VALUE INVESTMENT STRATEGIES FOR COMMERCIAL REAL ESTATE

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This draft version: March 28, 2017

Executive Summary

This paper examines the value effect hypothesis with respect to commercial real estate properties. Value based investment strategies have attracted growing attention by fund managers for a wide range of asset classes. However, until recently, scant research has focused on institutional-grade commercial real estate.

Our analysis uses a large, proprietary property-level dataset with appraisal based returns on the commercial real estate properties that are included in the NCREIF Property Index (NPI). Classifying high cap rate properties as value properties and controlling for location, property type and time period, we examine whether and the extent to which value properties outperform other properties in terms of raw and risk-adjusted returns.

Our results show that high cap rate (value) properties earn higher returns compared with low cap rate properties, and outperform low cap rate properties on a risk-adjusted basis. The return differential is statistically significant, economically meaningful, and holds across property types and over the real estate cycle. Moreover, the value effect is evident both within and across locations so that, on average, higher cap rate properties within a category of CBSA outperform lower cap rate properties from the same CBSAs and higher cap rate CBSAs outperform lower cap rate CBSAs. Our analysis also examines the source of the value effect and finds that, other than for apartment properties, higher cap rate properties outperform lower cap properties due mostly to higher income.

Real estate investors and academics should find interest in our analysis given the evidence we provide on the strength and consistency of the value effect based on individual property data.

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[†] We thank the ***Real Estate Research Institute*** for a research grant and the ***National Council of Real Estate Investment Fiduciaries*** for providing their commercial real estate data.

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1. Introduction

Value investing is one of the most commonly followed investment strategies in the capital markets. Discussion of value investing goes back at least to Graham and Dodd (1934) and interest in the concept likely goes back much farther in time. At its core, value investing involves some version of buying assets whose prices are low relative to some metric, under the expectation that, if value investing is effective, these assets will generate higher risk-adjusted returns (the "value effect"). The fact that value investing essentially involves looking for assets that trade at a low price has great intuitive appeal for investors, and can help explain its enduring popularity.

Value investing, however, is not only a popular strategy, its efficacy has been documented in a number of contexts. There has been extensive academic research on the value effect in the equity markets going back to at least the 1980s (see Stattman (1980) for an early example) and continuing through Fama and French (1992) and many others. More recently, in a paper titled "Value and Momentum Everywhere", Asness, Moskowitz, and Pedersen (2013) document evidence of a value effect across several asset classes and geographies, including equities, equity indices, currencies, commodities, and government bonds. However, Asness et al.'s "everywhere" does not include real estate.

In this paper, we examine and test for the value effect in commercial real estate using property-level data. In commercial real estate, relative valuation is commonly measured by the cap rate (net operating income divided by property value). We therefore define individual properties as value properties if their cap rate, at a particular time, is high relative to other properties that are similar in terms of property type and location. Using appraisal based returns on properties in the NCREIF Property Index (NPI), our results show that high cap rate (value) properties earn higher returns than low cap rate properties, and outperform low cap rate properties on a risk-adjusted basis. The return differential is large and economically significant, and holds across property types and over the real estate cycle.

We are not the first to examine the relationship between cap rates and performance in commercial real estate. Plazzi, Torous, and Valkanov (2010) find that higher cap rates predict higher returns (except for

office properties). Beracha and Downs (2015) report that high cap rate metropolitan areas outperform low cap rate metro areas. However, both of these papers rely on metro-level indices to measure cap rates. While results on a metro level can be important to investors in helping determine target markets, and to establish that there is a value effect at work in real estate markets, actual investment decisions in commercial real estate are made at the asset level. Further, looking at the effect of cap rates at the metro level ignores the fact that within the same metro area some properties may have relatively high cap rates while others are relatively low.

We overcome the issues in using metro level measures of cap rates by using data on a property specific level, and classifying individual properties as having a high or low cap rate. Related to this approach, Plazzi, Torous, and Valkanov (2011) use property level data in a portfolio optimization to show that optimal portfolios should tilt (relative to a benchmark) towards high cap rate properties. Perhaps most related to our work is Peng (2016) who uses property level data to show that properties acquired at a higher cap rate have higher future returns over their holding period. However, Peng (2016) also finds a positive relationship between initial cap rate and property systematic risk, and interprets his findings as consistent with market efficiency in real estate. In contrast, our results indicate strong outperformance by value properties on a risk-adjusted basis.

Our results indicate that the value effect is economically meaningful and widespread in commercial real estate markets. Over time, the average difference between reported returns to high and low cap rate properties ranges from 75 basis points (bp) per year in office, up to 212 bp per year in apartment. Further, even more dramatic differences can be seen in select cases. As an example, when comparing office properties that are "relatively expensive properties in expensive markets" (i.e. properties in markets with below average cap rates, where the property has a cap rate even lower than average) to office properties that are "relatively cheap properties in cheap markets" (high average cap rate market, property has higher than average cap rate), we find that the value properties with high cap rates have an average return almost double the more expensive properties. The size and persistence of these effects on reported returns mean

that our results are of interest both to real estate investors, and to researchers interested in inefficiencies in the real estate market and the role of the value effect specifically.

2. Data

Our data comes from the National Council of Real Estate Investment Fiduciaries (NCREIF). Data contributing members of NCREIF (investment managers, managing capital on behalf of institutional investors) submit detailed quarterly data on each property they hold. From this data, NCREF produces the NPI, which is the most widely followed index of commercial real estate performance in the US. While NCREIF does not make data on individual properties publicly available, they provided us access to their data for the purposes of this research. Our sample begins with all properties that have been part of the NPI at some point between Q1 1978 and Q4 2015. The initial sample is composed of 23,981 different properties and 481,052 property-quarter observations.

We examine the office, apartment, retail, and industrial property types, and exclude hotels from our analysis due to the latter's unique operating arrangements. Further, we examine each property type separately because of the inherent differences across these sectors. For properties within each sector, we apply filters to the data to ensure sufficient data for our tests, and to avoid including time periods and geographies with thin data that may bias our results. To be included in the sample for a particular quarter, a property must have at least five quarters of trailing history (which we use to classify value properties, as detailed later) and at least 20 quarters of data going forward from which we calculate five year returns. These conditions mean that the earliest possible start date for our data is Q2 1979. Because the data runs until Q4 2015, the last date for which we can calculate five year returns is Q1 2011. We use metro-level data to market-adjust each property (details later), where we define metro-level by Core Based Statistical Area (CBSA). As such, we require that each CBSA have at least 20 consecutive quarters of data, and that each CBSA-quarter include at least five properties. In quarters in which these criteria are not meet, all properties in those CBSAs are excluded. Hence, we exclude CBSAs that are represented in the NPI over some short time period, but are not typically included and therefore not typically target markets for

institutional real estate investment, and CBSAs which have few properties in the database and for which averages cannot be reliably calculated.

Given that the NCREIF data is considerably thinner in the early periods of the sample, our filters result in entirely omitting some of the earlier quarters, although this varies by property type. Because the availability of data varies considerably across property types in the early part of the database, the start date for our final sample is different for each property type.[1] For office properties, the final sample consists of 1264 properties and 22,894 property-quarters, beginning in Q1 1981. For apartment properties, the final sample is 804 properties and 13,900 property-quarters beginning in Q2 1990. For retail properties, we have 617 properties and 10,948 property-quarters, beginning in Q2 1979 (there are breaks in the retail data as the periods Q2 1981 to Q3 1981 and Q1 1982 to Q1 1983 do not have data after applying the filters). Finally, for the industrial sector the sample includes 2093 properties and 41,123 property-quarters, beginning in Q2 1979. As individual properties do not remain in the NPI over the entire time span, the number of properties in the sample also varies over time.

