

Understanding Equity Real Estate Performance: Insights from the NCREIF Property Index

by

Michael S. Young

Vice President and Director of Quantitative Research
The RREEF Funds

101 California Street, San Francisco, California 94111
phone: 415-781-3300 / fax: 415-781-2229 / e-mail: MYoung@RREEF.com

and

David M. Geltner

Professor of Real Estate, Department of Finance
University of Cincinnati

428 Lindner Hall, P.O. Box 210195, Cincinnati, Ohio 45221-0195
phone: 513-556-7071 / fax: 513-556-4891 / e-mail: David.Geltner@uc.edu

and

Willard McIntosh

Managing Director-Research
Prudential Real Estate Investors

8 Campus Drive, Parsippany, New Jersey 07054
phone: 201-683-1793 / fax: 201-683-1794 / e-mail: Willard.McIntosh@prudential.com

and

Douglas M. Poutasse

Senior Vice President
AEW Capital Management

225 Franklin Street, Boston, Massachusetts 02110-2803
phone: 617-261-9559 / fax: 617-261-9555 / e-mail: dpoutass@awc.com

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Since its inception over a decade ago, the NCREIF Property Index (NPI)¹ has achieved preeminence as an indicator of the investment performance of institutionally-held commercial property in the United States. The NPI is widely reported, cited, and used by journalists, real estate investment analysts, and other practitioners and investors, as well as by academics. It has become a benchmark that the industry uses for a variety of performance and analytical purposes. Nonetheless, the formulas used by NCREIF to calculate performance measures, especially the income and capital components:

- Differ from performance measures used in stocks and bonds in important ways;
- Are difficult to explain to clients, lay persons, and industry participants;
- Fail to shed light on the sources of real estate investment performance;
- Offer little insight into performance differences among different property types;
- and
- Are often misunderstood or misinterpreted.

Thus, we suggest several new formulas—actually, modifications to the current formulas—to correct these problems and to expand our understanding of the behavior of equity real estate as an investment vehicle.

New Real Estate Performance Measurement Formulas

With relatively minor changes in the NPI formulas, we improve the information content of the components of *total return*: the *income return* and the *capital return*. Also, by explicitly defining a *current capitalization rate* statistic, we avoid the confusion that has crept into everyday conversation and even academic writing about the meaning of the current *income return* component of the NPI.

Apart from the *current capitalization rate* statistic, some people will say that is just what is reported today. Granted, the names may be the same, but the formulas and, in some cases, the notions behind the formulas are clearly different, and convey more useful information about equity real estate investment performance.² The new definition of *income return* reflects the cash flow from property available for distribution to investors rather than the current formula that most real estate practitioners would recognize as a current capitalization rate expressed

¹ The NCREIF Property Index was formerly known as the Russell-NCREIF Property Index, but in 1995 control of the index data collection and production was moved from the Frank Russell Company to NCREIF.

² The current NCREIF formulas for income and capital return are “accounting-based.” In this article, we develop formulas that are more “financial-economics-based.” See M.S. Young, D.M. Geltner, W. McIntosh, and D.M. Poutasse, “Defining Commercial Property Income & Appreciation Returns for Comparability to Stock Market-Based Measures,” *Real Estate Finance* 12 (1995), pp. 1-14 for an alternative exposition of these different views.

(erroneously) as a quarterly “return.” The new definition of *capital return* isolates the change in property value from period to period, irrespective of the capital expenditures that have been made, which is a more strict measure of capital value change.

Exhibit 1 highlights the differences between the current and the new formulas. Changes in the definitions of the NPI performance measures are:

- 1 The denominator in all return measures is redefined as simply the previous period’s market value (appraised value or transaction price), eliminating the fractional shares of the capital improvements, partial sales, and net operating income;
- 2 Capital improvement expenditures during the current quarter are subtracted from the numerator of the *income return* rather than from the numerator of the *capital return* (leaving the numerator of the *total return* unchanged from the current definition of *total return*); and
- 3 The *current capitalization rate* statistic which, apart from the more simplified denominator, is similar to the current (misnamed) income return.

The first change (the *denominator change*) only negligibly affects the total return or its two component returns: income and capital. The second change (the *numerator change*) results in substantial revision in the two components of *total return* each period relative to the current formulas, but does not change the *total return*, because the numerator contains all the same variables as the current formula.

Rationale for the Denominator Change

In most indices of returns covering a short time interval the denominator over which the return is measured simply equals the asset value at the end of the previous period. Thus, for the return during period t the denominator is defined as V_{t-1} , the asset value at the end of period $t-1$. The denominator employed in the NPI, on the other hand, is:

$$V_{t-1} + \left(\frac{1}{2}\right)CI_t - \left(\frac{1}{2}\right)PS_t - \left(\frac{1}{3}\right)NOI_t \quad \text{Expression (1).}$$

The reason to define the denominator as in Expression (1) was a desire to approximate an internal rate of return (IRR) for a calendar quarter while recognizing the monthly or mid-quarter timing of property cash flows. Brueggeman and Giliberto³ explained this rationale in a report to NCREIF the last time the NPI formulas underwent a minor revision. More recently, Giliberto⁴ described Expression (1) as an approximation to a Taylor-series approximation to the actual IRR (defined in per annum rates) achieved by a property during a calendar quarter.

