The Characteristics of Commercial Real Estate Holding Period Returns (IRRs)

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January 2002

The authors acknowledge support by both the Real Estate Research Institute and the National Council of Real Estate Investment Fiduciaries for this study. Thanks also go to Martha Peyton for helpful comments and suggestions. All errors are our responsibility.

Section 1. Introduction

Recent studies have suggested that the size of the commercial real estate market exceeds $4 trillion dollars (Miles et al. [1994], Hartzell et al. [1994]). Yet given the size of this asset class, very little empirical research has been conducted in an attempt to describe the realized performance characteristics of institutional grade commercial real estate. A number of explanations may be offered. First, property specific data have been historically difficult to obtain, as owners of commercial real estate are reluctant to provide proprietary data for purposes of academic research. Second, in many cases firm specific data that are secured often provide only limited information, or lack cross-sectional and/or time series characteristics that allow for meaningful research. Moreover, in cases where detailed data are available from a specific firm, questions arise as to the applicability of research results. Third, many firms simply do not keep accurate historical records on the underlying operating information of commercial properties that they either own or manage on behalf of third parties. Last, there exist only a limited number of sources for U.S. institutional grade real estate operating information. These include the National Council of Real Estate Investment Fiduciaries (NCREIF) and the National Association of Real Estate Investment Trusts (NAREIT). While these groups collect information at the property or firm level, results tend to be reported in an aggregate format, thus not allowing for a detailed analysis of performance at the property level.

A better understanding of the performance of institutional-grade commercial real estate is important for several reasons. Lacking alternatives, we have traditionally relied upon the NCREIF performance index (NPI) as a proxy for direct real estate investment returns. While many would argue that this performance series provides a close approximation of 'true' real estate returns, it potentially suffers from the well-known appraisal bias that may lead to unrealistic estimates. Moreover, the volatility of real estate returns based on this series is felt to be generally lower than that of a true, transaction-based return series. As a result, investment in institutional grade real estate based on the NPI return series would appear to offer exceptionally high risk-adjusted returns. This has led to some skepticism about the actual performance of commercial real estate. An analysis of real

estate returns based on transaction results will provide insight into the performance of this asset class not only for purposes of performance measurement but also for purposes of benchmarking.

Prior empirical research on commercial real estate may usefully be grouped into four categories: 1) those dealing with the tenure characteristics of commercial real estate (examples include Fisher and Young [2000], Farragher and Kleinmand [1996], Gau and Wang [1994], Webb and McIntosh [1986], or Fisher and Stern [1982], 2) studies dealing with appraisal-based smoothing concerns (see Fisher et al. [1994], Geltner et al. [1994], or Geltner [1991, 1993]), 3) research on the performance of commercial real estate (see for example Liu and Mei [1994], Gyourko and Keim [1992], Chan et al. [1990], Sirmans and Sirmans [1987], or Bruggeman et al. [1987], and 4) studies dealing with the characteristics of real estate in a portfolio setting (for example Hartzell et al. [1986, 1987], and Miles and McCue [1982]). While all of these studies have enhanced our understanding of the nature of commercial real estate investment and performance, they do so primarily at an aggregate level. Thus, we know little about the disaggregate nature of commercial real estate holding period returns.

The main objective of the proposed study is to compile a large and diverse sample of institutional grade commercial properties that have been sold and to calculate holding period returns (IRRs) over the period of ownership. The proposed inquiry differs from earlier studies in that the focus of analysis will be at the individual property level, allowing for a more detailed analysis of the characteristics of commercial real estate returns. In addition, the study will allow for an investigation of the performance of commercial properties over both the strong growth period of the 1980's as well as the real estate recession of the early 1990's.

Our findings suggest that overall institutional grade real estate holding period returns (IRRs) averaged 8.73% percent for 3,444 properties sold over the period 1980 through

2001.[1] Significant variation in return is found across property type, size, region, year of acquisition/disposition, and investment structure. Specifically we find returns on apartment properties to dominate the sample, with a mean holding period return of 10.64 percent while office properties are found to offer the lowest return over the period of analysis, at 5.89 percent. Properties located in the Mideast region are found to offer superior performance, with a mean return of 10.97 percent, while those located in the Southwest region offered the lowest performance over the study period, at 7.80 percent.

When examined by year of acquisition or disposition we find similar general trends in that holding period returns are greatest for properties acquired or sold in the late 1970s through the early 1980s and again in the mid to late 1990s. Conversely, properties acquired and/or sold in the late 1980s to mid 1990s are found to offer significantly lower holding period returns. Property size is also shown to impact the performance of commercial real estate. Based on square feet, properties in largest size quartile (over 263,000 sq. ft.) realized an average return (IRR) of 9.95 percent, whereas those in the smallest size quartile (<80,000 sq. ft.) had a mean return of 6.92 percent. Length of ownership is also found to affect the holding period performance, with properties held for periods shorter than 3 years and greater than 16 outperforming properties held for intermediate periods. Age of the property also seemed to affect performance, with the youngest age group (one to five years old) exhibiting a mean return or 14.49 percent whereas those in the oldest age quartile (over 35 years old) are shown to have returned an average of 5.50 percent.

Performance of real estate is also found to vary significantly by metropolitan area (MSA). When examined by size, we find the largest 20 MSAs to range from 12.11 percent for Baltimore to 2.69 percent for Houston.[2] When stratified by the top performing MSAs, we observe New Haven, CT, San Jose, CA and Salt Lake City, Utah had superior IRRs relative to other MSAs, with mean holding period returns of 17.01, 13.78 and 13.72 percent respectively. Manager expertise is also found to significantly affect performance

[1] There were a total of 3,720 sales but 276 were eliminated because the property was held for only one year or less. These sales were not considered representative of a buy and hold strategy typical for most institutions.

[2] Not controlling for other factors such as time of acquisition and disposition.

of commercial real estate, with the top decile of managers (ranked by mean performance) earning 14 percent or more as compared to the lowest decile at 4.5% or less.[3]

Overall, our findings provide evidence to suggest that significant differences in commercial real estate returns exist across property type, region and metropolitan area of location, holding period, size, and manager expertise. These results suggest that further investigation into appropriate strategies for the selection and management of commercial real estate products may be warranted.

The remainder of the paper is organized as follows. In Section 2 we describe and summarize the data to be used in the study. Section 3 provides the methodology employed to estimate holding period returns. In Section 4 we present empirical results. Section 5 discusses implications of the study and concludes the paper.

Section 2. Data

The data employed in this study are secured from the National Council of Real Estate Investment Fiduciaries (NCREIF). NCREIF is a non-profit organization formed with the express intent of soliciting and maintaining real estate performance data from participants who own or manage properties on behalf of institutional investors. These data are used to create the NCREIF Property Index (NPI), which is a quarterly return series, primarily stratified by property type and region.[4] The database includes approximately 8,500 properties that were acquired over the period 1978 through 2000. From this database all properties sold, and for which complete cash flow histories exist, represent the sample to be used in the study.[5]

[3] As described later in this study these results do not control for date of acquisition or disposition or whether the manager had discretion as to when and where to invest over the market cycle.
[4] See www.NCREIF.org for further information.
[5] As of the 4th quarter of 2001 there were 3,447 properties in the NCREIF Property Index (NPI) and there were 3,720 properties that were true sales prior to that quarter. There are additional properties that leave the database for various reasons such as a change of manager, destroyed by an "act of God", etc.

From this database we select all properties that have been sold, and for which complete cash flow histories exist, and that were held for more than one year to represent the sample to be used in the study. In total, 3,444 properties are included in the sample.

Cash flow histories are comprised of three components: acquisition price, net operating income, and sale price. The sale price is net of any fees associate with the sale of the property. Cash flow is equal to net operating income (NOI) less all capital expenditures as well as any partial sales associated with the property.[6]

Exhibit 1 provides counts on the number of properties in the sample, as stratified by property type and regional location, and by year of acquisition and disposition. As shown in Panel A of Exhibit 1, the predominate property type in the sample is industrial with 1,285 properties, constituting 37 percent of the sample. This is followed by office properties representing 27 percent of the sample, retail properties comprising 19 percent and apartment at 15 percent of the sample. The smallest property type category in the sample is hotel, with 33 percent properties, representing only about 1 percent of the sample.

When examined by location (Panel C), we see that properties located in the Pacific division dominate the sample at 24 percent. Those located in the Southeast region represent 14 percent of the sample, followed by properties located in the East North Central region, with 13 percent of the sample. The distribution of sold properties in the sample compares favorably with the overall NCREIF database.[7]

In order to control for the relative time period over which properties are owned, we also collect data on the sample for both year of acquisition and disposition. Exhibit 2 provides a description of the sample as stratified by acquisition year and by disposition year. The distribution of the sample by acquisition year is consistent with the general investment climate for real estate over the study period. Note that we observe moderate levels of

[6] Examples of partial sales include the sale of out-parcels or one of the buildings in an industrial park.
[7] As of the 4th quarter of 2001 industrial properties were 31% of the properties in the NPI followed by office at 30%, apartment at 22% and retail at 15%. The Pacific division had 24% of the properties followed by the Southeast with 15% and East North Central with 11%.

acquisition activity in the early 1980s, followed by an increase in the mid to late 1980s. Acquisition activity is found to decline significantly in 1993 and 1994, during the bottom of the real estate recession. Purchase activity is shown to increase in 1995 through 1997, commensurate with the strong rebound in real estate performance coming out of the crippling recession. The final few years of the sample period are less informative, due to the right censoring of observations included in the study.[8]

In terms of dispositions, peak sale activity occurs in the late 1990s, with nearly 17 percent of the properties in the NPI sold during 1987. This suggests that owners of investment grade real estate sold into an improving market and continued to sell throughout the upturn in the markets during the late 1990s. Little disposition activity is shown to occur in the early 1980s as the NCREIF data collection process was only initiated in late 1977.