We measure the returns to high and low cap rate properties using the quarterly returns on each property as calculated by NCREIF, and compounding those returns out to a five year horizon. We use appraisal-based returns. While measuring returns over a relatively long horizon (five years) will mitigate the effect of appraisal smoothing on our results, we admit that because we do not use transaction prices on actual round-trip investments it is possible that appraisal bias may affect our results. However, we argue that the use of appraisal-based returns in the context of our analysis has benefits. First, usage of transaction prices would require an examination of properties only at the times they are actually purchased and sold, which can create a self-selection bias in the sample if investors only choose to sell (or buy) at certain times or under certain conditions. Second, appraisal based returns allow us to measure returns over a consistent horizon across properties and through time. Assuming a common investment horizon allows us to examine in a consistent fashion how any observed value effect changes over time and through the real estate cycle.

[1] For example, apartments became a widely accepted sector for institutional investment long after the other commercial property types were widely held by institutions. Therefore, the data on apartments in the early quarters of the NPI is quite sparse relative to the other property types and those early quarters are filtered out of our final sample.

In a later section we argue that the results we find are too strong and too consistent to be fully explained by appraisal bias, although we do admit that there may be some effect on our results and leave an exploration of this issue to future research. At the very least, our results apply to the returns reported by investors on their property investments during their holding periods, if not to actual realized returns on round-trip transactions, and are therefore still of great interest to real estate investors as well as empiricists.

3. Methodology

For each property in each quarter, t, from Q2 1979 to Q1 2011, we calculate the income return from quarters (t-4) to (t-1). The trailing income return on each property serves as a proxy for its cap rate and we use it to classify properties as having high, low, or mid-range cap rates. However, any classification of cap rate as "high" or "low" is relative to some norm, which varies depending on the situation. Typical cap rates are quite different across property types. Average cap rates also vary over time and with market conditions (cap rates being lower in strong market conditions). Cap rates also vary significantly by location – cap rates in large markets with significant institutional interest such as New York are generally substantially lower than in smaller markets such as Cleveland, and the cap rate spread between markets can vary over time. To address the issue of property type, we perform all of our classifications separately for each of the four sectors examined. To address the variation of cap rates over time and location we market-adjust cap rates for each property based upon the CBSA in which they are located.

Our market-adjusted cap rate is defined as:

$$CapRate_{i,t} = \left(CapRate_{i,t-4\ to\ t-1} - CapRate_{CBSA\ median,t-4\ to\ t-1}\right) \quad (1)$$

where $CapRate_{i,t}$ is the market-adjusted cap rate for property *i* at time *t*, $CapRate_{i,t-4\ to\ t-1}$ is the trailing income return for property i from *t*-4 to *t*-1, and $CapRate_{CBSA\ median,t-4\ to\ t-1}$ is the median trailing income return across all properties of the same property type in the same CBSA from *t*-4 to *t*-1.

We calculate the median trailing income return in each CBSA before applying our data filters so as to ensure that we are market-adjusting against all relevant properties with data available at the time and

not just those that meet our data requirements. It is well known that factors such risk level, growth prospects, and liquidity will affect asset pricing and therefore the cap rate of a property. Our market adjustment process controls for these factors to the extent that they are determined by time period and CBSA.

Each quarter, for each property type, we rank all properties by their market-adjusted cap rate and classify those in the top 30% as high cap rate properties, those in the bottom 30% as low cap rate properties, and those in the middle 40% as mid cap rate properties. Note that our classification is done on a national level, across all properties in each property type, even though the market adjustment is done at the CBSA level.

To measure returns by cap rate category, for each property we compound returns from quarters (t+1) to (t+20) to generate the annualized five year total return. Note that in our process we use income returns from (t-1) back to classify properties, and total returns from (t+1) forward to calculate returns. Hence, returns in quarter t itself are skipped; this is consistent with the typical approach in studies of the value effect and is meant to ensure time for information dissemination, so that investors can incorporate knowledge on property cap rates in their investment decisions.

The median annualized five year return within each classification is used to evaluate the performance of high, mid, and low cap rate properties, each quarter. Using the median has the benefit of controlling for the effect of outliers, while also of providing a more realistic view for investors in this context. In comparison, an equal- or value-weighted mean opens research on real estate returns to the criticism that investors would be unable to replicate such results in practice given constraints on portfolio size. Obtaining a market-wide diversified real estate portfolio is difficult, if not impossible, due to the high degree of idiosyncratic risk and non-normality of returns. This means that it can take a very large number of properties for an investor to reach full diversification, far greater than the number in most actual portfolios (see, for example, Byrne and Lee (2003) and Young, Lee, and Devaney (2006)). It can therefore be difficult for investors to effectively mimic results based on returns to large portfolios of properties. Hence, we choose to examine median returns rather than portfolio returns, and note that our results are best

interpreted as representing the performance of a typical property within each category rather than of a portfolio of those properties.

Our approach results in a time series of median returns for high, mid, and low cap rate properties, separately for each property type, which we use to examine evidence of a value effect in real estate. We discuss these results in the next section.

4. Results

As noted in the methodology section, our approach yields a time series of median five year returns in each cap rate category. To produce overall summary statistics we calculate the time series mean of these figures; the results are presented in Exhibit 1.[2] The exhibit shows that, in all four property types, higher cap rate properties generate higher average returns compared with lower cap rate properties. The differences in returns between high and low cap rate properties are significant, both statistically and economically. High cap rate office properties have produced an average return over five year horizon holding periods of 5.48%, compared to only 4.73% for office properties with low cap rates. The difference between high and low cap rate returns in office, 75 basis points (bp) per year, is very large in practical terms. That said, the value effect on property returns is even stronger in the other property types. Industrial properties show an average return difference of 156 bp per year between the typical high and low cap rate properties. In retail the difference is 182 bp. The apartment classification shows the highest differential, with high cap rate properties earning an average 212 bp per year more than low cap rate properties. Overall, the results in Exhibit 1 are consistent with a strong value effect at the individual property level.

One can imagine two sources for the return differential observed between high and low cap rate properties: (1) due to their higher going-in cap rates, high cap rate properties produce higher income returns, or (2) high cap rate properties tend to reprice over the five year going forward period, with cap rate compression producing higher appreciation returns. Of course, the explanation may involve a combination

[2] We also calculate the median returns over time, which leads to consistent results and the same conclusions. We present only mean returns for space reasons; median results are available from the authors on request.

of these two factors. To explore the source that is driving the return differential, Exhibits 2 and 3 present the average income returns and appreciation returns for each cap rate category.[3]

Given the initial cap rates differential, the results presented in Exhibit 2 are perhaps not particularly surprising; high cap rate properties have future income returns that are significantly higher than those of low cap rate properties. This holds across all property types. Looking at Exhibit 3, however, shows that returns in the form of appreciation vary by property type. For office and retail there is no evidence that high cap rate assets appreciate more over time than lower cap rate properties. In fact, appreciation returns are significantly lower for office properties with high cap rates. These results imply that in these sectors, the observed differential in total returns is entirely driven by higher income returns, with no evidence of repricing driving the value effect.