While this type of mathematical sophistication is laudable, and might matter over longer holding periods (i.e., if the NPI were reported less frequently than quarterly), Exhibit 2 demonstrates that there is no practical quantitative difference in a quarterly index. Considering that scholars debate the merits of the IRR as an indicator of investment performance in the first place, and that Expression (1) is in fact two steps removed even from the actual IRR (i.e., it is an approximation of an approximation), there seems to be no compelling reason to remain wedded to Expression (1). Furthermore, making the denominator simply V_{t-1} brings the NPI into closer conformity with the way other indices are defined in other financial markets, for example. The

³ W.B. Brueggeman and S.M. Giliberto, *Measuring Real Estate Investment Performance: A Revised Approach* (Chicago, Illinois: National Council of Real Estate Investment Fiduciaries, 1987).

⁴ S.M. Giliberto “The Inside Story on Rates of Return,” *Real Estate Finance* 11 (1994), pp. 51-54.

new definition is simpler, is notably easier to explain, and, in fact, is what most people generally assume the actual definition to be.

Finally, the current denominator is inextricably tied to quarterly returns while the new, simpler denominator, V_{t-1} , can be used for any time period: daily, monthly, quarterly, annually, etc.

Effects of the New Formulas

There are three principal effects of the new formulas:

- 1 A reduction in the periodic *income return*,
- 2 An increase in the periodic *income return* dispersion, and
- 3 An increase in the periodic *capital return*.

One additional effect is notable by its absence: namely, the *total return* is virtually unchanged in any period despite the seemingly radical change in the denominator.

The effects of these changes can be seen in Exhibit 2, quarterly return statistics for the three return series, and Exhibit 3, quarterly return graphs for the entire property data base for the three return series using both the current and the new formulas.

Exhibit 2 shows the quarterly time-series sample statistics for the historical NPI from its inception in 1978 through the first quarter of 1994, under the current definition and under the new definition with both the *numerator* and *denominator changes*.

Contrasting statistics under the current and new formulas shows clearly that the new *denominator change* causes a negligible difference in the total return versus the current definition, while giving the NPI returns a denominator more similar to that employed by securities indices.

The substantively important difference between the new formulas and the current formulas is seen in Exhibit 3, affecting only the *income* and *capital return* components while the *total return* results remain virtually unchanged regardless of which of the two definitions is used. As seen in the middle graph of Exhibit 3, the new formula produces an *income return* component notably smaller and more volatile than the current formula. On the other hand, as the bottom graph of Exhibit 3 shows, the new formula causes the *capital return* component of the NPI to display more growth—or less loss—of capital value over time. This, we believe, is a more accurate depiction of the affect of capital expenditures that is absent from the current formulation.

The difference between the two yield or *income return* measures depicted in the middle graph of Exhibit 3 is the capital improvement expenditures each quarter as a fraction of market value. This averages 63 basis points, or the equivalent of about 2.5% of property value per year, a sizable amount. The capital improvement expenditures represent property cash flow not available for distribution to property owners or investors, because the typical practice in the institutional real estate investment management business is to set aside cash flow from operations for payment of the bulk of capital expenditures rather than financing via new equity capital from the investors or via debt. No prudent property owner, investor, or manager would deny that capital improvement expenditures are necessary. Thus, subtracting capital improvement expenditures from net operating income enables the *income return* component to reflect more accurately the cash flow potentially available for distribution as a fraction of market or asset value.

As stated previously, the new formula corresponds more closely to the *income return* portrayed in securities indices, including REIT indices, where the *income return* is defined as the dividends paid out as a fraction of share price. REITs (like other common stocks) must devote some of their

operational income to paying for capital improvements to the physical assets they own, and dividends are generally paid out only from the cash flow remaining after capital improvement expenditures have been made. Indeed, in the long run, no company can afford to pay out dividends in excess of its net cash flow less capital expenditures without either returning capital to investors (i.e., self-liquidation of the asset) or relying on external sources for the capital expenditure amounts (i.e., issuance of new equity shares or the issuance of debt). In the case of institutionally-managed real estate, investment managers generally use external financing only for major new property acquisitions or redevelopment, not for routine small-scale capital improvements, tenant improvement allowances, and leasing commissions. Thus, if we remove the capital expenditure from the *income* component of the return, and not from the *capital* appreciation component, we obtain a more accurate representation of cash flow available for distribution.⁵

As comparisons and joint analyses of NPI and REIT returns become more common and more important to investors, the current definition of *income return* may mislead unwary analysts many of whom naturally equate the NPI *income return* to, for example, the NAREIT Index *income return*. However, under the current definition, such comparison, without adjustment, is clearly “apples vs. oranges.” Furthermore, unless analysts adjust for the capital improvement expenditure component, the two statistics are not comparable. For these reasons it makes sense to redefine the *income return* as suggested.

