

NCREIF Research Corner

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New NCREIF Indices – New Insights

This month's Research Corner article by Mike Young and Jeff Fisher introduce three new metrics to be formally released by NCREIF during the first quarter of 2015. The new metrics are designed to supplement the NCREIF Property Index (NPI) by providing measures of how market values are changing over time, how much cash flow is being generated each quarter and the ratio of capital expenditures to market value. The article explains how these new measures are optimized to answer these questions.

The NCREIF Research Corner is produced by NCREIF.

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New NCREIF Indices – New Insights

Jeff Fisher and Mike Young

The NCREIF Property Index (NPI) has been an important indicator of *returns* for institutional real estate since the inception of NCREIF over 30 years ago. As an indicator of returns, it has been used in many ways such as comparisons with other asset class performance, with returns for different property sectors or locations, or with manager's performance against a benchmark, including attribution to explain why returns deviated from the benchmark. Unfortunately, sometimes the NPI has been misused as an indicator of trends for which it was not designed. This misuse stems mainly from the way the total return is broken down into components of *income* and *capital appreciation returns*.

Capital Appreciation Return

When calculating a quarterly capital appreciation return, all capital expenditures regardless of their source or intent are subtracted from the ending market value. This is logical because simply investing more money in a property (e.g., for renovation or expansion) does not necessarily result in a return on capital invested. To have a positive impact on the property's return, the ending market value must increase by more than the amount of capex put into the property (it could also increase by less and negatively affect value). Accountants often presume that market value increases by the exact amount of the capex unless or until there is an appraisal to indicate otherwise.

But, capex generally does increase the value of the property. Also, real estate ownership generally requires capital expenditures to maintain a competitive property or to retain tenants. So, while capex may or may not result in a higher return, it may result in higher property values, or keep property values from falling compared to other properties that have not incurred capex.

From the above discussion, it should be clear that while the NPI capital appreciation return may be a component of the property's total return, it is NOT an indication of how property values are changing. Yet, researchers and analysts often mistakenly use the capital appreciation return as an indication of how property values are changing.

Income Return

The other component of the NPI total return is the so-called *income return*. Because capex was subtracted when calculating the capital appreciation return, it is NOT subtracted when calculating the income return. However, generally capex is an expenditure of cash (some major renovation is financed by third-parties, but the renovation costs are paid when incurred). Thus, the amount of *cash flow* available from a property is reduced by the amount of capex. Like the capital appreciation return, the income return is often misused. Investors may be told that commercial real estate generates a high income return compared to the dividend yield on

stocks but this is an apples-to-oranges comparison. What should be compared to stock dividend yield is the amount of cash flow generated by property after capital expenditures have been paid.

Alternative Calculations

For many years, NCREIF has provided researchers the means to break down the total return into components such that all capex is subtracted from the NOI when calculating the income return and thus, not subtracted when calculating the capital appreciation return. Doing this results in what is closer to components of property cash flow return and market value change that still add to the NPI total return. Unfortunately, this alternative calculation of return components has not been widely promoted as a complement to the NPI that gives better insight into the how property values are changing and how much net cash flow properties actually generate.

While this alternative breakdown goes a long way toward understanding how property values are changing and how much cash flow is being generated, it is not ideal for this purpose for at least two reasons:

1. The denominator used for this alternative calculation is still the denominator used for the NPI, a denominator designed to best approximate an IRR for a calendar quarter assuming NOI is received monthly and capex occurs mid-quarter. Said differently, it is based on the broad asset class, industry standard, Modified Dietz formula designed for *returns*.
2. It treats all capex the same. However, some capex is part of the normal operations of a property to keep it competitive while other capex, such as major renovation and expansion of a property, is really new investment. The latter capex essentially results in a physically or functionally or economically different property than it was before the capex. Thus, comparing market value after major capex with the market value before the capex is not “same store.”