For apartment and industrial, however, high cap rate properties do exhibit higher appreciation returns over time, indicating that mean reversion of their initial high cap rate is contributing to the total return differential. For the industrial sector, the difference between appreciation returns on high and low cap rate properties is 50 bp per year (=0.90% - 0.40%). This compares to a difference in income returns for industrial of 95 basis points per year. Therefore, while appreciation does add to the total return differential on industrial properties, the income effect is the dominant contributor. In the apartment sector, the story appears somewhat different; differences between high and low cap rate properties in income and appreciation are 74 bp and 126 bp, respectively. Therefore, while the income effect adds to the total return differential in a material way, appreciation is the more dominant source of higher returns. Overall, Exhibits 2 and 3 indicate that the basic factors underlying the value effect in returns vary across property types. In the office and retail sectors, high cap rate properties generate higher returns on average simply because of their higher income. In apartment, and to a lesser extent industrial, higher income combines with revaluation of the typical property over the five year period to produce higher total returns.

[3] Note that the income and appreciation returns do not add to the total returns in Exhibit 1. This is due to using median returns with the returns being compounded over five year horizons.

While we have presented evidence that higher cap rate properties generate significantly higher returns than lower cap rates properties, we have not yet examined the risk aspect associated with value properties. We begin our risk investigation by calculating the standard deviation of the time series of median five year (annualized) returns in each category. The results are presented in Exhibit 4. An examination of the exhibit reveals that there is no significant difference in standard deviation between properties based on their cap rate category.

The findings of significantly higher average returns for higher cap rate properties with no differential in the standard deviation of returns over time serves as an evidence that high cap rate properties outperform low cap rate on a risk-adjusted basis. The distribution of returns may also serve as an evidence that higher cap rate properties are associated with better risk-adjusted returns compared with lower cap rate properties. Exhibit 5 shows the annualized five year returns generated by the high and low cap rate office properties plotted against one another over time (the date on the horizontal axis corresponds to quarter t+1, the beginning of our performance measurement period). A glance at the exhibit shows that high cap rate office have generated higher returns in the majority of time periods. In fact, high cap rate office exhibited higher returns in 72.7% of the quarters. Assuming that this sample of past returns is indicative of possible future returns, investors could interpret this as, given no knowledge of future market conditions, a high cap rate office strategy would be expected to outperform almost three-quarters of the time. Given these results, and that returns on average are higher for high cap rate office properties, a high cap rate strategy would appear preferable for office property investors.

To formalize this idea, we first divide the range of returns into 50 bp increments and construct histograms for the observed returns on high and low cap rate office properties based on those increments. We then cumulate the histograms to create the empirical cumulative distribution functions (CDF) for each of the cap rate categories. The CDFs for office properties are presented in Exhibit 6. The key point from Exhibit 6 is that the CDF of high cap rate office lies below that of low cap rate office for the majority of the range of returns. Thus, for almost any possible target return that might be chosen there is a higher chance of exceeding, and a lower probability of falling below, that target using high cap rate office properties. If

one cumulates the area between the two lines in Exhibit 6, the cumulative area (with areas where the low cap rate CDF is higher being defined as positive) is always less than or equal to zero. This feature of the distributions of returns implies that high cap rate properties second order stochastically dominate low cap rate properties (see Ingersoll (1987), page 137). In turn, this means that a risk averse investor should prefer high cap rate over low cap rate properties. Overall, Exhibit 6 provides strong evidence of a value effect in office property; high cap rate office properties generate higher returns, outperform on a risk-adjusted basis, and should be preferred by risk averse investors.

Exhibits 7 through 12 repeat this process for the apartment, retail, and industrial sectors. In Exhibit 7, high cap rate apartment properties exhibit higher returns in 95.2% of the quarters in the sample period. Exhibit 8 shows that the CDF for high cap rate apartment lies below that of low cap rate apartment the majority of the time with an exception on the extreme left tail of the distribution (this is due to the negative return on high cap rate apartments in Q2 1990, which can be seen on the left of Exhibit 7). This early period data explains why neither category of apartment stochastically dominates the other. However, we can infer from Exhibit 8 that all but the most risk averse apartment investors should prefer investing in high cap rate over low cap rate properties.

In Exhibit 9, high cap rate retail properties generate higher returns in 81.8% of quarters. Further, Exhibit 10 shows that the CDF of high cap rate retail properties always lies below that of low cap rate retail, indicating that high cap rate properties first order stochastically dominate and should be preferred by all investors. Similarly, high cap rate industrial properties outperform low cap rate industrial in 89.8% of periods examined (Exhibit 11) and, like retail, high cap rate industrial properties first order stochastically dominate low cap rate industrial according to the empirical CDFs (Exhibit 12).

Taken together, our results indicate the existence of an economically meaningful and statistically significant value effect for individual real estate properties. High cap rate properties outperform low cap rate in both absolute returns and on a risk-adjusted basis. The degree of outperformance is large, consistent across property types, and persistent over time.

Exhibits 5, 7, 9, and 11 show that high cap rate properties outperform persistently through time, and across various market conditions. However, to explore whether the observed intensity of value effect varies across the real estate cycle we compare our results to the return on the overall NPI. For each quarter we calculate the return performance differential by subtracting the annualized return to low cap rate properties from the return to high cap rate properties. We then calculate the annualized future five year return on the NPI over the corresponding period. We also calculate the return on the NPI in the year preceding high-versus-low property classification (i.e. over the same period used to measure property cap rates). To determine whether the intensity of the value effect varies over the cycle we regress the return differential on each of the forward and past NPI returns. The results are shown in Exhibit 13.

For both retail and industrial properties, the results of the regressions show no relationship between the intensity of the value effect and the overall health of the real estate market as measured by NPI returns. The coefficient on NPI returns is insignificant for both forward and past NPI returns for these two property types. For office properties, while there is no significant relationship between the observed value effect and returns over the forward five year return on the NPI, the return differential is significant and negatively related to return on the NPI over the prior year. When cap rates are measured following a period of strength in the overall market, the intensity of the value effect is lessened.

Apartment appears to behave differently from the other property types. There is a significant and positive relationship between the high minus low cap rate differential in apartments for both future and past NPI returns. Consequently, the observed value effect for apartments intensifies during rising markets. This is consistent with results shown in Exhibit 3, which indicate that appreciation explained a significant portion of the total return differential for the apartment sector, and consistent with our contention that the dynamics underlying apartments may be different than that underlying the other sectors.

Overall, the results of the regressions in Exhibit 13 indicate that there is no universal rule across sectors on how the intensity of the value effect varies with the overall real estate cycle. Other than for apartments, there is no relationship between the strength of the effect and returns on the overall market over the period in which the effect is measured. For retail and industrial, there is also no relationship between

the value effect and market returns leading up to the time cap rates are measured. While office and apartments both show a relationship between the return differential and past NPI returns the coefficients are opposite in sign.