A concern of nearly all institutional investors is the determination of an optimal asset holding period. Institutions are concerned with asset/liability matching, and choose assets that most appropriately match existing and expected future liabilities. For institutional investors of commercial real estate a typical holding period is five to seven years. In Exhibit 3 we present the sample as stratified by holding period. As shown, slightly greater than one third of the sample, or 1,429 properties, are sold within four years of acquisition, while slightly less than 2,000 properties have a holding period of five years or greater. The average holding period for all properties in the sample is 6.31 years. We should note that there is a bias toward shorter holding periods when examining a sold property sample due to the fact that we are only calculating holding periods for properties that have *already been sold*. Thus the sample does not include the holding period for properties that were acquired but *not yet sold* (see Fisher and Young [2000] for a discussion on how this bias may be corrected).

In Exhibit 4, we provide counts on the number of properties located in the 40 largest metropolitan statistical areas (MSA), as well as by the highest representation in the

[8] To be included, properties must have been sold, thus those sold late in the study period have, by definition, shorter holding periods.

sample. When stratified by MSA size (Panel A), we observe that Chicago and Los Angeles are shown to have the most number of properties. Nassau-Suffolk, NY has no sold properties, an interesting observation, considering its size ranking. In total, properties purchased and sold in the top 20 most populated MSAs represent 75 percent of the sample. In Panel B we provide counts in descending order based on number of properties sold. Here we observe that Chicago, Los Angeles, and Washington, DC are the most active disposition markets for institutional owners of commercial real estate, with 230, 195, and 184 sold properties, respectively. Properties in the top 40 MSAs ranked by number of properties sold comprise 80 percent of the sample.

In summary, we believe the sample to be well distributed by property type and region of location. The sample also appears to be well distributed by both acquisition and disposition cohorts. While we do observe some skewness with respect to ownership period, we do not anticipate that this skewness will impact the results of our analysis.

Section 3. Methodology

Among institutional investors much discussion exists as to the appropriate manner in which to measure real estate returns. The NCREIF property index is calculated as a quarterly return series with returns being 'chain-linked', in that returns from one quarter are "rolled" to the next quarter. As a result of the methodology employed to calculate the NPI, investment dollar amount plays no direct role in the computation of the series. Therefore, we may characterize the NPI series as being a 'time-weighted return' (TWR) or 'marginal' return series. In contrast, a transaction-oriented performance series, such as used in the present study, is based on the internal rate of return (IRR) realized over the ownership period of the property. This series may be thought of as 'dollar-weighted', since returns are based on initial dollar investment, and total proceeds generated from operating cash flows and asset appreciation or depreciation over the ownership period. The IRR implicitly assumes reinvestment of temporal dollars at the IRR rate. The only time an IRR and TWR would be the same mathematically is when there are no cash flows to reinvest, i.e., the property produced no annual cash flow. TWRs require an estimate of value every period (e.g., every quarter for a quarterly return series) in order to calculate

the periodic returns that are chain linked. Thus TWRs rely on having appraised values for the property each period, since real estate does not actually transact that frequently. In contrast, IRRs only require the initial value (purchase price or acquisition cost) and resale value at the end of the holding period based on the actual sale price, and therefore, do not require an estimate of market value at each period.

In effect the TWR asks what the return would be if the property was purchased at the beginning of the quarter and sold at the end of the quarter. It is in effect an IRR *during* the quarter.[9] The IRR for the entire holding period (acquisition to disposition) on the other hand assumes only that interim cash flows are received between acquisition and disposition, with no inter-temporal market values being incorporated into the calculation.

In order to calculate transaction-based holding period returns (IRR), we estimate the rate of return for each property in the sample, r , which provides a solution to the following:

$$\left[\frac{CF_1}{(1+r)^1}+\frac{CF_2}{(1+r)^2}+\ldots+\frac{(CF_n+SP_n)}{(1+r)^n}\right]-PP_0=0 \qquad (1)$$

where r is the periodic holding period return (IRR) for each property in the sample, PP_0 , is the initial acquisition price of the property, $CF_{1\text{-}n}$ represent the net periodic cash flows that accrue to each property over the ownership period, and SP_n represents the sale price of the property at the end of the holding period. We measure periodic cash flows on a quarterly basis, as net operating income, less, capital expenditures, plus an cash proceeds from partial sales. Sale price of the property is net of selling costs.

The solution to equation 1 represents a quarterly internal rate of return, as measured over the ownership period of each individual property in the sample. For purposes of analysis, we convert quarterly holding period returns to annual equivalents.[10]

[9] The formula used to calculate the NPI is designed to approximate an IRR for the quarter assuming cash flows occur monthly during the quarter.
[10] We do so by geometrically compounding the quarterly return into an annual return.

Section 4. Results

4.1 Holding Period Returns (IRRs)

In order to examine the investment performance of institutional grade commercial real estate, we estimate holding period returns (IRRs) for each property in the sample as described above. In this section, we present results, as stratified by selected categories. Exhibit 5 Panel A provides results of our holding period return (IRR) analysis for the entire sample, as well as by year the property was acquired. Over the entire study period 1977 through 2001 we observe an average holding period return for 3,444 properties in the sample of 8.73 percent.[11] Also reported in the Exhibit is the standard deviation of cross-sectional IRRs, i.e., for the sample of properties. It is important to note that this is the standard deviation of the sample of properties for each year (or for the entire sample) – not the standard deviation of returns over time as would be used in risk measures.[12] In order to calculate a standard deviation, we estimate the variability of each property in the sample (or stratified grouping) from the mean of the overall sample (or stratified grouping). The standard deviation is included to provide an indication of the cross-sectional variance across properties. If we assume that this standard deviation is representative of the underlying population of properties from which these sold properties were drawn, then the standard deviation of the sampling distribution would be equal to the standard deviation shown in the exhibit divided by the square root of the number of properties. For the entire sample this would be 5.64% / SQRT (3444) = .96% or approximately 1%. Therefore if we assume that the IRR sample returns are normally distributed, a 95% confidence interval would be +/- 2 standard deviations, or +/- 2%. Thus the 95% confidence interval for the IRR for the entire sample would be 8.73% +/- 2% or 6.73% to 10.73%.

4.1.1 Stratified by Year of Acquisition.

[11] Mean returns are arithmetic.

[12] Calculating the standard deviation of the returns over time would require estimates of value every quarter (or every year). This can, of course, be calculated using the reported appraised values in the NCREIF database for each property. But the purpose of this article is to use transaction prices – not appraised values for performance measurement.

In Exhibit 5 Panel A, we provide return performance as stratified by acquisition year. Notice that a significant number of properties are acquired in 1977. This results from a censoring phenomenon, in that NCREIF was initiating solicitation of property data in 1977, which resulted in a large number of properties coming into the database. As described earlier, acquisition activity was fairly consistent throughout the study period, with drops in the weak market of the early 1990s. Holding period returns are shown to be greatest for those properties in the late 1970s and early 1980s, with IRRs of 7 to 10 percent, and again for those acquired in the mid to late 1990s, with average returns in the 10 to 17 percent range. Interestingly, we observe a significant number of acquisitions in the mid to late 1980s, which correspond to the lowest holding period returns.

4.1.2 Stratified by Year of Disposition.

Exhibit 5 Panel B provides IRRs by year of disposition. Here we observe a similar trend as was noted by acquisition year; superior holding period returns for properties sold early and late in the study period. In contrast to Panel A, where properties were shown to have been acquired in a fairly consistent fashion over the study period, dispositions are shown to have been concentrated in the mid to late 1990s with correspondingly larger holding period returns. As expected, properties sold at the bottom of the recession in the early 1990s exhibited the lowest returns, and in fact, negative holding period returns were shown for the 147 properties sold in 1993. The standard deviation of each category is also provided in this exhibit.

Exhibit 6 includes the same breakdown of IRRs by year sold as Exhibit 5 Panel B but adds a measure of the percent of properties that were sold from the NCREIF database each year. This is a rough indication of the transaction activity taking place over the market cycle. As discussed above, acquisition and disposition activity dropped off in the early 90s when the market was weakest and then built up during the mid 90s. Disposition activity peaked at a level where over 16% of the NPI properties were being sold in 1997. Dispositions dropped off after that as the market began to weaken.

4.1.3 IRRs and Transaction Volume

Exhibit 7 plots the IRR by year sold versus the percentage of all properties sold from the NCREIF database. This shows the correlation between IRRs and transaction volume. A notable characteristic of private real estate markets is that transaction activity (and therefore liquidity) tends to be pro-cyclical. When the market is doing well and returns are high, there are more transactions. When the market is weak, investors tend to take properties off the market, or at least they are not willing to sell their property at the price buyers are willing to pay.[13]

4.1.4 IRRs Stratified by Property Type

Exhibit 8 reports the characteristics of holding period returns as stratified by property type. Panel A is by year of disposition and panel B by year of acquisition. Notice that returns on apartment properties dominate those generated by office, industrial, and retail properties by a large margin, with a mean return of 10.64 percent over the period under examination. Returns on apartments are more than 250 basis points over industrial properties, which exhibit a mean return of 8.10 percent. These are followed by retail properties at 7.70 percent, and office properties at 5.89 percent. Of interest is the fact that returns on apartments are nearly twice as large as those for office properties. In part, this may be explained by the short term nature of multi-family leases, and the ability to mark-to-market on a relatively rapid basis, as compared to other property types, which generally have longer term lease structures. Addtionally, with the overbuilding of multi-family units in the late 1970s and the subsequent downturn in multi-family construction as a result of tax law changes in the mid 1980s, supply was kept in check, on a relative basis, as compared to office and retail properties.

For all property types we observe a general trend of higher holding period returns for properties acquired and/or sold early in the study period and again late in the study period. This may in part result from the time period over which property sales are

[13] This phenomena and implications for construction of real estate indices is discussed in a recent working paper by Fisher, Gatzlaff, Geltner and Haurin (2002).

selected and the fact that the bottom of the cycle occurred about midway through the period under analysis.

4.1.5 IRRs Stratified by Geographic Division

In Exhibit 9, Panels A and B we report holding period returns as stratified by NCREIF geographic divisions. Notice that properties located in the Mideast region have the highest returns over the examination period, with a mean of 10.97 percent. The Mideast region is followed by the Pacific and Northeast regions with mean holding period returns of 9.99 and 9.30 percent, respectively. The lowest returns are shown in the Southwest and West North Central regions, with returns of 6.48 and 6.31 percent, respectively. While our priors are that the Southwest region might indeed exhibit low returns due to the length and depth of the recession in this region, we did not expect to observe the strong performance as shown in the Northeast region. This may be explained by the severe, but relatively short nature of the recession's impact on property values in this region. While office properties were especially hard hit in this region during the early 1990s, other properties fared comparatively well.