Introducing New Indicators

To remedy these problems, NCREIF is introducing three new indicators, the Market Value Index (MVI), Free Cash Flow Yield (FCFY), and the CapEx Ratio (CXR). The MVI is designed to reflect how property values are changing over time and is a better indicator of price change trends than the NCREIF capital appreciation return index. The FCFY is designed to indicate operating cash flow yields of properties. As we will see, the sum of these first two indicators is a number that is almost identical to the total return on the NPI – but, will differ slightly for the two reasons noted above: the formulas do not use a denominator designed for returns and we filter out properties whose major capex results in comparisons that are not same store. Note the use of the term “indicator” as the purpose is not to suggest that these statistics be used to create indices. While an index series is appropriate for the Market Value Index, it is not appropriate for the Free Cash Flow Yield that is intended as a snapshot for each reporting period.

The CapEx Ratio that excludes major renovation costs is designed to give us insight into how much recurring or operating capex is typically incurred for properties, excluding major renovations. In effect, this is what explains the difference between an income return and the Free Cash Flow Yield – although again there will be a slight difference due to the different denominator and same store methodology.

Equal Weighted Methodology

Before showing the actual formulas and results, one more point to be made is that these new indicators will be equal weighted instead of value weighted like the NPI. (We will make value weighted versions available through the query tool.) The NPI is value weighted because it is the best way to capture the return for a portfolio. That is, the NPI is interpreted as a portfolio of all properties held by NCREIF data contributing members. Higher value properties do impact the portfolio more than lower value properties.

The main purpose of these new indicators, however, is to provide insight into how market values are changing among commercial properties and how much periodic cash flow is generated by the broader population of institutional real estate. Statistically, equal weighting is more appropriate when generalizing from a sample of properties to a broader universe. So, the “headline” indicators of the three new series will be equal weighted although value weighted versions will be available in NCREIF Property Value Trends and the Query Tool.

Methodology

Market Value Index (MVI) is computed for each property as the *sum* of Ending Market Value and Partial Sales *divided by* Beginning Market Value *minus* 1 for each quarter.

To deal with the “same store” issue discussed above, in any quarter where the *absolute value* of specified capital improvements exceeds a fraction of Beginning Market Value the property’s MVI computation *shall be excluded from the data series*. We call this process of identifying quarterly data for exclusion a “filter rule” and provide its definition and application below.

It should be noted that Partial Sales and Full Sales are typically reported net of selling costs whereas appraisal market values reported to NCREIF are not reduced by current period selling costs unless the property is being held for sale. Due to the relatively infrequent occurrence of sale transactions in the NCREIF data set and the relatively small fraction of sales price represented by selling costs, the slight reduction in periodic MVI that result from selling costs is not deemed significant and therefore the MVI is fairly representative of the actual price or value change on an apples-to-apples basis.

The MVI formula is:

$$(MV_t - MV_{t-1} + PS_t) / MV_{t-1} \quad \text{for unsold properties}$$

or alternatively:

$$[(MV_t + S_t) / MV_{t-1}] - 1 \quad \text{for sold properties}$$

where MV_t is Market Value, PS_t is Partial Sales and S_t is Full Sales reported to NCREIF in quarter t .

Free Cash Flow Yield (FCFY) is computed for each property as the quantity Net Operating Income *minus* Capital Improvements *divided by* Beginning Market Value for each quarter. Notice that major capital expenditures for expansions or renovations are not included in the formula. Accordingly, in quarters where the *absolute value* of capital improvements defined in the filter rule exceed a fraction of Beginning Market Value, the property's FCFY computation *shall be excluded from the data series*.

Thus, the FCFY formula is:

$$(NOI_t - CI_t) / MV_{t-1}$$

where NOI is the Net Operating Income, CI is Capital Improvements, and MV is Market Value reported to NCREIF in quarter t .

