1.00				
20-yr Gov't Bonds	0.05	0.01	-0.26	-0.31	1.00			
Freddie Mac Repeat Sales Price Index	-0.11	0.22	-0.38	-0.08	0.10	1.00		
Treasury Bills	0.01	0.38	0.15	-0.02	0.06	-0.39	1.00	
Inflation	0.12	-0.06	-0.21	0.04	-0.12	0.06	0.13	1.00

*1992-2002: 44 Observations

Table 2C: Simple Correlations, 1978-2002*

Excess Quarterly Returns on Real Estate, Stocks, and Bonds

	Equity REITs-NAREIT	NCREIF Property Index	S&P 500	Small Stocks	30-yr Gov't Bonds	Freddie Mac Repeat Sales Price Index	Treasury Bills	Inflation
Equity REITs-NAREIT	1.00							
NCREIF Property Index	-0.03	1.00						
S&P 500	0.55	-0.05	1.00					
Small Stocks	0.64	-0.09	0.80	1.00				
20-yr Gov't Bonds	0.29	-0.16	0.18	0.06	1.00			
Freddie Mac Repeat Sales Price Index	0.09	0.23	-0.01	0.14	-0.06	1.00		
Treasury Bills	-0.09	0.08	-0.07	-0.07	-0.11	-0.63	1.00	
Inflation	-0.09	0.10	-0.16	0.50	-0.34	-0.12	0.61	1.00

*1978-2002: 100 Observations

Table 3: Excess Quarterly Returns
By Quarter Equity REITs and NCREIF 1978-2002*

	NCREIF Property Index		NAREIT Equity REIT Index	
	Mean	Variance	Mean	Variance
1st Quarter	0.64	1.00	3.64	59.05
2nd Quarter	0.51	1.29	2.34	20.95
3rd Quarter	0.61	1.25	0.01	64.21
4th Quarter	0.84	5.56	1.11	41.76

* 1978-2002: 25 Observations

Table 4: Transactions-Based and Appraisal-Based Real Estate Returns - Regression Analysis, 1979-2002*

(Standard deviations in parenthesis)

Panel 1: $NCREIF_t = \beta_0 + \beta_1 NAREIT_t + \beta_2 NCREIF_{t-1} + \beta_3 NCREIF_{t-4} + \varepsilon_t$

Intercept	$NAREIT_t$	Adjusted-R2	Durbin-Watson Statistic
0.0419	0.0144	0.56	1.83
(0.1163)	(0.0149)		

Panel 2: $NCREIF_t = \beta_0 + \beta_1 NAREIT_t + \beta_2 NAREIT_{year,\ t-1} + \beta_3 NCREIF_{t-1} + \beta_4 NCREIF_{t-4} + \varepsilon_t$

Intercept	$NAREIT_t$	$NAREIT_{year,\ t-1}$	Adjusted-R2	Durbin-Watson Statistic
-0.1767	0.0140	2.6206	0.62	1.96
(0.1219)	(0.0138)	(0.6716)		

Panel 3: $NCREIF_t = \beta_0 + \beta_1 NAREIT_t + \beta_2 NAREIT_{year,\ t-1} + \beta_3 S\&P500_t + \beta_4 S\&P500_{year,\ t-1} + \beta_5 NCREIF_{t-1} + \beta_6 NCREIF_{t-4} + \varepsilon_t$

Intercept	$NAREIT_t$	$NAREIT_{year,\ t-1}$	$S\&P500_t$	$S\&P500_{year,\ t-1}$	Adjusted-R2	Durbin-Watson Statistic
-0.2038	0.0208	2.2541	-0.0068	0.6814	0.61	1.97
(0.1275)	(0.0171)	(0.7535)	(0.0144)	(0.6402)		

Table 4: Cont'd

Panel 4: $NCREIF_t = \beta_0 + \beta_1 NAREIT_t + \beta_2 NAREIT_{year,\ t-1} + \beta_3 SmallStocks_t + \beta_4 SmallStocks_{year,\ t-1} + \beta_5 NCREIF_{t-1} + \beta_6 NCREIF_{t-4} + \varepsilon_t$

Intercept	$NAREIT_t$	$NAREIT_{year,\ t-1}$	$SmallStocks_t$	$SmallStocks_{year,\ t-1}$	Adjusted-R2	Durbin-Watson Statistic
-0.2051	0.0162	1.9635	-0.0004	0.7649	0.62	1.96
(0.1239)	(0.0180)	(0.8091)	(0.0108)	(0.5298)		

Panel 5: $NCREIF_t = \beta_0 + \beta_1 NAREIT_t + \beta_2 NAREIT_{year,\ t-1} + \beta_3 LongBonds_t + \beta_4 LongBonds_{year,\ t-1} + \beta_5 NCREIF_{t-1} + \beta_6 NCREIF_{t-4} + \varepsilon_t$

Intercept	$NAREIT_t$	$NAREIT_{year,\ t-1}$	$LongBonds_t$	$LongBonds_{year,\ t-1}$	Adjusted-R2	Durbin-Watson Statistic
-0.1670	0.0182	2.3787	-0.0166	0.4362	0.61	1.93
(0.1261)	(0.0145)	(0.7198)	(0.0156)	(0.7928)		

* 1978-2002: 96 Observations