4.1.6 Effect of Holding Period

We also examine holding period returns by ownership period. As presented in Exhibit 10, we see that properties held less than 3 years, and those held more than 13 years generally exhibit the greatest returns, at between 9 and 14 percent, while those held between 5 and 12 years exhibit mean returns of approximately 5 to 6 percent. As discussed earlier, properties held 2 years and less may represent selective sales from portfolio acquisitions and/or strategic sales, where short term ownership may be a function of opportunistic buying and/or repositioning of the asset for subsequent sale. Nonetheless, reported returns on properties held for short and long time periods are nearly double those held for intermediate terms of 7 to 12 years.

4.1.7 Stratified by MSA

When examined by MSA, we see a wide dispersion of holding period returns. In Exhibits 11 to 13, we report counts and holding period returns, as stratified by largest 40 MSAs (based on population – Exhibit 11), the 40 MSAs with the most properties (based on count – Exhibit 12), and the 40 best performing MSAs (based on holding period return – Exhibit 13). Notice that returns vary greatly for the largest MSAs (Exhibit 11), with properties located in Newark, New Jersey reporting the highest mean holding period return at 15.57 percent although there were only 9 props sold in this MSA. We can generally conclude from these results that MSA size may not be a perfect indicator of commercial real estate returns.

Exhibit 12 reports holding period returns as stratified by MSAs with the greatest representation in the sample. Notice that Chicago, Los Angeles, Washington D.C., Dallas, and Atlanta top the list, with 230, 195, 184, 177, and 144 sold properties, respectively. Returns, however, vary dramatically across the 20 MSAs with the greatest representation in the sample. San Jose, ranked 11th in terms of property counts with 94 properties, had the greatest mean holding period return, at 13.78 percent. San Jose was followed by Fort Worth, Baltimore, and San Francisco, with mean returns of 12.34, 12.11 percent and 11.94 percent, respectively. The lowest performing MSAs include Houston, Tampa, and Minneapolis with returns of 2.69, 5.51 and 5.84 percent, respectively.

Exhibit 13 provides metropolitan results as stratified by the top 20 performing markets. Here we see that New Haven, San Jose, Salt Lake, Colorado Springs, and Fort Worth constitute the top five performing metropolitan areas, with returns of 17.01, 13.78, 13.72, 12.85 and 12.34 percent, respectively. Nearly all properties in the top 20 exhibited holding period returns of greater than 10 percent, and those in the top 24 MSAs outperformed the mean return, 8.73 percent, for all properties in the sample.

4.1.8 Age

In Exhibit 14, we report sample characteristics as reported by age of the property. For purposes of analysis, we stratify the sample by every 5 years. Note that the most populated category in the sample is comprised of in the 11 to 15 year old category

followed by the 16 to 20 year old category. The "youngsters" appeared to have the highest IRR with the 1 to 5 year olds earning 14.49% and the 6 to 10 year olds earning 12.25%. IRRs tended to level off in the 10% to 11% range until properties were over 30 years old. The "30 something" groups had an IRR in the 5% to 6% range.

4.1.9 Manager

A question that is of interest to institutional investors in commercial real estate is whether investment performance varies systematically across managers of these assets. Managers are chosen in large part due to their expertise in selecting, operating and disposing of real estate assets, in hopes of meeting pre-specified return levels. Prior to the present study, we have only anecdotal evidence as to the actual realized performance of institutional grade real estate. While the level of detail in the data do not allow for a reporting of individual manager performance, we are able to identify whether differences exist across broad groupings. In Exhibit 15, we provide mean holding period returns as stratified by manager deciles. As shown, performance by manager grouping varies significantly, ranging from a mean return of 15.31 percent for the top performing decile, to 2.91 percent for the lowest performing quartile. While these results do not control for dates of acquisition and disposition and/or other factors which the manager may or may not have had control over, they do suggest that a wide dispersion of returns exists by manager.

4.1.10 Type of Fund

In Exhibit 16, we stratify our performance results by fund type; closed-end, open-end, or separate account. Also provided in the Exhibit are the number of properties in each category, and the average holding period. Note that only limited data are available for this comparison, with a total of 464 properties. Data on fund type were only available in on properties that sold fairly recently. In contrast to performance by manager grouping, we see a much more similar performance across fund type, with closed-end funds slightly having the highest return of 13.02 percent followed by separate accounts at 11.74 percent and open-end funds with a return of 10.92. Open-end funds were prevalent investment

vehicles early in the study period, and may have suffered somewhat from the 'exit desire' of many investors during the downturn of real estate markets in the early 1990s.

Holding periods for open and closed-end funds are found to be similar, with separate accounts only slightly lower. It is somewhat interesting that the standard deviation of cross-sectional returns for open-end funds is smaller. Keep in mind that this is not the risk as measured by the variance of returns over time. Perhaps the tighter distribution reflects more homogeneity in the type of property selected for open-end funds – especially "core" funds.

4.1.11 Acquisition and Disposition Cohorts

From the previous analysis of the data stratified separately by acquisition and disposition date, it was obvious that it mattered when the property was purchased and it also mattered when the property was sold. Thus, to benchmark IRR performance it is necessary to compare properties that were purchased and sold at the same points in time, i.e., acquisition and disposition cohorts. The calculation of these cohorts is illustrated in Exhibit 17. For example, properties acquired in 1981 realized an IRR of around minus 8% if the property was sold in 1991, but almost plus 8 percent if held until 1998.

4.2 Comparison to NPI

While the results described above provide considerable insight into the holding period return characteristics of commercial real estate, we are also interested in comparing the results of the present sample to what the returns would be based on time-weighted returns used to calculate the NPI. Recall that to calculate time-weighted returns we need periodic, i.e., quarterly appraised values since returns must be calculated each period and chain linked. Transaction prices are thus only used in the very last quarter and affect only that quarter's return.

To make a direct comparison between the sample and the overall NPI, we estimate Time Weighted Returns (TWRs) for each sold property in the sample, for each quarter that the property was held, using appraised values from the NCREIF database.

Exhibit 18 shows a comparison of the TWR for the sold properties in the sample, versus the overall NPI. The TWR can be thought of as the NCREIF index (NPI), as estimated for those properties in the sample, and is calculated for every quarter that the property is in the database until it was sold. The quarterly return is calculated for each property using the NCREIF formula and the appraised values. This is then value weighed for each property in the sample for that quarter and then the returns are chain-linked each quarter to produce time-weighted returns.

Note that the two series are very similar except in the last couple of years where the sample size for the TWR is dropping off. Obviously the sample size drops off for the past couple of years because the property has to eventually be sold to be included, and all properties in our sample have to be sold by the end of 2001. Despite being a smaller sample, the TWR for all sold properties in the data set looks quite similar to the overall NCREIF Property Index (NPI), suggesting that the sample is a fairly good representation of the NPI.

Exhibit 19 shows a comparison of the IRRs for the sold properties with the TWRs calculated for the *same sold properties*. This shows the differences in the nature of TWRs versus IRRs. Because TWRs use value changes every quarter, in theory they should capture changes in the market more quickly because they capture the marginal change in return from quarter to quarter. Of course this depends on the appraisal process to accurately capture these quarterly changes. IRRs are by nature a dollar weighted average of returns over the entire holding period. As such, IRRs should lag TWRs, a result shown in this exhibit. Furthermore, as would be expected for an *average – marginal* relationship; the marginal TWR is below the IRR when the market is falling and the TWR is above the IRR when the market is rising.

We should note that a comparison of the TWR with the IRR is a bit of an 'apples to oranges comparison' since, as noted above, the TWR is more like a marginal return whereas the IRR is an average return. In an attempt to correct this problem, we calculate the geometric mean of the quarterly time weighted returns (TWRs) for each individual property over the period that the property was held. This allows for a comparison of the IRR with the geometric mean of the TWR plotted by year of sale. This is illustrated in Exhibit 20. The difference from what was calculated in Exhibit 19 is that the geometric mean of the TWRs for each individual property over that property's holding period is calculated. These geometric means are then averaged for each year based on the year sold which allows for comparison with the IRR that is also plotted based on the year the property is sold. Exhibit 19, on the other hand, calculates the return for each property for each quarter and averages the single quarter return across all properties for that quarter and plots the returns for that quarter. So the returns in Exhibit 19 are the marginal return for that particular quarter whereas the returns in Exhibit 20 are based on the geometric mean of the properties return for all quarters it was held. You could think of Exhibit 19 as showing "marginal returns" whereas Exhibit 20 shows average returns.

Looking at Exhibit 20, it is now it is virtually impossible to distinguish between the geometric mean of the TWRs and the IRRs. This is quite important because it suggests that the geometric mean of TWRs for properties in the NCREIF index may provide a decent estimate of the IRR for the same properties.

There are, however, systematic biases between IRRs and the geometric mean of the TWRs that must still be considered. This becomes obvious if we calculate the *spread* between the IRR and the geometric mean of the TWR. This is shown in Exhibit 21. Whereas the spread is generally within 10 to 20 basis points, it should be clear that there is a bias in the spread and it can be as much as a 30 basis point bias. Note that the spread is systematically positive when the market is weak. In fact, the spread is inversely correlated with the overall returns in the market. **The spread is greatest when the market is the weakest in the early 1990s.** Clearly the spread is not just "noise" and this bias must be taken into consideration when considering whether to benchmark investment performance using IRRs versus TWRs.

4.3 Regression analysis

In order to control for the simultaneous interaction of the factors that may affect IRRs on commercial real estate that we have discussed, we can specify the following general model:

$$IRR_i = bX_i + e_i \qquad (2)$$

where IRR_i is the holding period return associated with the *ith* property, b is a row vector of coefficients, X_i is a vector of location, property, market, and timing characteristics thought to influence the holding period return on commercial real estate, and e_i is a random error term. We estimate this model using ordinary least squares techniques for all sold properties in the sample. Note that the sample size drops to 1,802 properties. This is because we included the property age in the regressions and not all of the sold properties had information as to age of the property. The results, however, for the other coefficients when age was excluded, and the full sample size of 3,444 properties was used, was very similar.