Return Differences by Property Type

NPI results have always shown differences in total returns among various property-type subsets. The current formula for the *income return*, however, did not show much difference in average returns or variability of returns among property types. The new formulas show greater differences that call attention to the large differences in capital improvement costs that are characteristic of particular property types. This can help investors understand the risks and opportunities of spreading or concentrating investment along the property-type dimension.

Exhibit 4 tabulates the annual mean and standard deviation of *total*, *income*, and *capital returns* for both the current and new formulas for all properties and for each property type subindex in the NPI. Historically, the R&D/Office property type showed the highest average *income return*, 8.31% under the current formula. However, when we apply the new formula to the data, the Apartment property type shows the highest average *income return*, 6.58% versus 6.18% for R&D/Office. This is directly attributable to the fact that it takes more capital improvements to maintain an R&D/Office property than it does for the typical institutional-grade Apartment property. Similarly, under the current formula, Apartments seemed to show the highest average annual capital growth of 3.24% per annum. If the new formulas are used, however, Retail properties show a greater average annual capital growth of 4.77% versus 4.31% for Apartments. This difference is attributable to the capital expenditures made in retail properties designed to upgrade tenancy and add leaseable space.

⁵ An exception might be made when the capital expenditure exceeds some fairly large fraction of the property's value, as that would likely reflect a case of major redevelopment of the property. Nonetheless, it is difficult for an index like the NPI, which is an aggregate of statistics of properties rather than a statistical summary of individual property performance results, to adjust for this condition. Mechanical filter rules, for example, could be criticized even if they captured a majority of major redevelopments or expansions.

Exhibit 5 shows rolling four-quarter (annualized) *income returns* for all properties and for each property type subindex in the NPI. Several differences among property-type *income returns* are evident in the new formulation. First, there are real and substantial differences among *income returns* by property type. Apartment properties devote less of their net operating income to capital improvements than all other types. Office and Retail properties are at the other end of the spectrum devoting roughly 35% to 45% of their average annual net operating income to capital improvements. Second, the pattern of income returns is considerably more volatile with the new formulation. This, we believe, better reflects the real world of real estate investment performance over time. Income-generation in real estate is not a steady, predictable process. Third, the patterns of *income return* under the new formulation show relatively little correlation that is obscured in the current formulation.

A natural consequence of the change in the *income return* formula is the change in the *capital return*, which gives the more upward-trending property value line indicated in Exhibit 1, bottom graph. Over the long term we see that capital improvements add to the value of the underlying property. The current formula of *capital return*, at best, obscures this effect. The new formula makes it quite clear that capital improvements have, in general, been productive in that property values have increased as a consequence of this investment.

Exhibit 6 shows rolling four-quarter (annualized) *capital returns* for all properties and for each property type subindex in the NPI. Capital expenditures are necessary and required of all properties to attract and hold tenants and to prevent deterioration of the asset. Additionally, investment managers typically make capital expenditures to increase market value. The current NPI *capital return* formula makes it appear that capital expenditures have not had a beneficial effect upon value. While it is true that real estate values have declined over the past few years, the magnitude of the loss has been exacerbated somewhat by the way in which *capital returns* have been computed. As Exhibit 6 shows, capital expenditures have produced positive capital growth over most of the history of the NCREIF data at an overall average rate of about 3.0% per annum versus the meager 0.5% produced via the current formula.

With the new formulas, the property value index at the end of the first quarter of 1994 is nominally 60% higher than where it started at the end of 1977, versus the current formula which portrays the nominal property value index as only 6% above where it started. Again, the new formula is the more realistic picture, as capital improvement expenditures do add to property value (otherwise it would not have been sensible for managers to make them). While we acknowledge that buildings tend to depreciate in real terms even with capital improvements being made to them, buildings are not such a wasting asset as appears from examination of the property value trend line under the current formulation.

Capitalization Rates

Changing the *income return* formula will eliminate what is better described as a *current capitalization rate* so we suggest retaining the basic idea with a the new formulation of the denominator, again to conform to common practice and assumed definition in everyday use. Our formulation of *current capitalization rate* measure is simply net operating income before capital improvements are removed divided by the value at the end of the prior period. An annualization of the quarterly net operating income divided by the value gives a statistic directly comparable to

the “overall rate” or “capitalization rate” used widely by appraisers as a rough indicator of property value and market sentiments.

Capitalization rates for all properties of the NPI and for each individual property-type subindex are shown graphically in Exhibit 7. In this exhibit we have fitted a third-order polynomial regression line that, for the period shown, presents a good approximation to the long-term trend in *capitalization rates*. The patterns for all property types are remarkably similar.

Conclusion

The NCREIF Property Index and its various subindices are widely used to understand the economic performance of institutional-grade commercial property. Investors, investment advisors, consultants, and appraisers rely upon the NPI as a benchmark of performance and often probe beyond the *total returns* into its components, the *income* and *capital returns*, to set expectations about future performance and to distinguish the return-generating capacity of one property type from another.

Unfortunately, the current formulas have a variety of drawbacks that might lead to erroneous conclusions or to misinterpretation of real estate's economic behavior. We suggest that relatively minor modifications to the formulas can greatly enhance our understanding of the real estate asset class. Further, a reformulation is in order to permit better comparison between real estate and other asset classes and to allow the differences among property types to become clear.