Notice that Market Value Index and Free Cash Flow Yield are components of total return for a quarter where the denominator is simply the Beginning Market Value rather than a day weighted value. Expressed in algebraic form, the total return for a property in a quarter would be:

$$TR_t = (MV_t - MV_{t-1} + PS_t + NOI_t - CI_t) / MV_{t-1}$$

Capital Expense Ratio (CXR) is computed for each property as Capital Improvements *divided by* Beginning Market Value for each quarter. In quarters where the *absolute value* of capital improvements defined in the filter rule exceed a fraction of Beginning Market Value, the property's CXR computation *shall be excluded from the data series*.

The CXR formula is:

$$CI_t / MV_{t-1}$$

where CI is Capital Improvements, and MV is Market Value reported to NCREIF in quarter t .

Filter Rule

To ensure that, within reasonable bounds, a particular property retains its physical continuity throughout a quarter, there must be a way to identify properties that have not had substantial, material changes to the physical asset within the quarter. If the changes are substantial, the property should be excluded for that quarter or subsequent quarters until such time as the property becomes stable physically or functionally or economically.

From the data NCREIF collects, there are several items that may indicate physical, functional, or economic change of a property. These elements include size (either area or number of units for Apartment or Hotel properties), total capital improvements, or subcategories of capital improvements.

A close examination of the historical record indicates that property size or number of units have incomplete or unreliable data. Some data elements also appear to be self-contradictory. For example,

there are instances within the NCREIF data base where a property changes size but not its number of units or vice versa.

Prior to 2000, only Total Capital Improvements were reported to NCREIF. Subsequently, additional subcategories of capital improvements gave us more information on composition of Total Capital Improvements. In particular, the subcategories included Added Acquisitions Costs, Leasing Commissions, Tenant Improvements, Building Improvements, Building Expansion, and Other Capital Improvements.¹

We must divide these subcategories into two groups: those that are typical recurring expenses related to changing tenancy and ordinary repairs, and those that are occasional high dollar value expenses that alter the physical, functional, or economic condition of a property. Leasing Commissions, Tenant Improvements, and Building Improvements fall into the former group and will be included in Capital Improvements in the FCFY and CXR series. Added Acquisitions Costs, Building Expansion, and Other Capital Improvements fall into the latter group and are all candidates for filtering properties for exclusion within all three series.

While we can use the latter group of capital improvements from the post-2000 era to create filter rules for excluding properties undergoing substantial capital improvements, the task is not without problems. First, a considerable number of reversals in whole or in part, contemporaneously or not indicate either errors in amounts or in initial categorization of expense, or a subsequent correction or re-categorization. Second, quite frequently, the dollar amounts reported in the subcategories that one would expect to be high are very small relative to market value, often less than \$100 down to as little as \$1 due to accounting accrual adjustments. Third, there is always the possibility of Type I or Type II errors. Type I errors, a false positive, would result from filtering for exclusion a property even when a major capital improvement had not taken place. Conversely, Type II errors, a false negative, would result from not filtering for exclusion a property when a major capital improvement had, in fact, taken place.

Absent more information about the capital improvement items, we are not able to say with certainty that properties filtered will be 100% accurately identified. We must strike a reasonable balance based on whatever indicators we find in the existing data and judgments about the reasonableness of the filter ratio.

Thus, we have chosen to filter only those subcategories of capital improvement in the subcategories of Added Acquisitions Costs, Building Expansion, and Other Capital Improvements that show an absolute value greater than 5% of Beginning Market Value of a property in any quarter. We compute for each property type the fraction of post-2000 observations that are filtered and then use that fraction to establish a filter rule for the pre-2000 era where we have only one indication of total Capital Improvements.

We tried several filter rules for pre-2000 data and found that an absolute value of Total Capital Improvements greater than 10% of Beginning Market Value provided the most similar fraction of excluded quarters for most property types and for the aggregate of all properties in the NPI. Exhibit XX shows the observations and fractions of properties excluded in both the pre-2000 and post-2000 eras.