Exhibit 22 summarizes the results for a regression where we found the IRR was affected by the properties holding period, the percentage of the property that was leased when it sold, whether the property was part of a joint venture, whether the property was in the NCREIF "classic" index (purchased on an unleveraged basis)[14], the size of the property, whether it was sold during the bottom of market cycle (1990 to 1994), property type dummy (retail) and the age of the property.[15] The term "Cons" is the constant or intercept for the regression. With the exception of size (evidently doesn't matter after all) and age (somewhat significant) the variables are highly significant. Perhaps not surprising, properties that had the greatest percentage of space leased when it was sold

[14] All IRRs in this study are calculated on an unleveraged basis (as is the NCREIF Index) regardless of whether it was actually leveraged or not. Classic properties are those that actually had no leverage. The other properties are "deleveraged" by ignoring the debt when calculating returns.
[15] Other property type dummies as well as location dummies turned out to not be significant.

had the greatest return, although if this were anticipated at the time of purchase one might have expected it to already be "priced" and result in a higher acquisition price rather than a higher IRR. Although age is marginally significant, the results are consistent with our earlier stratification that indicated older properties had lower returns. Leveraged properties (not in the 'classic' index) seemed to do better even though the IRR was calculated on an unleveraged basis. Naturally the returns were lowest if sold during 1990 to 1994. Retail properties also had significantly lower returns for the sample time period even after controlling for 1990 to 1994 which hurt all property types. Joint venture properties had lower returns for some reason and returns decreased for properties held for longer holding periods.

Section 5. Implications and Conclusions

In this study, we have examined the investment performance of a sample of 3,444 properties derived from the National Council of Investment Fiduciaries (NCREIF) database. This examination is the most comprehensive to date on the asset specific performance of institutional grade commercial real estate. For each property, we have secured pertinent information related to the acquisition price, cash inflows and outflows during ownership, partial sales, and disposition price of the property. These data are used to calculate an internal rate of return over the ownership of each property in the sample. While IRRs may not be the ideal choice for performance measurement of commercial real estate, they do provide an attractive alternative measure, devoid of the traditional 'appraisal bias' associated with NCREIF Performance Index (NPI). Moreover, IRRs do provide a useful measure of return over the entire holding period of the asset.

We find that over the period 1980 through 2001, commercial real estate has produced an overall dollar weighted average return of 8.73 percent. These IRRs are found to vary significantly by such factors as year of acquisition or disposition, property type, location of property, holding period, age, manager, type of fund, and metropolitan statistical area (MSA). More specifically, we find returns on apartment properties to dominate other types, while office properties are shown to lag considerably over the period under

examination. Regional location is also found to be important, with properties in the Mideast region of the country out performing their counterparts in the Southwest region.

We also find a general trend to suggest that properties acquired and/or sold early or late in the study period out perform those acquired and/or sold in the interim period. Newer properties are also found to out perform older properties. Significant variation in performance is also noted by metropolitan statistical area, manager, and holding period.

In order to control for the interactive effects of selected variables, OLS regressions were conducted, with preliminary results suggesting that holding period, ownership structure, disposition timing, age, and property type help explain performance. As more data become available, further analysis on the effect these variables have on performance may be conducted.

A clear relationship is shown to exist between the performance of commercial real estate as measured by the IRR and that measured by a geometric mean of Time Wieghted Returns (TWRs) such as those used to calculate the appraisal based indices like the NCREIF Property Index (NPI). However, we have also shown that systematic biases exist between these two series based on the overall direction of property markets at specific time intervals. These biases must be taken into consideration in order to directly compare these two series.

While we have been careful to note that volatility of cross sectional IRRs is not directly comparable to volatility of time series returns, a better understanding of the overall performance of institutional commercial real estate is of use to both practitioners and academics. Useful extensions of the present study will allow for a more thorough examination of the risk factors associated with performance as measure by the IRR.

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Exhibit 1: Panel A: Distribution of Sold Properties by Property Type and year of Acquisition

Property Type	Apartment	Hotel	Industrial	Office	Retail
1977	8	1	135	28	32
1978	-	-	40	13	9
1979	1	1	42	20	23
1980	2	1	59	24	20
1981	2	-	71	74	23
1982	2	2	87	57	33
1983	4	3	23	23	14
1984	6	-	45	44	16
1985	9	4	96	68	26
1986	9	-	57	34	29
1987	13	-	64	27	20
1988	41	4	49	45	29
1989	50	-	59	55	55
1990	26	2	76	58	36
1991	26	-	35	25	21
1992	57	3	57	57	44
1993	37	-	29	19	36
1994	26	1	45	29	24
1995	41	6	41	59	96
1996	60	-	95	59	24
1997	44	5	45	74	25
1998	30	-	19	24	22
1999	20		11	19	2
2000	4		5	7	7
Total	**518**	**33**	**1,285**	**942**	**666**

Exhibit 1: Panel B: Distribution of Sold Properties by Property Type and year of Disposition

Property Type	Apartment	Hotel	Industrial	Office	Retail
1979	1	-	1	-	-
1980	-	-	3	-	-
1981	-	-	3	1	-
1982	-	1	10	3	7
1983	1	-	23	8	10
1984	-	1	32	27	15
1985	2	-	60	18	16
1986	2	-	46	31	19
1987	1	1	44	26	18
1988	9	1	65	26	22
1989	5	1	70	49	19
1990	4	2	49	33	9
1991	5	2	49	36	9
1992	9	-	38	28	16
1993	36	2	41	47	21
1994	37	2	77	39	24
1995	30	2	56	54	30
1996	56	9	121	102	64
1997	69	2	175	87	104
1998	62	2	110	109	86
1999	54	-	87	79	83
2000	64	3	70	98	48
2001	71	2	55	41	46
Total	**518**	**33**	**1,285**	**942**	**666**

Exhibit 1: Panel C: Distribution of Sold Properties by Division and year of Acquisition

DIVISION	EN	ME	NE	SE	SW	WM	WN	WP
1977	45	11	9	18	19	19	15	68
1978	12	14	7	2	5	7	7	8
1979	18	5	8	8	9	10	9	20
1980	20	7	6	8	20	11	10	24
1981	26	11	13	19	36	13	20	32
1982	28	16	12	17	33	31	15	29
1983	5	2	6	18	7	4	6	19
1984	9	17	10	11	15	13	7	29
1985	31	25	21	21	29	16	19	41
1986	13	10	8	17	11	11	9	50
1987	17	10	11	19	16	6	13	32
1988	24	19	21	28	10	10	13	43
1989	28	44	20	35	23	9	5	55
1990	27	22	14	22	19	19	10	65
1991	16	14	7	13	5	11	7	34
1992	18	20	26	30	41	28	12	43
1993	16	14	9	26	13	11	4	28
1994	27	20	16	22	15	5	3	17
1995	25	21	22	49	48	22	13	43
1996	28	33	14	42	29	18	7	67
1997	17	30	18	26	19	22	10	51
1998	5	11	7	17	11	16	3	25
1999	3	13	7	9	2	7	1	10
2000	-	3	2	2	6	-	1	9
Total	**458**	**392**	**294**	**479**	**441**	**319**	**219**	**842**

Exhibit 1: Panel D: Distribution of Sold Properties by Division and year of Disposition

DIVISION	EN	ME	NE	SE	SW	WM	WN	WP
1979	1	-	-	1	-	-	-	-
1980	1	-	-	-	-	-	1	1
1981	1	-	-	-	1	-	1	1
1982	4	2	3	3	5	1		3
1983	8	1	6	5	9	2	2	9
1984	12	6	5	7	16	7	6	16
1985	17	8	12	4	6	8	11	30
1986	25	14	7	12	5	6	4	25
1987	21	6	8	11	7	7	10	20
1988	21	7	10	18	23	5	13	26
1989	22	8	10	10	36	11	11	36
1990	13	4	2	7	10	36	6	19
1991	16	17	4	16	13	5	13	17
1992	9	6	6	15	12	18	7	18
1993	14	13	13	23	26	23	8	27
1994	32	13	8	17	27	25	8	49
1995	15	18	24	18	27	23	7	40
1996	37	44	30	46	35	23	29	108
1997	59	59	47	74	38	21	23	116
1998	45	57	22	59	44	26	20	96
1999	32	39	25	44	51	21	17	74
2000	26	47	30	40	28	25	18	69
2001	27	23	22	49	22	26	4	42
Total	458	392	294	479	441	319	219	842

Exhibit 2: Sold Property Sample Distribution by Year Acquired and Year Sold

Year	Acquired	Sold
1977	204	-
1978	62	-
1979	87	2
1980	106	3
1981	170	4
1982	181	21
1983	67	42
1984	111	75
1985	203	96
1986	129	98
1987	124	90
1988	168	123
1989	219	144
1990	198	97
1991	107	101
1992	218	91
1993	121	147
1994	125	179
1995	243	172
1996	238	352
1997	193	437
1998	95	369
1999	52	303
2000	23	283
2001	-	215
Total	3,444	3,444

Exhibit 3 Sample Distribution by Years Held

Years held	Num Props	Cumulative Sold
1	218	218
2	430	648
3	428	1,076
4	366	1,442
5	333	1,775
6	296	2,071
7	251	2,322
8	291	2,613
9	231	2,844
10	78	2,922
11	127	3,049
12	107	3,156
13	78	3,234
14	61	3,295
15	49	3,344
16	33	3,377
17	28	3,405
18	12	3,417
19	14	3,431
20	5	3,436
21	6	3,442
22	2	3,444