By moving the capital improvements figure from the current formula's *capital return* component to the *income return* component, we find that the *income return* is more closely aligned with what investors typically receive as distributed cash flow from their real estate assets. Also, with the new formula, the *capital return* is strictly the change in property value without the distorting effect of deducting the costs of maintaining the asset or adding to its market value. We believe that our alternative definitions produce a more realistic picture of the performance of equity real estate and are more in line with the performance formulas used in financial markets.

Exhibit 1
Current and New Formulas

Current Formulas	New Formulas
<p><i>Total Return =</i></p> $\frac{NOI_t + V_t - V_{t-1} - CI_t + PS_t}{V_{t-1} + (\frac{1}{2})CI_t - (\frac{1}{2})PS_t - (\frac{1}{3})NOI_t}$	<p><i>Total Return =</i></p> $\frac{NOI_t + V_t - V_{t-1} - CI_t + PS_t}{V_{t-1}}$
<p><i>Income Return =</i></p> $\frac{NOI_t}{V_{t-1} + (\frac{1}{2})CI_t - (\frac{1}{2})PS_t - (\frac{1}{3})NOI_t}$	<p><i>Income Return =</i></p> $\frac{NOI_t - CI_t}{V_{t-1}}$
<p><i>Capital Return =</i></p> $\frac{V_t - V_{t-1} - CI_t + PS_t}{V_{t-1} + (\frac{1}{2})CI_t - (\frac{1}{2})PS_t - (\frac{1}{3})NOI_t}$	<p><i>Capital Return =</i></p> $\frac{V_t - V_{t-1} + PS_t}{V_{t-1}}$
	<p><i>Current Capitalization Rate =</i></p> $\frac{4(NOI_t)}{V_{t-1}}$

where:

V_t and V_{t-1} are the values in the current and prior period,
 NOI_t is the net operating income in the current period,
 CI_t is the capital improvements in the current period, and
 PS_t is the partial sales in the current period.

Exhibit 2
Quarterly Return Statistics Using Current and New Formulas
NPI, All Properties, 1978:1 to 1994:1

	Total Return		Income Return		Capital Return	
	Current	New	Current	New	Current	New
Mean	1.98%	1.98%	1.87%	1.24%	0.11%	0.74%
Standard Dev.	2.03	2.03	0.18	0.32	1.97	1.95
Maximum	6.19	6.16	2.29	2.06	4.03	4.77
Minimum	-5.20	-5.19	1.58	0.48	-6.91	-6.22
Percentiles:						
95th	5.31%	5.29%	2.18%	1.75%	3.38%	4.13%
75th	3.07	3.05	2.02	1.43	1.27	1.75
50th (median)	1.84	1.84	1.85	1.19	0.13	0.73
25th	1.27	1.27	1.71	1.04	-0.41	0.19
5th	-0.82	-0.81	1.63	0.76	-2.82	-2.29
Interquartile range	1.80%	1.79%	0.31%	0.39%	1.56%	1.56%
Correlation:						
Current formula	1.000	1.000	1.000	0.711	1.000	0.993
New formula	1.000	1.000	0.711	1.000	0.993	1.000