The regression specifications displayed in Exhibit 13 also provide a rough test of whether our results might be driven entirely by an appraisal bias. Recall that our analysis uses appraisal-based returns data. If high cap rate properties appear to generate higher returns simply because they are comprised of properties for which the appraised value is lower than the actual price that an investor would be required to pay in an arm's length transaction, then our results may be driven by appraisal error and not apply to actual returns on a round-trip transaction. However, if this is true, the effect should vary with market conditions. Since appraised values lag transaction prices, if appraisal bias explains our results one would expect the effect of the bias to be greatest in rising markets. To the contrary, Exhibit 13 shows that for industrial and retail properties there is no relationship between the value effect and the market, and office actually exhibits an opposite relationship as the cap rate return differential is less pronounced in rising markets. Given the positive coefficients for the apartment regressions, it is possible that appraisal bias helps explain our results in that sector – although we once again note that apartment seems to behave in a unique way relative to the other sectors. Overall, the results in Exhibit 13 suggest that, with the possible exception of the apartment market, our results are not due to appraisal bias.

We provide additional evidence for our discussion of the risk and return characteristics of high and low cap rate properties by looking at risk in an alternative manner. Recall that returns are measured each quarter by the median return across properties in each category. As mentioned previously, this implies that the returns can be interpreted as representing a typical property within each property sector at each time period rather as portfolio returns. Nevertheless, in choosing actual properties in which to invest, investors do not necessarily acquire a typical property. If the distribution of individual property returns around the median is more highly dispersed for high cap rate properties than it is for lower cap rate parties, then investors may face a greater risk that they acquire a "less than typical" property. This form of investment risk is determined by the cross-sectional distribution of returns across the individual properties within each

cap rate category. To explore this alternative risk, we examine the median returns across properties in each quarter along with returns at the 25th and 75th percentiles. Exhibit 14 presents the means over time of these figures for each property type in each cap rate category.

Based on Exhibit 14 there is no evidence that investors in specific high cap rate properties run a greater risk of selecting a poorly performing property than do investors in low cap rate properties. In all cases, the 25th percentile property return is greater for high cap rate than it is for low cap rate, indicating that the poorest performing high cap rate properties do better than the poorest performers amongst low cap rate properties.

The results presented in Exhibit 14 also help to further reinforce to extent to which high cap rate performance is better compared to low cap rate performance. For example, in apartments the 25th percentile high cap rate property has an average return (8.30%) that is not far below that of the median low cap rate property (8.95%). In retail, the median high cap rate property return (11.09%) is only 86 bp lower than the 75th percentile low cap rate return. These results, while not definitive, help illustrate the degree to which high cap rate properties outperform low cap rate properties.

4.1. Differences in Property Characteristics across Cap Rate Categories

To explore whether the value effect we identify might be related to characteristics of the properties beyond their cap rate, we briefly examine other property-specific variables available in the NCREIF database. For a property purchased as a value-add investment, the investor's strategy is typically to invest in the property in order to raise its value. If properties with high cap rates are typically value-add investments, and low cap rates typically signify core properties, and if value-add investments are expected to generate higher returns (they are typically thought to be higher return, higher risk investments), then this might explain the relationship we find between cap rate and future investment performance. This may be especially applicable to apartments, for which high cap rate properties were shown to have higher total returns largely due to higher appreciation (see Exhibit 3).

To examine this possibility we consider the capital expenditures (CAPEX) on each property. For each property we sum the total CAPEX over the five year return measurement period, and divide the total CAPEX by the property market value at time t to generate total CAPEX as percentage of value measure. As future returns may also be affected by past improvements to the property, we also calculate the total CAPEX over quarters (t-4) to (t-1) as a percentage of market value at time t. Because CAPEX in the NCREIF database contains some extreme outliers on both the up and down sides (properties with CAPEX equal to multiple times market value, or with negative CAPEX, which is likely due to reversals of previously accrued amounts), we winsorize the CAPEX data at the 1% and 99% levels to control for data errors and unusual, non-representative situations. As we did for the other variables, each quarter we calculate the cross-sectional median of these variables within each cap rate category and property type; Exhibit 15 presents the averages over time.

The exhibit shows that for office, retail and industrial properties, there is no evidence from CAPEX levels that the properties with high cap rates tend to be value-add investments. CAPEX as a percentage of current market value is, in fact, significantly lower for high cap rate properties in these sectors. This holds for both CAPEX over the subsequent five years as well as over the trailing year. The results on CAPEX in the apartment sector, however, differ substantially from the other property types. As a percentage of market value, CAPEX over the next five years averages 6.88% for high cap rate properties, and only 4.19% for low cap rate properties. The difference is statistically significant at any conventional level. Differences in CAPEX between high and low cap rate apartment properties in the trailing year are also economically meaningful at 0.97% and 0.53% of market value, respectively. These results do not necessarily imply that high cap rate apartments are typically value-add investments and that this explains the observed value effect in that sector, but they are consistent with that interpretation. It is difficult to establish a definitive answer on this issue given that there is no precise and universal definition of exactly what the term value-add implies and there is substantial idiosyncratic variation in how a value-add strategy might be implemented across properties. Nevertheless, we can conclude that the factors driving differences across cap rate categories appear to be different in the apartment sector compared to other property sectors.

Overall, from Exhibit 15 we conclude that in office, retail and industrial properties there is no evidence that our results on returns are driven by the disproportionate presence of value-add investments amongst high cap rate properties. In the apartment sector, it is possible that value-add investments are contributing to the observed value effect.

Exhibit 16 displays the average property value by cap rate category. Consistent with the previous analysis, in each quarter we calculate the median market value across properties and report the mean over time of the variable. The properties classified as high cap rate in our sample are, on average, significantly smaller than the low cap rate properties. The difference is especially pronounced in retail, where low cap rate properties are 1.7 times larger than high cap rate properties.

It is possible that the value effect we identify in the data overlaps with a size effect. However, a number of past researchers looking at the effect of property size have concluded that large properties actually earn higher returns on average. For example, Esrig, Hudgins, and Cerreta (2011), Ziering and McIntosh (1999), and Pai and Geltner (2007), all find a positive relationship between property size as measured by market value and average returns. If larger properties do earn higher returns on average, the differences in market value observed in Exhibit 16 cannot explain the value effect documented here. It is true, however, that research on property size is mixed; both MacKinnon (2010) and Fuerst and Marcato (2009) find that smaller properties have higher average returns. Given the mixed results in the prior literature on property size, we leave an attempt to systematically unravel any relationship between the size effect and the value effect to future research.

4.2. City versus Property

Our last examination of the value effect looks at the cross-effect of metros associated with high or low average cap rates and properties associated with high or low cap rates relative to their metro area. Beracha and Downs (2015) find evidence of a value effect in real estate at a metro level. They report that metros with average high cap rates outperform those with low average cap rates. In this study, we first classify metros as high or low cap rate markets as did Beracha and Downs (2015), but then extend their analysis by

looking at property level data to examine whether the value effect at the property level exists within a category of metro areas. In other words, we are interested in whether properties in a high cap rate metro area that have high or low cap rates relative to that high metro average exhibit differences in average returns (and similarly with regards to low cap rate metros). This approach can also be related to an intuitive, practical question for real estate investors: Is it better to buy an average asset in a cheap market, or a relatively cheap asset in an expensive market?

For each CBSA in each quarter we use the properties in our sample to calculate the median cap rate for the CBSA. We then define the top 30% as high cap rate CBSAs, the bottom 30% as low cap rate, and the middle 40% as mid cap rate CBSAs. We then repeat the process described above for comparing high, mid, and low cap rate properties, but do so separately for each category of CBSA. The results are shown for each property type in Exhibits 17 through 20.