Exhibit 4 Panel A

Ranked by Size of MSA

	City	Props
1	Los Angeles-Long Beach, CA PMSA	195
2	New York, NY PMSA	28
3	Chicago, IL PMSA	230
4	Boston, MA PMSA	85
5	Philadelphia, PA-NJ PMSA	66
6	Washington, DC-MD-VA MSA	184
7	Detroit, MI PMSA	34
8	Houston, TX PMSA	103
9	Atlanta, GA MSA	144
10	Dallas, TX PMSA	177
11	Riverside-San Bernardino, CA PMSA	40
12	Minneapolis-St. Paul, MN-WI MSA	93
13	Nassau-Suffolk, NY PMSA	na
14	San Diego, CA MSA	61
15	Phoenix, AZ MSA	121
16	St. Louis, MO-IL MSA	51
17	Baltimore, MD MSA	64
18	Pittsburgh, PA PMSA	11
19	Cleveland, OH PMSA	20
20	Seattle, WA PMSA	103
21	Oakland, CA PMSA	53
22	Tampa-St. Petersburg-Clearwater FL MSA	38
23	Miami-Hialeah, FL PMSA	28
24	Newark, NJ PMSA	9
25	Denver, CO PMSA	102
26	Portland, OR PMSA	45
27	Kansas City, MO-KS MSA	31
28	San Francisco, CA PMSA	48
29	New Haven-Meriden, CT MSA	12
30	Cincinnati, OH-KY-IN PMSA	32
31	San Jose, CA PMSA	94
32	Norfolk-Virginia Beach-Newport News VA MSA	12
33	Fort Worth-Arlington, TX PMSA	25
34	Indianapolis, IN MSA	33
35	San Antonio, TX MSA	16
36	Milwaukee, WI PMSA	36
37	Sacramento, CA MSA	36
38	Columbus, OH MSA	36
39	Fort Lauderdale-Hollywood-Pompano Beach FL PMSA	55
40	Orlando, FL MSA	41

Exhibit 4 Panel B

City	MSA	Props
IL-Chicago	1600	230
CA-Los Angeles	4480	195
DC-Washington	8840	184
TX-Dallas	1920	177
GA-Atlanta	520	144
AZ-Phoenix	6200	121
CA-Orange County	5945	106
WA-Seattle	7600	103
TX-Houston	3360	103
CO-Denver	2080	102
CA-San Jose	7400	94
MN-Minneapolis	5120	93
MA-Boston	1123	85
PA-Philadelphia	6160	66
MD-Baltimore	720	64
CA-San Diego	7320	61
FL-Fort Lauderdale	2680	55
CA-Oakland	5775	53
MO-Saint Louis	7040	51
CA-San Francisco	7360	48
OR-Portland	6440	45
FL-Orlando	5960	41
CA-Riverside	6780	40
FL-Tampa	8280	38
WI-Milwaukee	5080	36
OH-Columbus	1840	36
CA-Sacramento	6920	36
MI-Detroit	2160	34
TN-Memphis	4920	33
IN-Indianapolis	3480	33
TX-Austin	640	32
OH-Cincinnati	1640	32
MO-Kansas City	3760	31
NC-Charlotte	1520	30
FL-West Palm Beach	8960	29
TN-Nashville	5360	29
NY-New York	5600	28
FL-Miami	5000	28
TX-Fort Worth	2800	25
NC-Raleigh	6640	22
OH-Cleveland	1680	20

Exhibit 5 – Panel A: IRR by Year Acquired and Sample Standard Deviation

Year Acquired	Properties	Annual IRR	Std Dev
1977	204	13.47%	3.28%
1978	62	9.64%	2.46%
1979	87	9.90%	3.26%
1980	106	7.82%	2.98%
1981	170	6.71%	3.69%
1982	181	6.81%	3.90%
1983	67	7.87%	4.14%
1984	111	5.92%	4.10%
1985	203	3.55%	4.98%
1986	129	4.24%	4.03%
1987	124	3.92%	5.88%
1988	168	2.45%	4.62%
1989	219	3.73%	5.12%
1990	198	0.57%	6.87%
1991	107	5.29%	4.60%
1992	218	7.62%	4.85%
1993	121	9.90%	4.36%
1994	125	10.86%	4.52%
1995	243	16.83%	8.31%
1996	238	15.82%	4.86%
1997	193	17.31%	6.03%
1998	95	14.25%	6.11%
1999	52	12.92%	4.17%
2000	23	16.42%	9.01%
All Years	3444	8.73%	5.64%

Exhibit 5 - Panel B: IRR by Year Sold and Sample Standard Deviation

Year	# Sales	Average IRR	Std Dev of IRR
1981	4	23.69%	6.75%
1982	21	12.98%	4.85%
1983	42	14.49%	3.94%
1984	75	9.86%	3.53%
1985	96	14.20%	3.82%
1986	98	11.31%	2.89%
1987	90	8.33%	5.34%
1988	123	7.03%	5.70%
1989	144	5.48%	5.65%
1990	97	5.40%	4.25%
1991	101	1.32%	6.88%
1992	91	0.92%	8.56%
1993	147	-0.48%	5.98%
1994	179	4.77%	5.55%
1995	172	3.67%	4.41%
1996	352	7.97%	7.26%
1997	437	9.56%	4.33%
1998	369	12.85%	5.90%
1999	303	11.91%	4.21%
2000	283	11.68%	4.30%
2001	215	12.02%	4.26%

Note: sales that occurred in 1979 and 1980 not reported above because there were less than two sales in each of those years.

Exhibit 6: IRR by Year Sold and Percent of total NPI properties Sold

Year Sold	Props Sold	Annual IRR	Props in NPI	% of NPI Sold
1981	4	23.69%	599	0.67%
1982	21	12.98%	760	2.76%
1983	42	14.49%	975	4.31%
1984	75	9.86%	1044	7.18%
1985	96	14.20%	1123	8.55%
1986	98	11.31%	1269	7.72%
1987	90	8.33%	1363	6.60%
1988	123	7.03%	1488	8.27%
1989	144	5.48%	1626	8.86%
1990	97	5.40%	1822	5.33%
1991	101	1.32%	2019	5.00%
1992	91	0.92%	2176	4.18%
1993	147	-0.48%	2127	6.91%
1994	179	4.77%	1991	8.99%
1995	172	3.67%	2200	7.82%
1996	352	7.97%	2450	14.37%
1997	437	9.56%	2619	16.68%
1998	369	12.85%	2430	15.19%
1999	303	11.91%	2526	12.00%
2000	283	11.68%	2897	9.77%
2001	215	12.02%	3264	6.59%

Exhibit 7: IRR by year sold versus Percent Sold

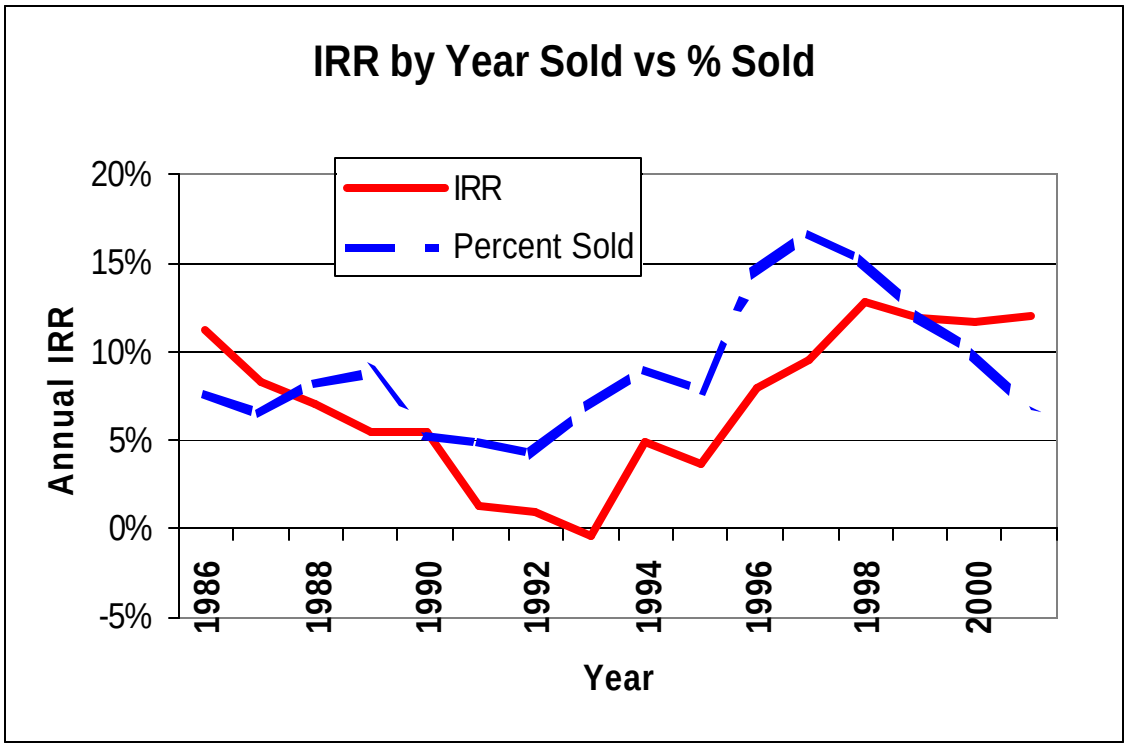

Exhibit 8 Panel A: IRR by Property Type – Overall and by year of sale

Property type	Apartment	Industrial	Office	Retail
All Time Ave IRR	10.64%	8.10%	5.89%	7.70%
Year Sold				
1985	15.82%	13.39%	15.21%	10.45%
1986	11.12%	11.11%	9.00%	12.63%
1987	19.73%	9.60%	6.75%	6.16%
1988	12.07%	7.03%	-1.06%	11.94%
1989	4.41%	6.54%	1.45%	8.69%
1990	8.91%	6.28%	1.38%	13.20%
1991	4.38%	1.11%	-1.38%	2.94%
1992	6.96%	4.73%	-12.74%	6.74%
1993	6.67%	-0.60%	-5.14%	-3.37%
1994	10.15%	4.81%	-4.17%	6.84%
1995	9.11%	3.08%	-1.09%	4.38%
1996	8.40%	5.82%	4.28%	10.42%
1997	11.18%	10.56%	7.00%	6.36%
1998	12.99%	10.76%	14.27%	8.05%
1999	12.24%	10.51%	13.24%	9.11%
2000	10.72%	11.53%	11.99%	8.00%
2001	12.42%	11.91%	13.31%	6.49%