The largest absolute and relative difference in the percent filtered pre-2000 versus post-2000 is found in the Apartment category. We note that the number of observations pre-2000 is only about one-quarter as many as post-2000, a fraction far smaller than in all other property types other than Hotel. Had we filtered pre-2000 Apartment observations with a 5% filter rule, the percent of filtered Apartment observations

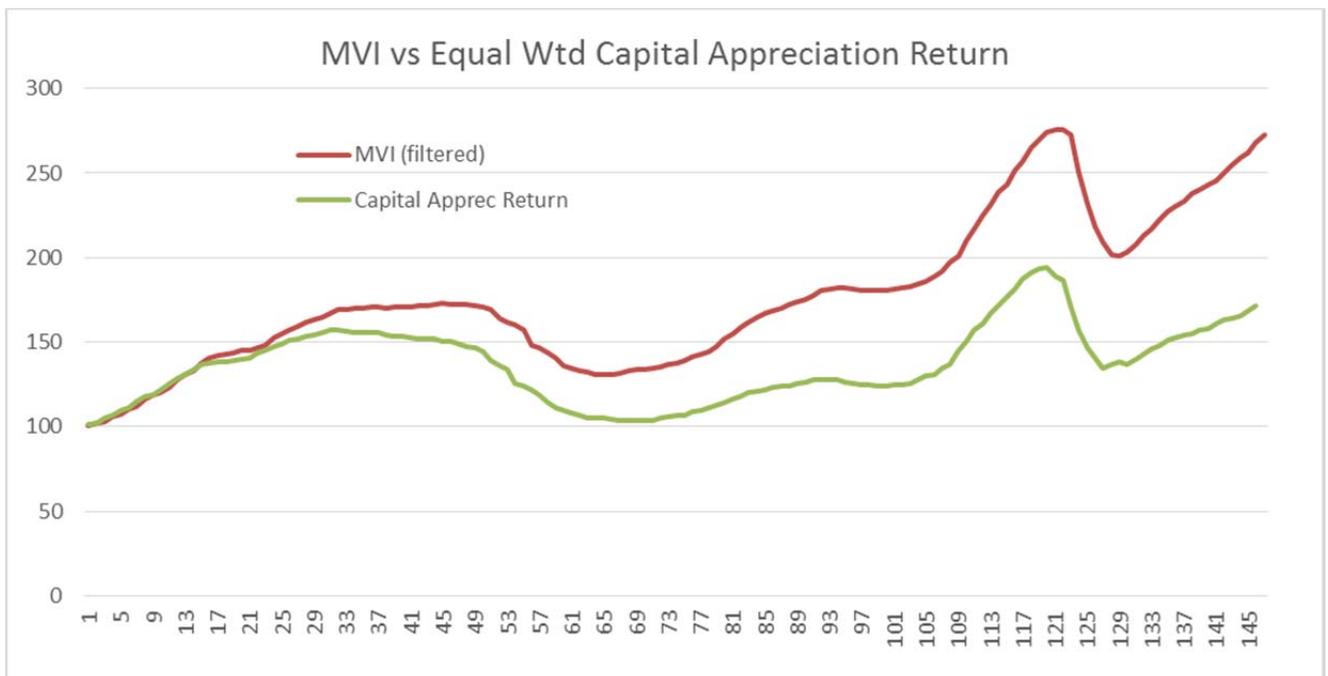
¹ Additionally, NCREIF began collecting detailed information on four revenue items and eight operating expense items at the same time.

pre-2000 would have been 0.64%. The number of excluded Apartment observations would have increased from 41 to 104 out of a full sample of 16,336 quarters of Apartment data, an average of about 0.7 observations per quarter over the 88 quarter span.

Results

Exhibit 1 shows a comparison of the new MVI with an equal weighted version of the NPI capital appreciation return. Again, the NPI capital appreciation return is net of all capex including properties that had expansions. The index based on the NPI capital appreciation return does not show as much increase in value over time. This is because it is being reduced by all capital expenditures including those that are an ordinary part of maintaining the competitive nature of a property. The MVI is more comparable to other commercial real estate indices such as the Moody’s Commercial Property Price Index (CPPI).