The near ubiquity of the value effect across the various categories is noticeable in exhibits 17 though 20. For example, comparing numbers vertically over the tables, properties with high cap rates relative to their CBSA always have higher average returns than properties with low relative cap rates. As a practical example, for an investor restricted to looking at only the most expensive (low cap rate) markets there is still an observable value effect as properties with high relative cap rates have shown higher returns. Essentially, this means that if one is investing in an expensive city, properties that are relatively cheap within the context of that city earn higher returns, on average. The same can be said for inexpensive (high cap rate) CBSAs, and of mid-range (mid cap rate) CBSAs. Looking at the results horizontally across the tables, a value effect in returns is again evident. Looking only at properties whose cap rates are high (or low, or mid) relative to their CBSA, higher average returns are earned by moving from low to high cap rate CBSAs.

The one notable exception to the patterns described above is industrial (Exhibit 20). While a value effect is seen at the property level by comparing results across the relative cap rate categories, there does not seem to be a value effect at the CBSA level. In fact, returns for industrial properties in CBSAs with high average cap rates are, on average, lower than they are in low average cap rate CBSAs. This suggests

that metro location is less important for industrial properties in terms of the value effect than it is in the other property types.

In some of the cases reported in Exhibits 17 through 20 the differences at the extremes are quite dramatic in economic terms. For example, the average return to office properties in high cap rate markets that also have relatively high cap rates (i.e., properties that are in a cheap city, and whose pricing is even cheaper than the city on average), have an average annual return of 6.22%. At the other extreme, relatively low cap rate office properties in low cap rate markets (i.e. the most expensive assets in expensive cities) return only 3.15% on average. The difference of 307 bp per year in return is extremely large, and the return on the least expensive office properties is almost double that of the most expensive.

We also note for office properties that in the highest cap rate CBSAs, the lowest relative cap rate properties have a higher average return (5.30%) than the highest cap rate properties in the lowest cap rate markets (4.46%). Intuitively, this can be interpreted as saying that it is better to buy a relatively expensive building in a cheap city, rather a relatively cheap property in an expensive city.

The exact results vary by property type. As one final example, a retail property in a high cap rate CBSA with an mid-range relative cap rate earns a higher average return (10.30%) than a retail property with a high relative cap rate in a low cap rate CBSA (9.77%). For retail properties, returns are better when investing in average properties in a cheap city, than in relatively cheap assets in expensive cities. Many more comparisons such as this are obviously possible and easily interpreted based on our reported results.

5. Conclusion

We use property level data to document a value effect in real estate using individual commercial property data. High cap rate properties earn higher returns, on average, and outperform on a risk-adjusted basis, low cap rate properties. This effect is consistent across property types (although the story behind apartment properties does appear to be somewhat different than the other property types), persistent over time, and is independent of the stage of the real estate cycle. The return differential between properties of high and low cap rates is very large, and both statistically significant and economically meaningful.

Given the strength of the value effect we find, our results should be of great interest to real estate investors as well as to academics. While our exploration of the causes of the value effect is not all encompassing – specifically, other than in the apartment sector, the value effect is not due to value improving capital expenditures on high cap rate properties (i.e., value-add investments), although there may be a relationship between the value effect and a size effect – our goal in this paper was to identify whether or not a value effect is, in fact, evident at a property level in real estate investments. Further exploration of what drives this effect, whether market inefficiency or some other property characteristic, would seem a fruitful avenue for future research.

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Exhibit 1: Mean annualized total returns by cap rate strategy

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	t-stat for diff. btw. high/low
Office	5.48%	5.16%	4.73%	3.27***
Apartment	11.07%	9.94%	8.95%	10.93***
Retail	11.09%	10.90%	9.27%	4.59***
Industrial	9.76%	9.14%	8.20%	13.16***

t-stats are from paired t-tests of difference in mean. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 2: Mean annualized income returns by cap rate strategy

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	t-stat for diff. btw. high/low
Office	8.18%	7.70%	6.88%	12.31***
Apartment	7.63%	7.28%	6.89%	10.64***
Retail	8.64%	7.89%	7.16%	17.56***
Industrial	8.67%	8.19%	7.72%	22.28***

t-stats are from paired t-tests of difference in mean. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 3: Mean annualized appreciation returns by cap rate strategy

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	t-stat for diff. btw. high/low
Office	-2.60%	-2.42%	-2.21%	-2.32**
Apartment	3.18%	2.51%	1.92%	8.75***
Retail	2.22%	2.61%	1.94%	0.75
Industrial	0.90%	0.73%	0.40%	4.85***

t-stats are from paired t-tests of difference in mean. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 4: Standard deviation of annualized returns by cap rate strategy

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	F-stat for diff. btw. high/low
Office	7.24%	6.80%	6.98%	1.08
Apartment	4.11%	3.53%	3.55%	1.34
Retail	5.69%	5.40%	5.16%	1.21
Industrial	4.87%	5.10%	4.70%	1.07

*** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 5: Office, annualized returns by cap rate

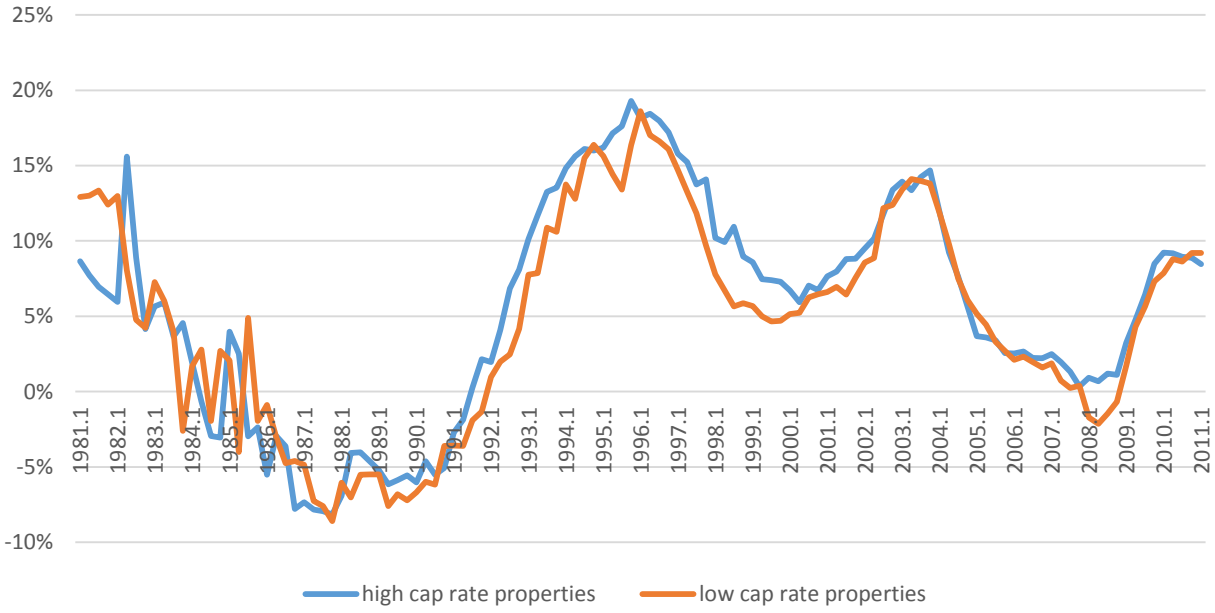


Exhibit 6: Office, Cumulative distribution function for high and low cap rate properties