Exhibit 8 Panel B: IRR by Property Type – Overall and by Year Acquired

PTYPE	Apartment	Industrial	Office	Retail
All Time Ave IRR	10.64%	8.10%	5.89%	7.70%
Year Acquired				
1977	12.50%	12.74%	10.67%	12.49%
1978	-	10.42%	6.24%	8.72%
1979	17.52%	9.65%	4.54%	9.75%
1980	9.53%	8.47%	1.51%	9.18%
1981	9.03%	5.67%	4.08%	8.66%
1982	-0.50%	7.07%	3.14%	9.83%
1983	8.62%	9.63%	2.92%	10.71%
1984	5.18%	7.10%	2.42%	9.93%
1985	5.09%	4.39%	0.53%	6.80%
1986	10.07%	3.42%	0.12%	7.52%
1987	5.38%	6.40%	-3.52%	1.70%
1988	5.86%	1.38%	-0.93%	4.22%
1989	6.51%	4.08%	-3.45%	6.33%
1990	7.54%	1.60%	-5.49%	-0.26%
1991	11.76%	3.01%	2.83%	1.95%
1992	11.42%	6.70%	3.30%	5.78%
1993	13.45%	11.01%	5.38%	5.67%
1994	10.55%	10.64%	12.81%	5.64%
1995	12.28%	14.29%	18.07%	13.30%
1996	13.17%	15.93%	17.55%	5.87%
1997	13.47%	13.74%	19.07%	10.58%
1998	11.53%	17.38%	13.22%	10.93%
1999	15.21%	9.01%	11.31%	5.17%
2000	14.53%	15.97%	22.37%	5.10%

Exhibit 9 Panel A IRR by Division by Year Acquired

DIVISION	EN	ME	NE	SE	SW	WM	WN	WP
All Time Ave IRR	7.61%	10.97%	9.30%	8.20%	6.48%	7.38%	6.31%	9.99%
1977	9.27%	17.04%	14.98%	11.97%	7.80%	10.22%	10.62%	17.26%
1978	7.23%	11.85%	9.25%	9.85%	10.58%	6.12%	10.20%	8.25%
1979	7.52%	7.07%	12.50%	7.71%	-0.66%	12.61%	6.44%	12.67%
1980	7.50%	10.88%	14.02%	7.87%	4.40%	5.07%	4.78%	9.46%
1981	6.82%	11.08%	11.03%	9.00%	-1.26%	1.41%	4.90%	8.39%
1982	6.90%	12.28%	10.42%	8.89%	4.87%	2.77%	2.59%	8.02%
1983	5.22%	10.42%	20.27%	8.57%	-0.55%	2.10%	5.85%	7.33%
1984	5.61%	5.61%	12.96%	7.76%	0.79%	5.91%	1.14%	6.89%
1985	8.22%	4.14%	4.89%	0.38%	-3.38%	1.16%	2.43%	6.94%
1986	4.85%	4.99%	12.09%	1.17%	-2.91%	-5.01%	1.76%	7.77%
1987	10.01%	7.56%	5.77%	4.00%	-8.97%	5.87%	3.21%	5.23%
1988	2.83%	0.98%	-1.15%	2.46%	1.06%	-2.35%	5.96%	5.01%
1989	2.68%	5.04%	4.33%	4.97%	6.53%	-6.54%	-2.69%	3.28%
1990	2.16%	2.81%	0.75%	3.84%	0.29%	-2.08%	-14.13%	1.14%
1991	4.20%	9.36%	5.99%	-1.41%	13.96%	8.18%	8.58%	3.66%
1992	2.40%	10.33%	3.37%	8.25%	7.74%	14.01%	6.88%	6.62%
1993	9.66%	11.46%	3.52%	12.83%	5.15%	13.33%	10.24%	9.40%
1994	10.01%	7.60%	11.58%	13.65%	11.65%	16.25%	31.70%	5.79%
1995	13.34%	37.64%	15.47%	13.04%	14.97%	15.16%	16.02%	16.90%
1996	14.34%	12.77%	16.69%	13.68%	15.19%	12.57%	17.30%	20.11%
1997	11.08%	18.48%	15.55%	10.18%	27.16%	14.81%	15.93%	20.65%
1998	13.38%	21.72%	26.96%	10.33%	10.39%	9.12%	15.21%	15.12%
1999	16.24%	15.94%	10.77%	6.96%	-3.36%	17.76%	6.03%	15.41%
2000		9.56%	26.59%	12.87%	11.19%	-	12.14%	21.20%

Exhibit 9 Panel B IRR by Division by Year Sold

DIVISION	EN	ME	NE	SE	SW	WM	WN	WP
All Time Ave IRR	7.61%	10.97%	9.30%	8.20%	6.48%	7.38%	6.31%	9.99%
1985	7.19%	17.51%	14.77%	11.57%	15.92%	16.24%	9.19%	18.38%
1986	8.25%	12.11%	12.95%	14.27%	8.04%	9.87%	9.53%	13.32%
1987	8.67%	10.98%	13.87%	5.67%	6.45%	0.05%	2.23%	13.04%
1988	5.46%	11.06%	15.03%	4.75%	-0.33%	9.61%	3.37%	13.54%
1989	8.83%	7.19%	12.53%	6.98%	-3.20%	0.26%	2.45%	11.88%
1990	10.00%	15.10%	20.33%	3.95%	-0.75%	2.92%	5.56%	7.05%
1991	3.88%	6.80%	10.06%	2.76%	-5.36%	-21.15%	-1.51%	3.87%
1992	1.22%	4.74%	-3.83%	0.51%	2.09%	0.61%	-14.84%	7.06%
1993	-1.64%	5.19%	-0.26%	1.04%	1.80%	-6.26%	-0.29%	-1.35%
1994	2.15%	8.07%	1.29%	3.66%	2.92%	11.05%	10.49%	3.44%
1995	3.96%	3.98%	0.58%	4.28%	2.56%	7.43%	4.44%	3.45%
1996	7.83%	15.63%	4.94%	10.24%	7.51%	11.37%	8.67%	4.02%
1997	8.94%	6.53%	8.70%	9.73%	9.82%	15.70%	8.26%	10.70%
1998	11.23%	13.05%	13.42%	10.46%	20.33%	11.68%	8.01%	12.72%
1999	11.58%	13.14%	11.48%	10.97%	9.22%	10.36%	14.99%	13.67%
2000	8.32%	12.15%	15.08%	8.24%	7.78%	13.34%	9.37%	14.71%
2001	9.08%	14.83%	12.64%	10.20%	10.80%	10.78%	9.57%	15.80%

Exhibit 10 IRR by years Held

Years held	IRR
1	10.56%
2	12.61%
3	9.79%
4	7.65%
5	7.64%
6	6.28%
7	5.92%
8	6.28%
9	5.83%
10	4.22%
11	4.16%
12	6.26%
13	6.26%
14	7.64%
15	7.22%
16	6.95%
17	9.52%
18	9.02%
19	10.34%
20	9.69%
21	9.99%
22	11.62%

Exhibit 11 IRR by Size of MSA

Ranked by Size of MSA

	City	Props	Annual IRR
1	Los Angeles-Long Beach, CA PMSA	195	10.75%
2	New York, NY PMSA	28	7.16%
3	Chicago, IL PMSA	230	7.87%
4	Boston, MA PMSA	85	10.92%
5	Philadelphia, PA-NJ PMSA	66	8.70%
6	Washington, DC-MD-VA MSA	184	9.53%
7	Detroit, MI PMSA	34	11.05%
8	Houston, TX PMSA	103	2.69%
9	Atlanta, GA MSA	144	8.72%
10	Dallas, TX PMSA	177	7.63%
11	Riverside-San Bernardino, CA PMSA	40	6.28%
12	Minneapolis-St. Paul, MN-WI MSA	93	5.84%
13	Nassau-Suffolk, NY PMSA	na	na
14	San Diego, CA MSA	61	8.28%
15	Phoenix, AZ MSA	121	6.15%
16	St. Louis, MO-IL MSA	51	8.99%
17	Baltimore, MD MSA	64	12.11%
18	Pittsburgh, PA PMSA	11	10.24%
19	Cleveland, OH PMSA	20	6.38%
20	Seattle, WA PMSA	103	10.57%
21	Oakland, CA PMSA	53	8.92%
22	Tampa-St. Petersburg-Clearwater FL MSA	38	5.51%
23	Miami-Hialeah, FL PMSA	28	7.04%
24	Newark, NJ PMSA	9	15.57%
25	Denver, CO PMSA	102	8.10%
26	Portland, OR PMSA	45	6.83%
27	Kansas City, MO-KS MSA	31	6.43%
28	San Francisco, CA PMSA	48	11.94%
29	New Haven-Meriden, CT MSA	12	7.31%
30	Cincinnati, OH-KY-IN PMSA	32	6.58%
31	San Jose, CA PMSA	94	13.78%
32	Norfolk-Virginia Beach-Newport News VA MSA	12	6.60%
33	Fort Worth-Arlington, TX PMSA	25	12.34%
34	Indianapolis, IN MSA	33	5.87%
35	San Antonio, TX MSA	16	5.07%
36	Milwaukee, WI PMSA	36	7.27%
37	Sacramento, CA MSA	36	9.64%
38	Columbus, OH MSA	36	9.33%
39	Fort Lauderdale-Hollywood-Pompano Beach FL PMSA	55	10.19%
40	Orlando, FL MSA	41	7.71%