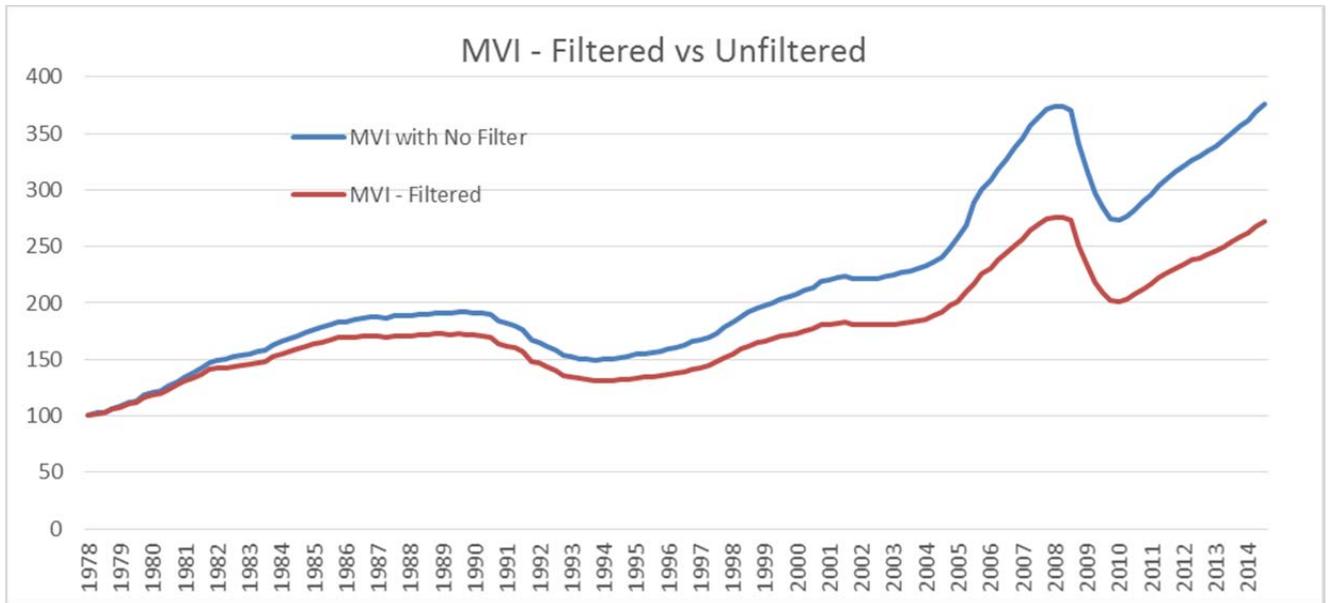
Exhibit I



As discussed previously, an important aspect of the new MVI is that it is “same store.” While it does not deduct capital expenditures from the ending market value, we do not want to compare the beginning and ending values of properties that had major capital expenditures as that would overstate the change in value for the *same* property. Exhibit II shows a comparison of the MVI with the filter criteria that will be implemented versus what it would be if there were no filter criteria. We see that the MVI with no filter is higher – but this is because it

includes an increase in value that really reflects new investment in the property. Thus, it overstates the change in value for properties.

Exhibit II



Conclusion

This article introduces three new indices being implemented by NCREIF and the rationale for each. As noted, using the NPI capital appreciation return results in an understatement of price changes because all capex is deducted and because an index that does not filter out major capex overstates the price change. The new MVI is designed to be “just right.” Graphs comparing the new MVI filtered and unfiltered and the new MVI to the NPI capital appreciation return index highlight differences. The MVI addresses how property values are changing in the capital market. Future Research Corner articles will provide more detail on the FCFY and CXR as measures of the operating performance of properties. These complement the MVI.