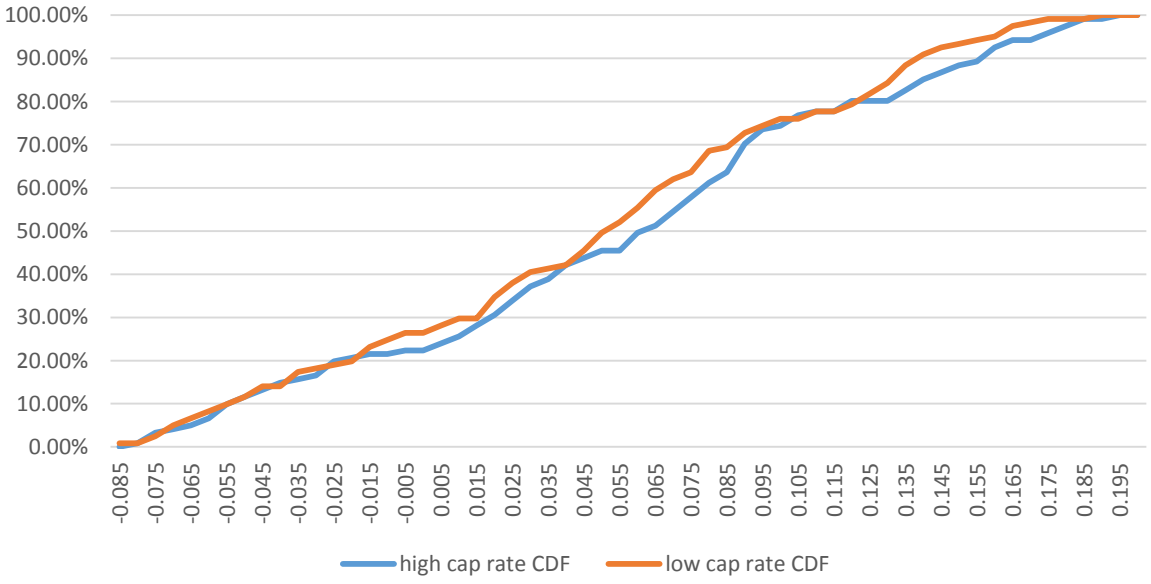


Exhibit 7: Apartments, annualized returns by cap rate

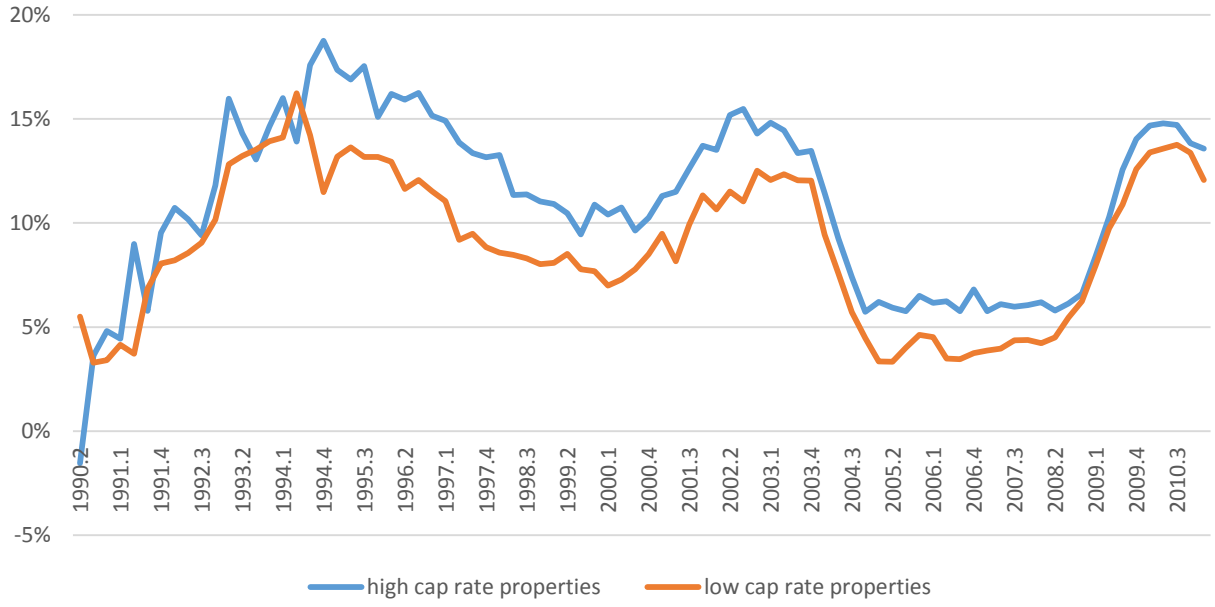


Exhibit 8: Apartments, Cumulative distribution function for high and low cap rate properties