Exhibit 12 IRR by Number of Sold Properties

City	MSA	Props	Annual IRR
IL-Chicago	1600	230	7.87%
CA-Los Angeles	4480	195	10.75%
DC-Washington	8840	184	9.53%
TX-Dallas	1920	177	7.63%
GA-Atlanta	520	144	8.72%
AZ-Phoenix	6200	121	6.15%
CA-Orange County	5945	106	9.07%
WA-Seattle	7600	103	10.57%
TX-Houston	3360	103	2.69%
CO-Denver	2080	102	8.10%
CA-San Jose	7400	94	13.78%
MN-Minneapolis	5120	93	5.84%
MA-Boston	1123	85	10.92%
PA-Philadelphia	6160	66	8.70%
MD-Baltimore	720	64	12.11%
CA-San Diego	7320	61	8.28%
FL-Fort Lauderdale	2680	55	10.19%
CA-Oakland	5775	53	8.92%
MO-Saint Louis	7040	51	8.99%
CA-San Francisco	7360	48	11.94%
OR-Portland	6440	45	6.83%
FL-Orlando	5960	41	7.71%
CA-Riverside	6780	40	6.28%
FL-Tampa	8280	38	5.51%
WI-Milwaukee	5080	36	7.27%
OH-Columbus	1840	36	9.33%
CA-Sacramento	6920	36	9.64%
MI-Detroit	2160	34	11.05%
TN-Memphis	4920	33	10.69%
IN-Indianapolis	3480	33	5.87%
TX-Austin	640	32	11.89%
OH-Cincinnati	1640	32	6.58%
MO-Kansas City	3760	31	6.43%
NC-Charlotte	1520	30	11.45%
FL-West Palm Beach	8960	29	7.40%
TN-Nashville	5360	29	9.77%
NY-New York	5600	28	7.16%
FL-Miami	5000	28	7.04%
TX-Fort Worth	2800	25	12.34%
NC-Raleigh	6640	22	10.34%
OH-Cleveland	1680	20	6.38%

Exhibit 13 Top Performing MSAs Ranked by IRR

City	MSA	Props	Annual IRR
CT-New Haven	5483	13	17.01%
CA-San Jose	7400	94	13.78%
UT-Salt Lake City	7160	13	13.72%
CO-Colorado Springs	1720	15	12.85%
TX-Fort Worth	2800	25	12.34%
MD-Baltimore	720	64	12.11%
CA-San Francisco	7360	48	11.94%
TX-Austin	640	32	11.89%
NC-Charlotte	1520	30	11.45%
MI-Detroit	2160	34	11.05%
MA-Boston	1123	85	10.92%
CA-Los Angeles	4480	195	10.75%
TN-Memphis	4920	33	10.69%
WA-Seattle	7600	103	10.57%
NC-Raleigh	6640	22	10.34%
PA-Pittsburgh	6280	11	10.24%
FL-Fort Lauderdale	2680	55	10.19%
TN-Nashville	5360	29	9.77%
CA-Sacramento	6920	36	9.64%
DC-Washington	8840	184	9.53%
OH-Columbus	1840	36	9.33%
CA-Orange County	5945	106	9.07%
MO-Saint Louis	7040	51	8.99%
CA-Oakland	5775	53	8.92%
GA-Atlanta	520	144	8.72%
PA-Philadelphia	6160	66	8.70%
VA-Richmond	6760	11	8.55%
CA-San Diego	7320	61	8.28%
CO-Denver	2080	102	8.10%
FL-Jacksonville	3600	13	8.05%
CT-Hartford	3283	15	7.95%
IL-Chicago	1600	230	7.87%
FL-Orlando	5960	41	7.71%
TX-Dallas	1920	177	7.63%
AZ-Tucson	8520	14	7.47%
FL-West Palm Beach	8960	29	7.40%
CA-Ventura	8735	12	7.31%
WI-Milwaukee	5080	36	7.27%
NY-New York	5600	28	7.16%
FL-Miami	5000	28	7.04%
OR-Portland	6440	45	6.83%
VA-Norfolk	5720	12	6.60%

Exhibit 14 IRR by Age

Age	Num Props	IRR
1 to 5	131	14.49%
6 to 10	409	12.25%
11 to 15	617	11.35%
16 to 20	469	10.92%
21 to 25	204	11.72%
26 to 30	113	12.58%
31 to 35	53	6.73%
Over 35	77	5.50%

Exhibit 15 IRR by Manager Deciles

Deciles for 85 manager observations	
Percentile	**IRR**
10	2.91%
20	4.50%
30	6.40%
40	7.21%
50	8.44%
60	10.52%
70	12.34%
80	14.00%
90	15.31%

Exhibit 16 IRR by Fund Type

Fund Type	Num Props	Years held	IRR	Std Dev of Sample
Closed	107	5.52	13.02%	2.57%
Open	124	6.18	10.92%	1.66%
Separate	233	4.42	11.74%	2.19%

Exhibit 17 IRR Cohorts by Year Acquired and Year Sold

	Year Sold															
Yr Acquired	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1980	10.51%	8.29%	11.54%	8.30%	6.22%	5.80%	-	5.09%	3.99%	6.34%	5.30%	5.69%	7.60%	10.76%	5.35%	10.85%
1981	11.69%	11.00%	7.45%	5.86%	0.86%	4.33%	-7.92%	1.21%	0.04%	7.43%	3.69%	5.93%	7.28%	7.94%	4.91%	6.72%
1982	15.57%	9.55%	6.90%	9.97%	6.42%	3.27%	3.86%	2.71%	-0.90%	3.74%	7.53%	7.22%	9.38%	7.33%	9.57%	-
1983	12.20%	7.88%	17.80%	12.60%	4.36%	14.98%	5.33%	8.47%	0.97%	2.20%	2.57%	8.90%	7.51%	7.96%	8.44%	10.09%
1984	27.27%	13.60%	15.12%	13.45%	6.32%	3.57%	0.79%	8.71%	-0.54%	1.27%	4.10%	4.73%	8.05%	5.41%	5.39%	-0.51%
1985		12.30%	5.93%	0.09%	-1.60%	3.08%	3.23%	1.02%	5.14%	2.07%	0.75%	4.30%	5.42%	8.44%	7.27%	5.57%
1986				10.52%	7.06%	3.93%	-3.32%	-1.89%	2.62%	1.28%	1.15%	3.78%	5.34%	7.77%	5.55%	7.31%
1987				5.88%	9.74%	12.43%	1.63%	0.01%	-1.75%	4.37%	-0.27%	2.72%	0.62%	2.45%	3.29%	6.51%
1988					3.69%	0.03%	2.66%	5.46%	-5.83%	0.66%	0.39%	2.41%	4.45%	4.64%	6.70%	6.80%
1989						8.23%	-9.14%	7.31%	-3.61%	2.27%	2.41%	2.97%	5.75%	6.50%	8.43%	7.19%
1990							-11.76%	-15.20%	-4.68%	0.56%	-0.45%	1.69%	4.65%	2.33%	5.95%	7.76%
1991								-4.62%	3.02%	3.33%	3.01%	3.96%	6.01%	7.63%	7.48%	9.84%
1992									4.28%	7.46%	8.13%	4.05%	9.31%	9.69%	8.07%	10.85%
1993										12.91%	6.55%	8.48%	13.08%	9.37%	10.66%	8.52%
1994											12.33%	10.78%	10.30%	11.37%	10.49%	10.83%
1995												30.75%	15.35%	17.58%	13.01%	10.90%
1996													18.50%	17.16%	15.01%	13.25%
1997														23.16%	17.83%	14.19%
1998															18.32%	15.25%
1999																10.19%