Exhibit 3
 NPI All Property Quarterly Returns, 1978.1 to 1994.1

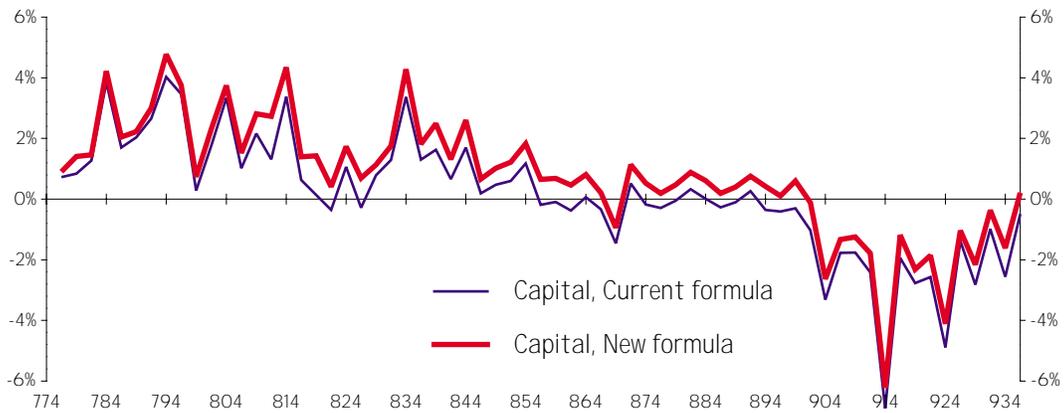
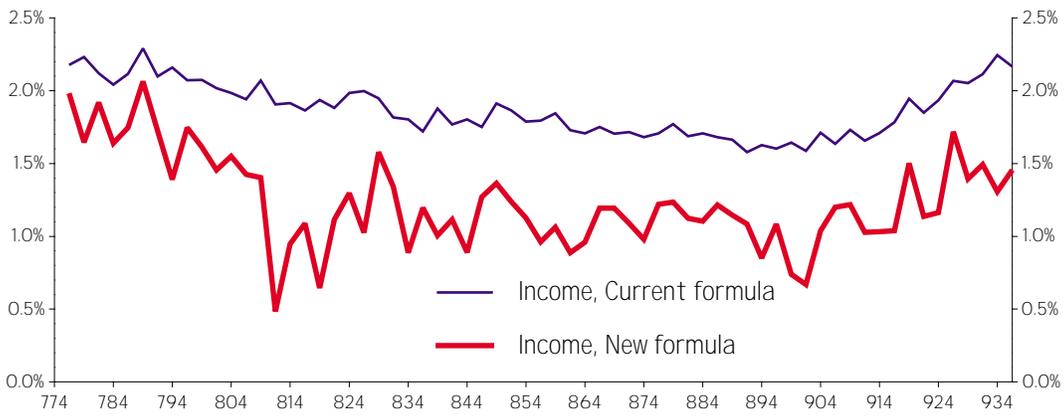
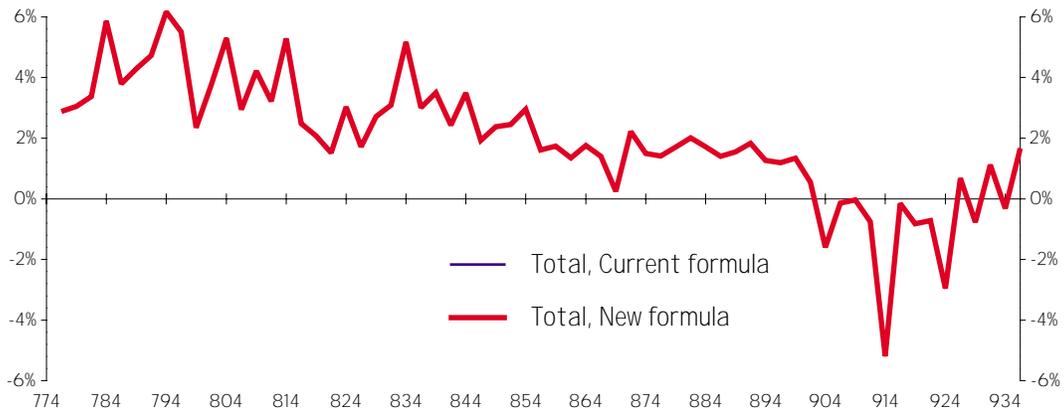


Exhibit 4
 Annualized Return Statistics Using Current and New Formulas
 NPI by Property Type and All Properties, 1978:1 to 1994:1

	Total Return		Income Return		Capital Return	
	Current	New	Current	New	Current	New
Office:						
Mean	6.62%	6.59%	7.33%	4.77%	-0.68%	1.76%
Standard Dev.	6.39	6.37	0.45	0.76	6.30	6.14
Retail:						
Mean	9.21	9.19	7.67	4.27	1.46	4.77
Standard Dev.	3.08	3.08	0.43	1.32	2.95	3.17
Warehouse:						
Mean	8.98	8.94	7.97	5.45	0.96	3.36
Standard Dev.	3.60	3.59	0.28	1.17	3.56	3.71
R&D/Office:						
Mean	8.77	8.73	8.31	6.18	0.44	2.43
Standard Dev.	4.82	4.80	0.35	1.10	4.78	4.80
Apartment:						
Mean	11.15	11.09	7.73	6.58	3.24	4.31
Standard Dev.	4.27	4.24	0.44	0.65	4.17	4.14
<hr/>						
All Properties:						
Mean	8.17%	8.14%	7.70%	5.04%	0.45%	2.99%
Standard Dev.	4.07	4.05	0.37	0.64	3.94	3.91

Exhibit 5
 Rolling Four-Quarter Income Returns
 NPI All Properties and by Property Type, 1978:4 to 1994:1