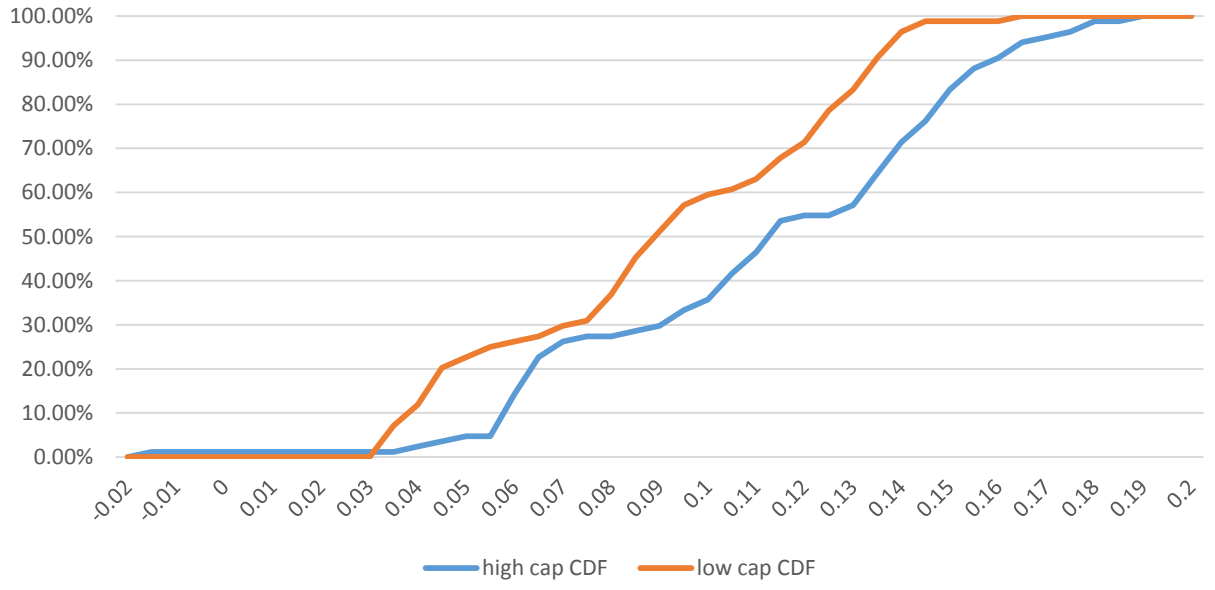
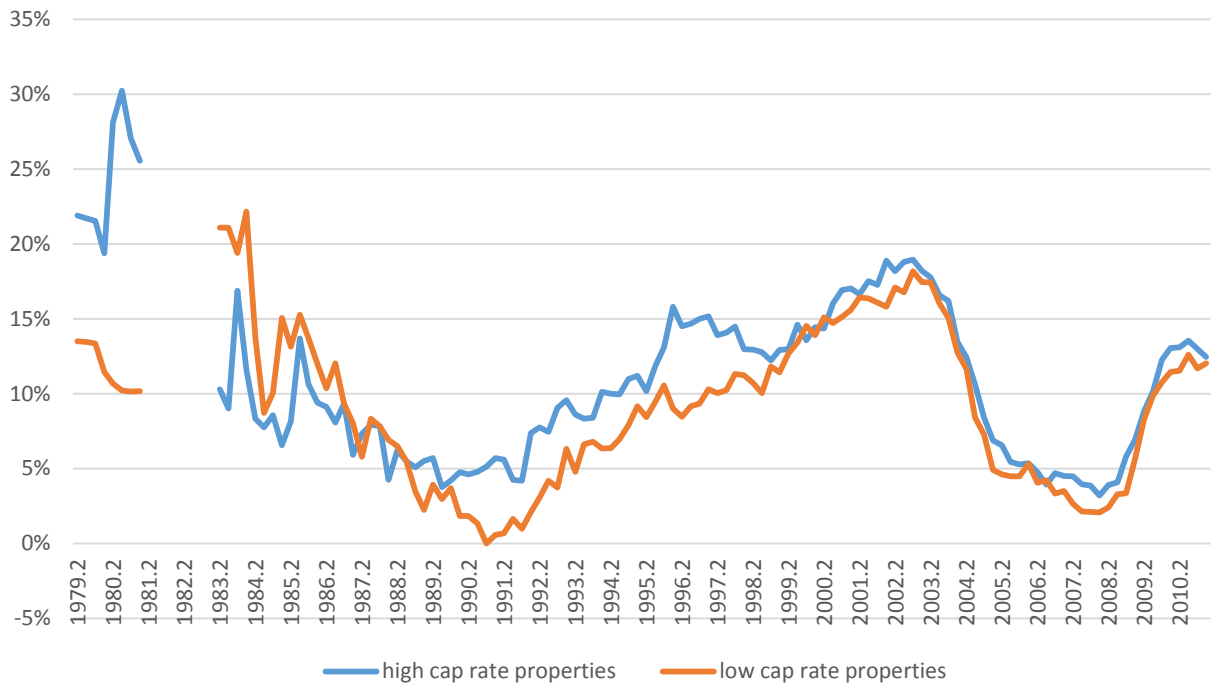


Exhibit 9: Retail, annualized returns by cap rate



No data from 1981.2-1981.3 and 1982.1-1983.1 as all retail properties were omitted by data filters for those quarters.

Exhibit 10: Retail, Cumulative distribution function for high and low cap rate properties

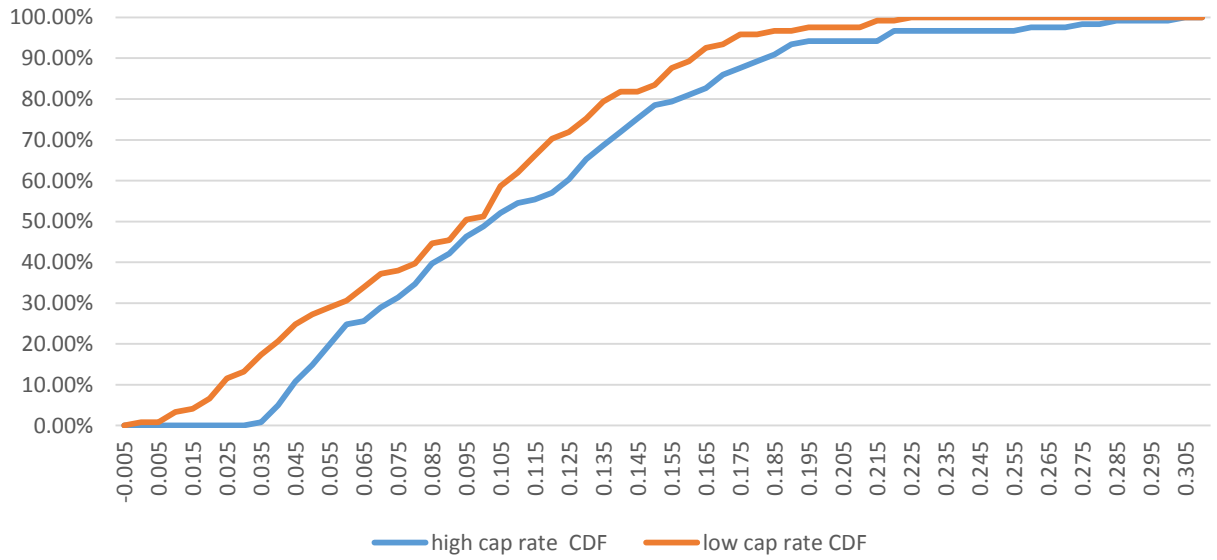


Exhibit 11: Industrial, annualized returns by cap rate

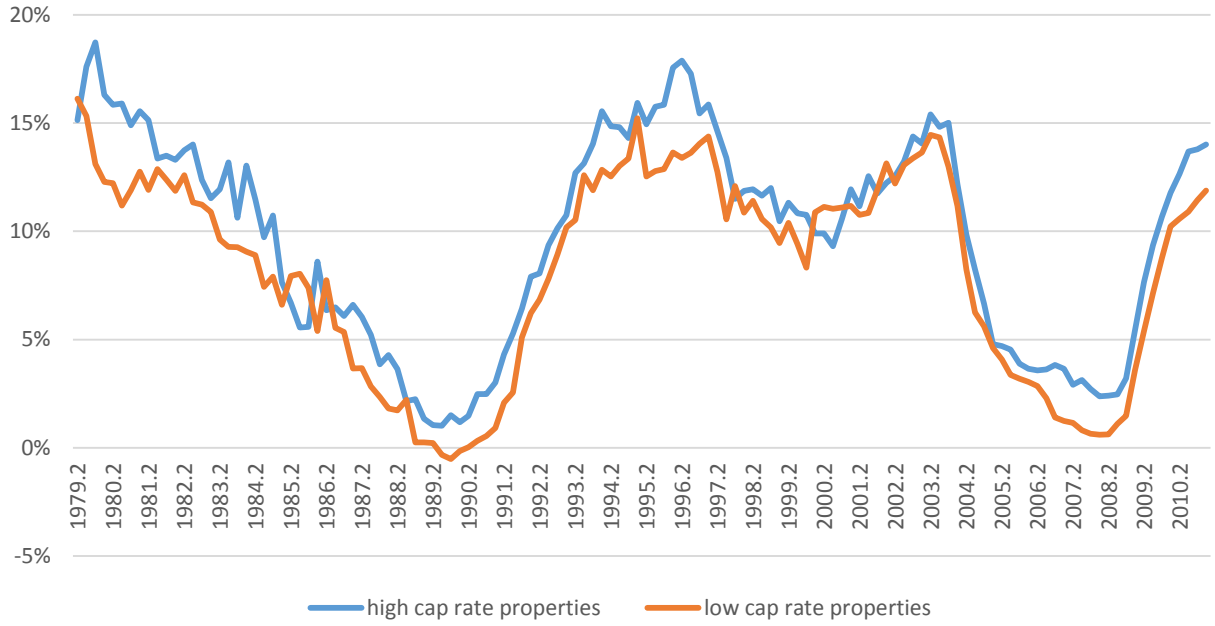


Exhibit 12: Industrial, Cumulative distribution function for high and low cap rate properties