Exhibit 18 NPI formula applied to Sold Props Sample vs. NPI using All Props

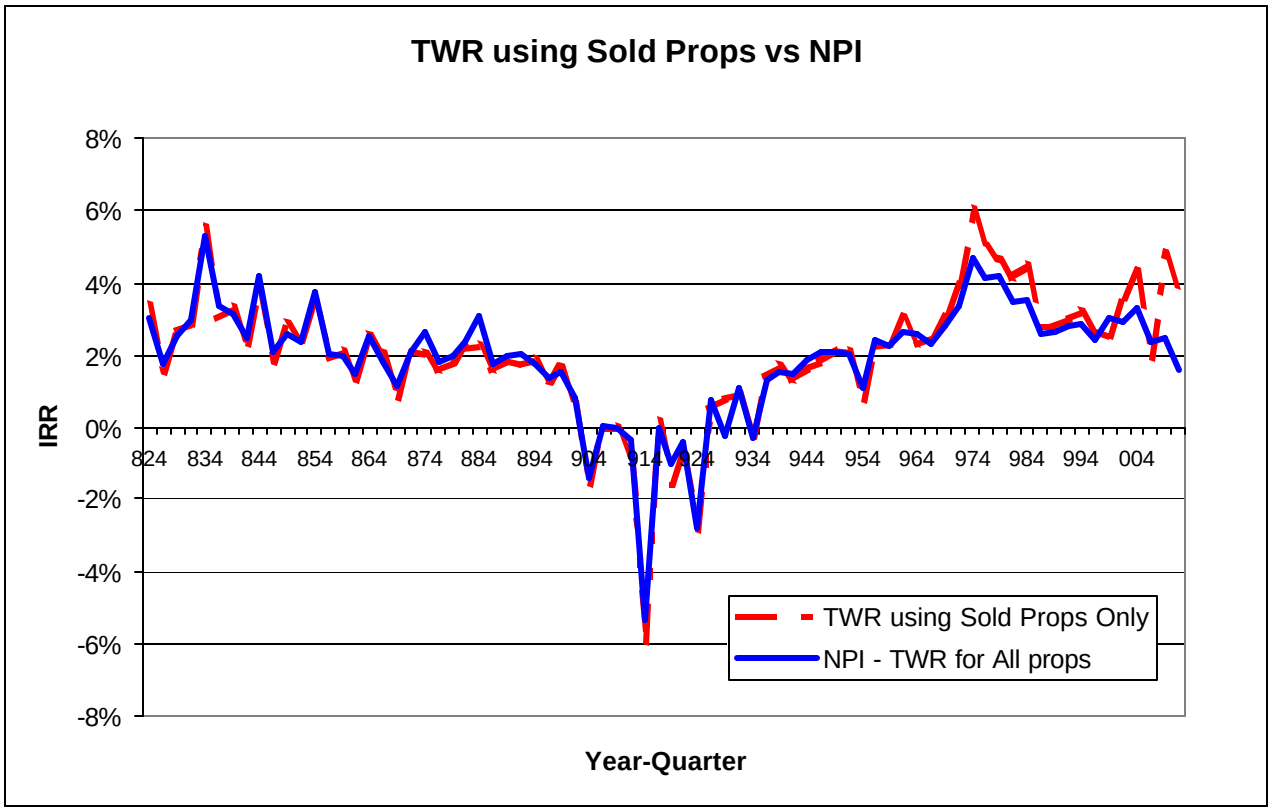

Exhibit 19 IRR vs TWR

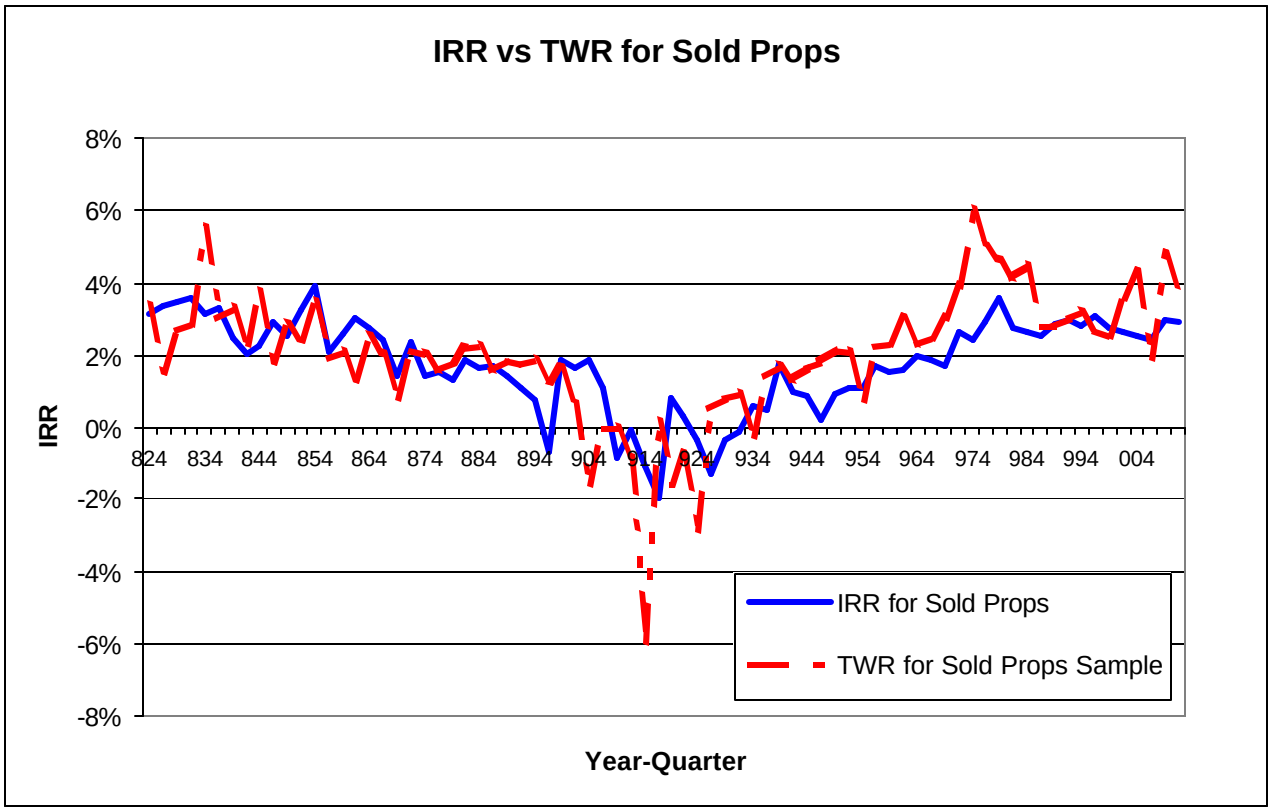

Exhibit 20 IRR versus Geometric Mean of TWR

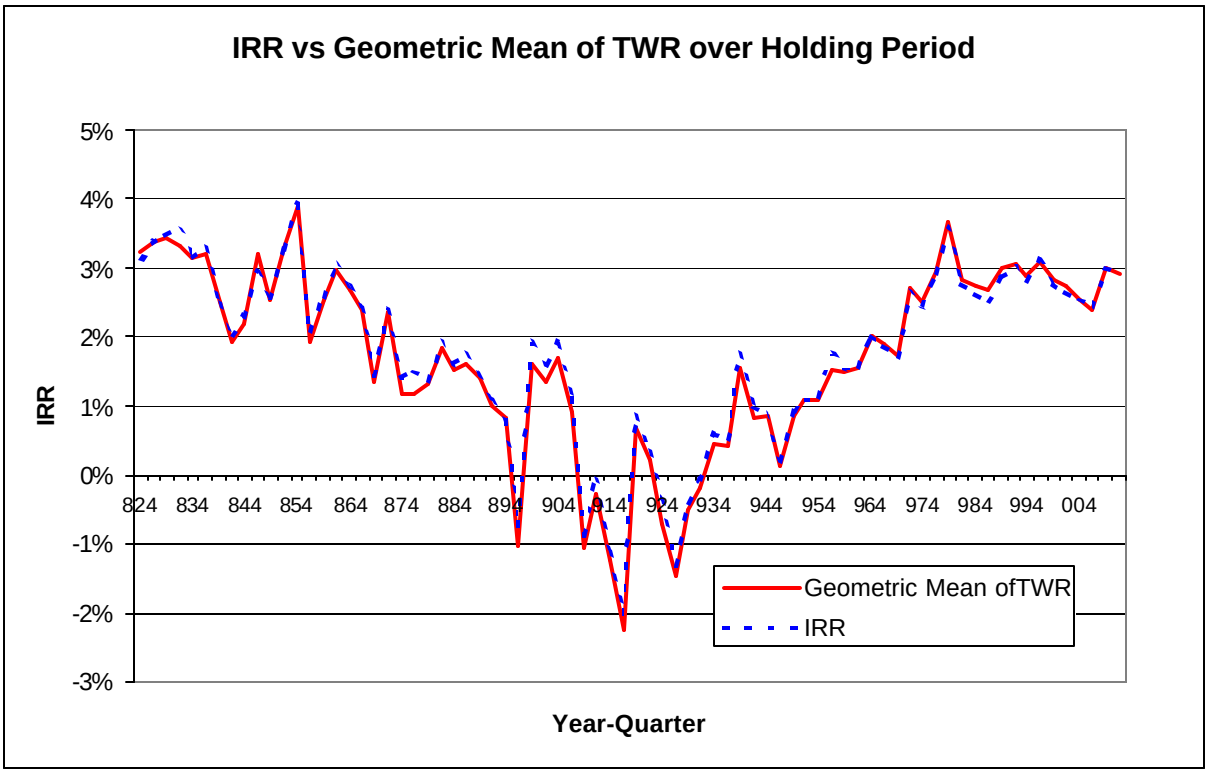

Exhibit 21 Spread between IRR and Geometric Mean of TWR over Holding Period

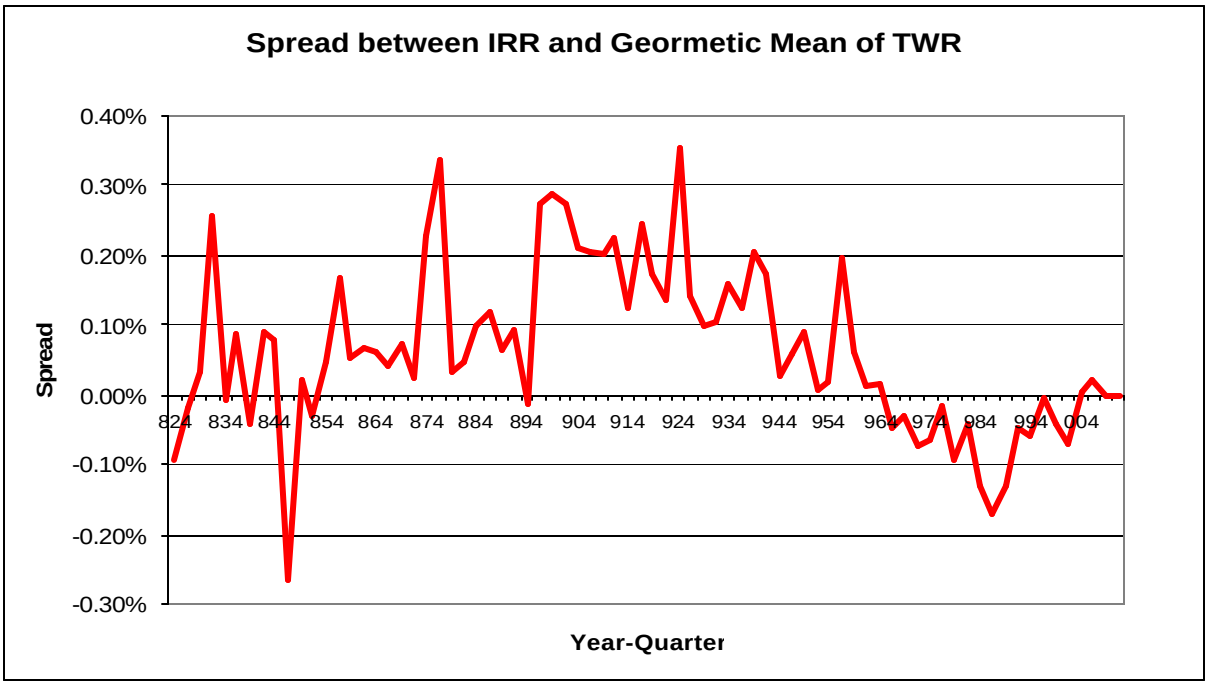

Exhibit 22 OLS Results

irr	Coef.	Std. Err	t	P>|t|	[95% Conf.	Interval]
hold_period	-0.00148	0.00013	-11.04	0.00	-0.00174	-0.00122
percentleased	0.00019	0.00002	8.00	0.00	0.00014	0.00023
jointven	-0.00672	0.00218	-3.08	0.00	-0.01100	-0.00245
classic	-0.00675	0.00210	-3.21	0.00	-0.01087	-0.00263
sqft	0.00000	0.00000	-1.11	0.27	0.00000	0.00000
yrs90_94	-0.01470	0.00229	-6.43	0.00	-0.01919	-0.01022
retail dum	-0.00574	0.00132	-4.34	0.00	-0.00834	-0.00315
age	-0.00007	0.00005	-1.35	0.18	-0.00018	0.00003
_cons	0.02601	0.00313	8.32	0.00	0.01988	0.03215