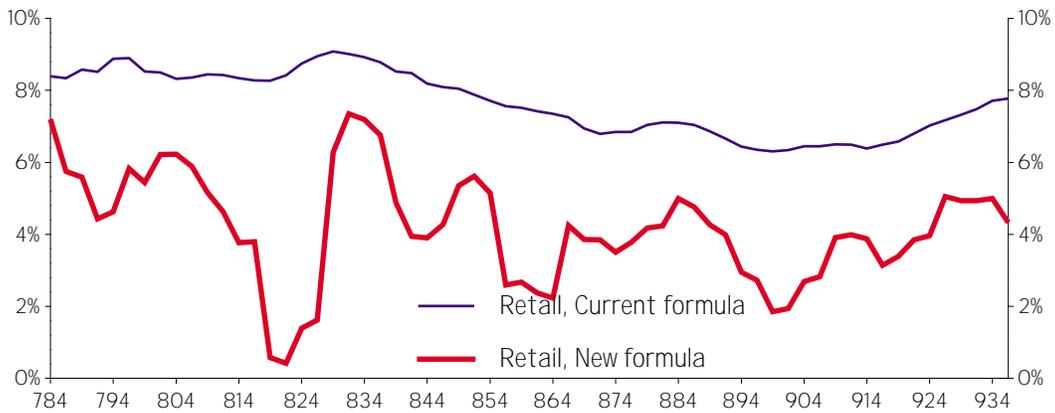
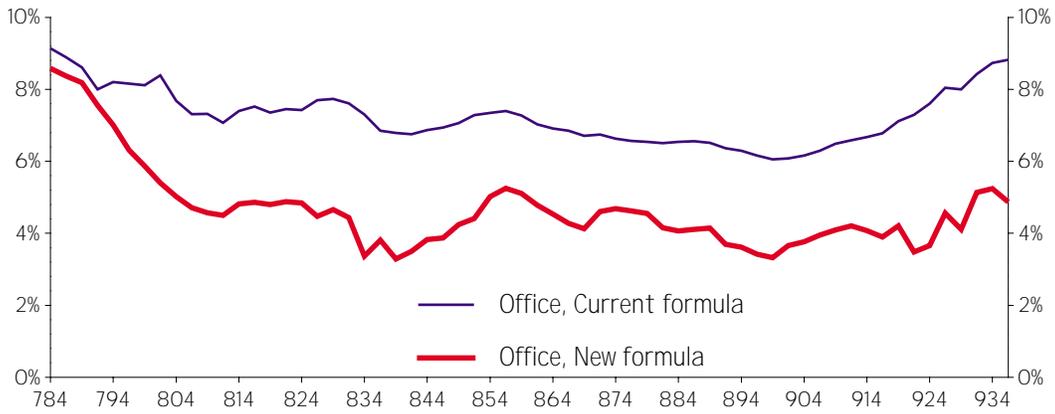
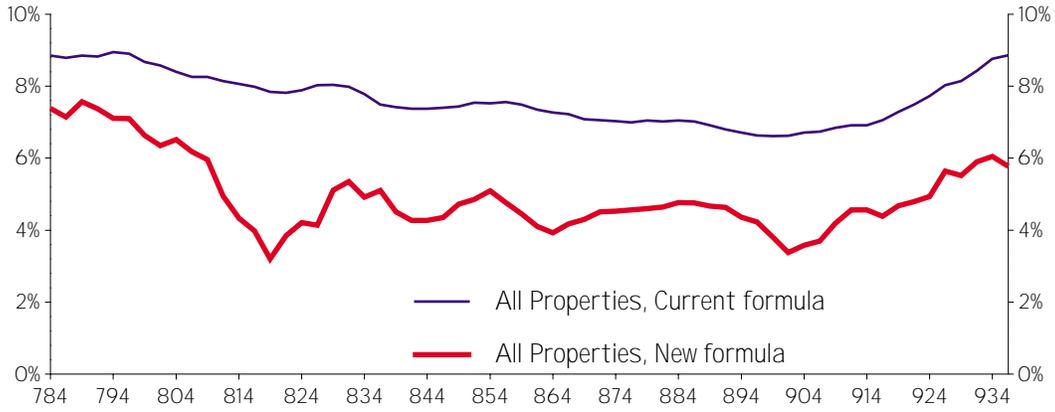


Exhibit 5 (continued)
 Rolling Four-Quarter Income Returns
 NPI All Properties and by Property Type, 1978:4 to 1994:1