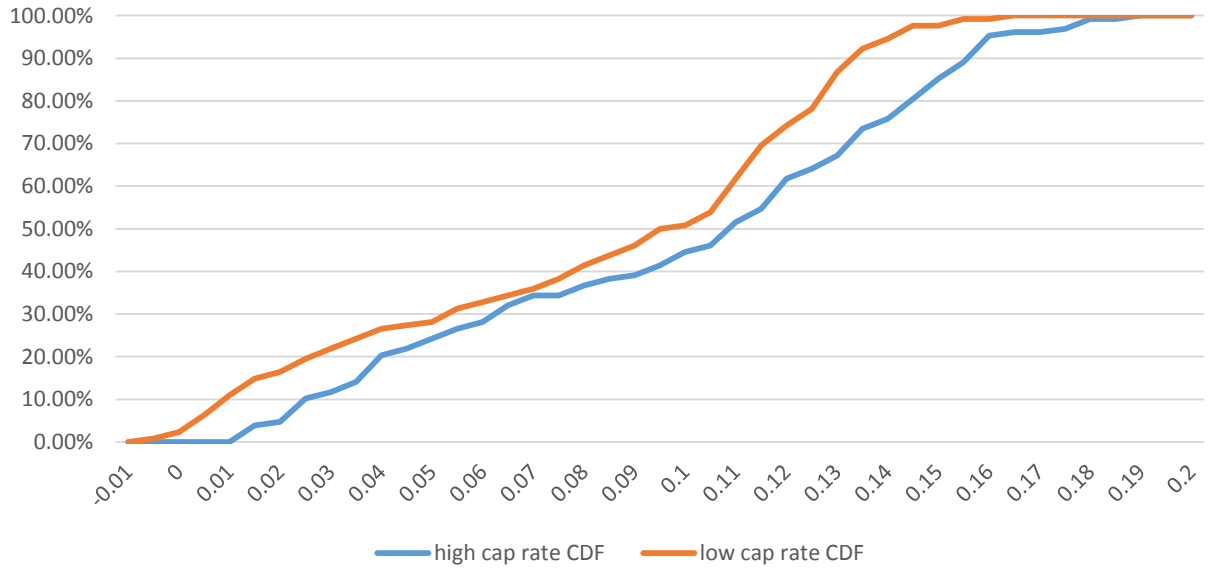


Exhibit 13 – Regressing Cap Rate Return Differential on NPI Returns

Independent Variable: 5-year Forward NPI returns	Constant	Coefficient
Office	0.010	-0.032
	(2.09)**	(-0.60)
Apartment	0.008	0.154
	(2.00)**	(3.66)***
Retail	0.169	0.004
	(1.97)*	(0.53)
Industrial	0.004	0.015
	(5.69)***	(0.56)
Independent Variable: 1-year Past NPI returns		
Office	0.012	-0.058
	(3.79)***	(-2.08)**
Apartment	0.018	0.040
	(7.61)***	(1.90)*
Retail	0.014	0.047
	(2.46)**	(0.97)
Industrial	0.016	-0.003
	(8.98)***	(-0.23)

t-statistics are in parentheses. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 14: Mean of total return percentiles

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties
Office:			
75th percentile	9.64%	9.85%	9.28%
Median	5.48%	5.16%	4.73%
25th percentile	0.36%	-0.11%	-0.18%
Apartments:			
75th percentile	13.98%	12.46%	11.18%
Median	11.07%	9.94%	8.95%
25th percentile	8.30%	7.38%	6.48%
Retail:			
75th percentile	13.82%	13.48%	11.95%
Median	11.09%	10.90%	9.27%
25th percentile	8.05%	7.86%	6.17%
Industrial:			
75th percentile	13.76%	12.91%	11.92%
Median	9.76%	9.14%	8.20%
25th percentile	5.79%	5.51%	4.52%

Exhibit 15: Capital expenditure differences as percent of market value

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	t-stat for diff. btw. high/low
Office:				
Ave. CAPEX, 5 years after portfolio formation	10.81%	12.66%	12.74%	-6.50***
Ave. CAPEX in year prior to portfolio formation	1.01%	1.22%	2.83%	-9.76***
Apartments:				
Ave. CAPEX, 5 years after portfolio formation	6.88%	5.16%	4.19%	8.98***
Ave. CAPEX in year prior to portfolio formation	0.97%	0.68%	0.53%	8.55***
Retail:				
Ave. CAPEX, 5 years after portfolio formation	3.39%	4.71%	5.78%	-7.24***
Ave. CAPEX in year prior to portfolio formation	0.34%	0.46%	0.73%	-6.64***
Industrial:				
Ave. CAPEX, 5 years after portfolio formation	6.10%	5.53%	6.92%	-3.80***
Ave. CAPEX in year prior to portfolio formation	0.24%	0.37%	0.94%	-12.24***

t-stats are from paired t-tests of difference in mean. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 16: Property market value by cap rate strategy

	High Cap Rate Properties	Mid Cap Rate Properties	Low Cap Rate Properties	t-stat for diff. btw. high/low
Office	18,154,423	28,527,652	29,531,118	-11.35***
Apartments	24,398,304	26,412,190	28,288,316	-8.06***
Retail	16,553,297	25,060,519	44,616,962	-9.13***
Industrial	6,609,607	9,210,813	8,044,300	-7.68***

t-stats are from paired t-tests of difference in mean. *** indicates significance at a 1% level, ** at 5% level, * at 10% level.

Exhibit 17: Office mean total returns, Interaction between median metro cap rate and property cap rate relative to metro

	High cap rate CBSAs	Mid cap rate CBSAs	Low cap rate CBSAs
High relative cap rate properties	6.22%	5.25%	4.46%
Mid relative cap rate properties	5.99%	4.03%	3.72%
Low relative cap rate properties	5.30%	4.11%	3.15%

Exhibit 18: Apartment mean total returns, Interaction between median metro cap rate and property cap rate relative to metro

	High cap rate CBSAs	Mid cap rate CBSAs	Low cap rate CBSAs
High relative cap rate properties	12.01%	11.46%	10.99%
Mid relative cap rate properties	10.67%	10.22%	9.72%
Low relative cap rate properties	9.66%	9.06%	9.00%

Exhibit 19: Retail mean total returns, Interaction between median metro cap rate and property cap rate relative to metro

	High cap rate CBSAs	Mid cap rate CBSAs	Low cap rate CBSAs
High relative cap rate properties	10.64%	9.44%	9.77%
Mid relative cap rate properties	10.30%	9.63%	9.77%
Low relative cap rate properties	9.56%	8.19%	7.41%

Exhibit 20: Industrial mean total returns, Interaction between median metro cap rate and property cap rate relative to metro

	High cap rate CBSAs	Mid cap rate CBSAs	Low cap rate CBSAs
High relative cap rate properties	9.77%	9.88%	10.04%
Mid relative cap rate properties	9.10%	9.22%	9.25%
Low relative cap rate properties	7.85%	8.55%	7.92%