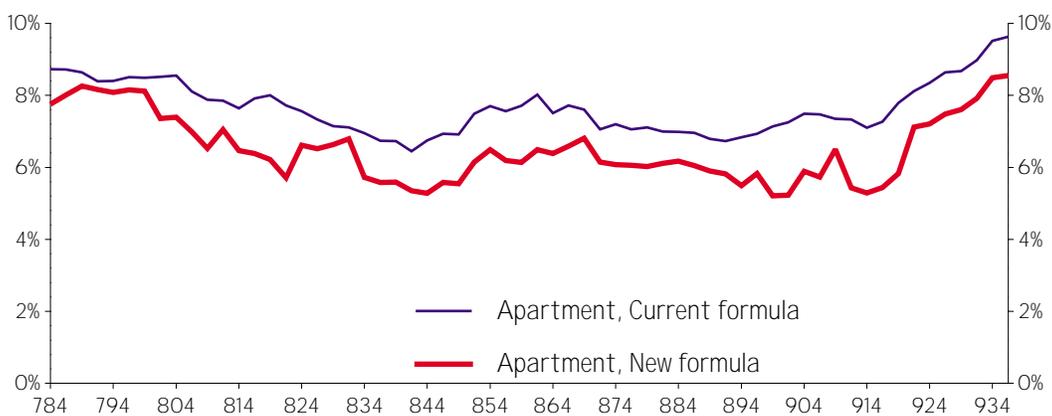
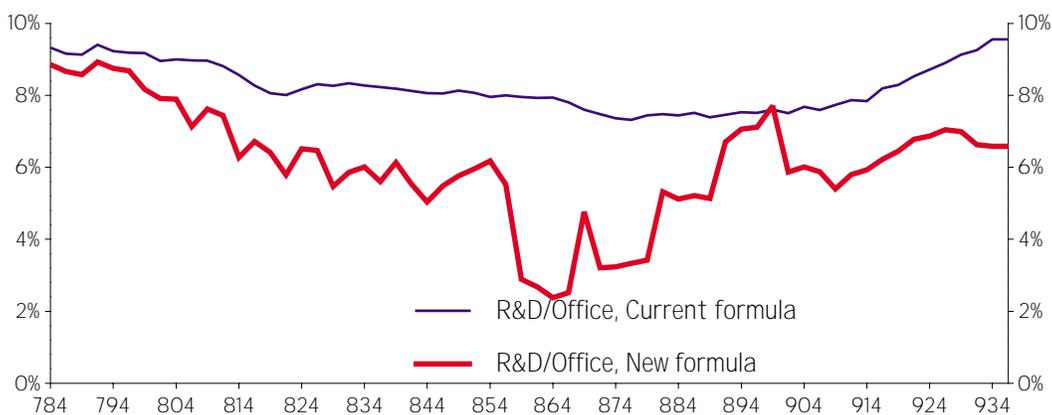
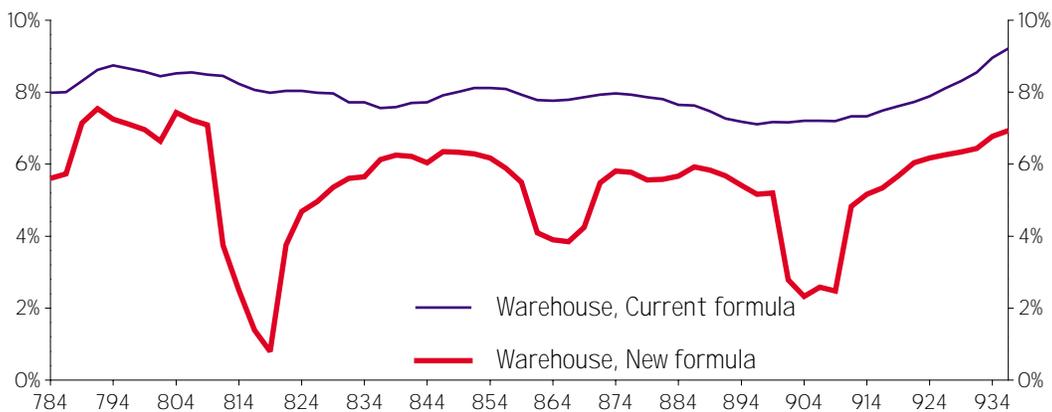


Exhibit 6
 Rolling Four-Quarter Capital Returns
 NPI All Properties and by Property Type, 1978:4 to 1994:1

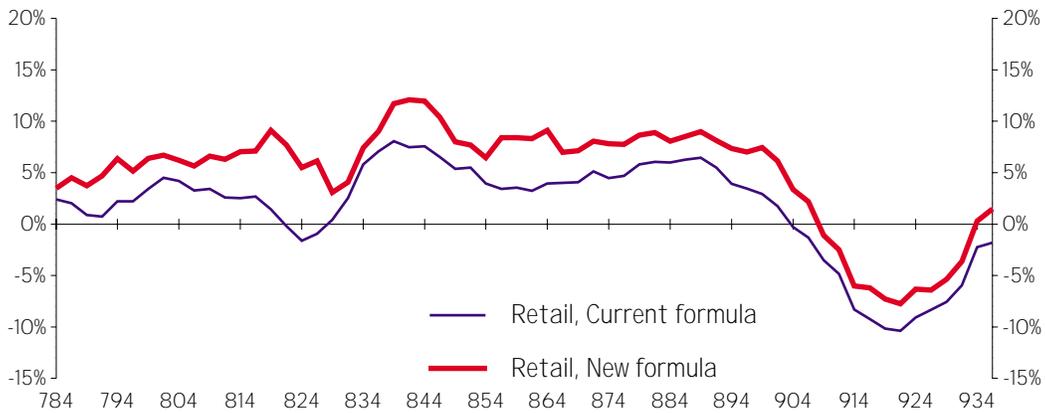
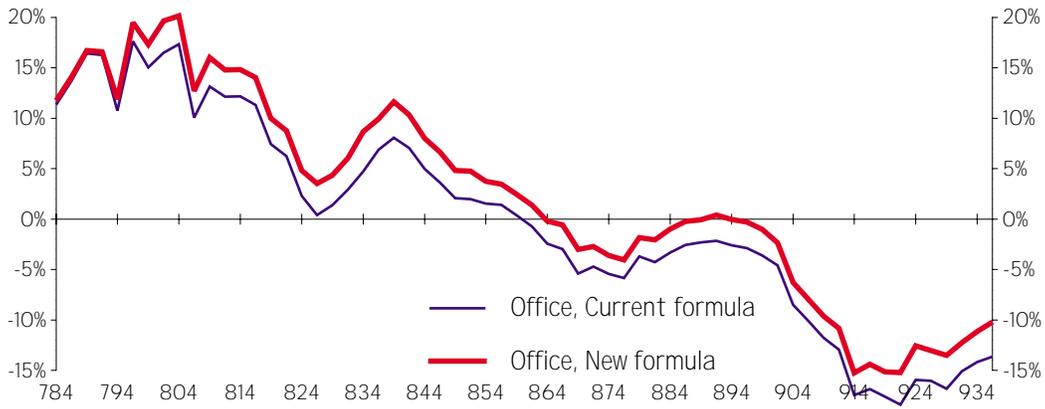


Exhibit 6 (continued)
 Rolling Four-Quarter Capital Returns
 NPI All Properties and by Property Type, 1978:4 to 1994:1

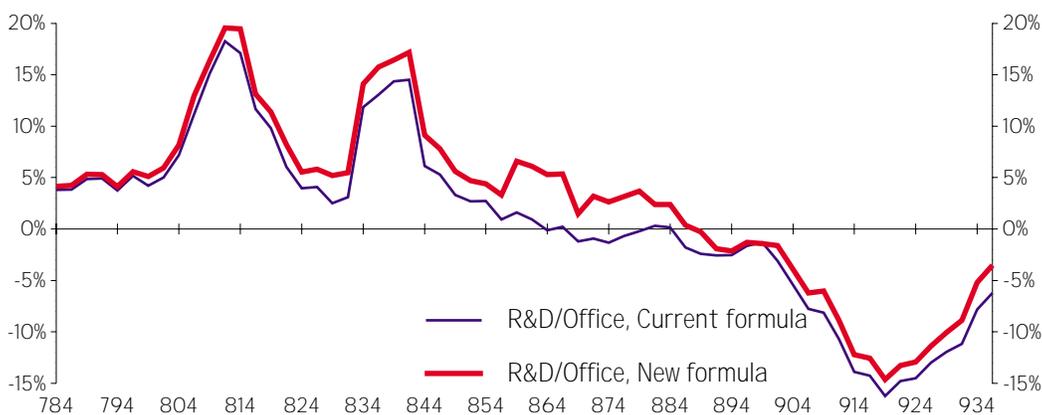
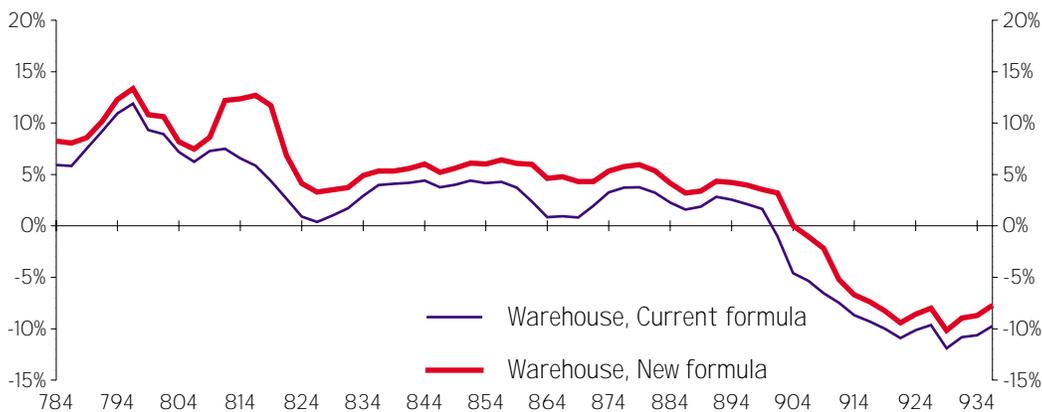


Exhibit 7
 Current Capitalization Rates
 NPI All Properties and by Property Type, 1978:1 to 1994:1

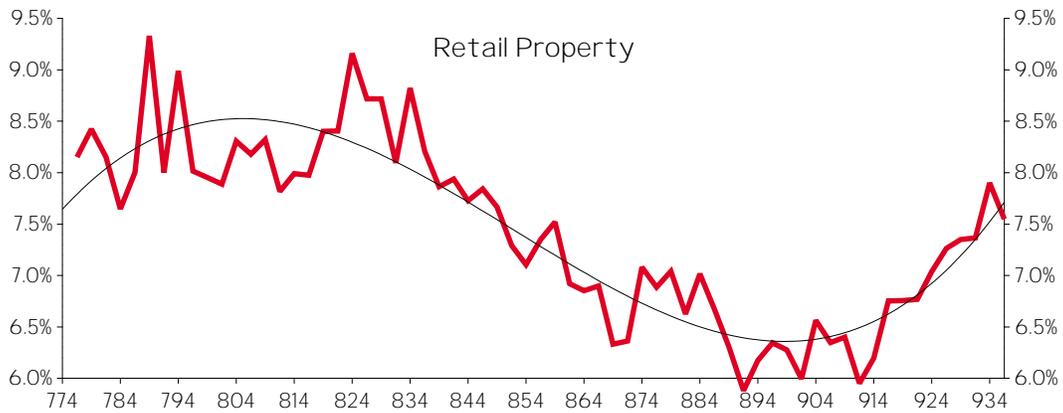
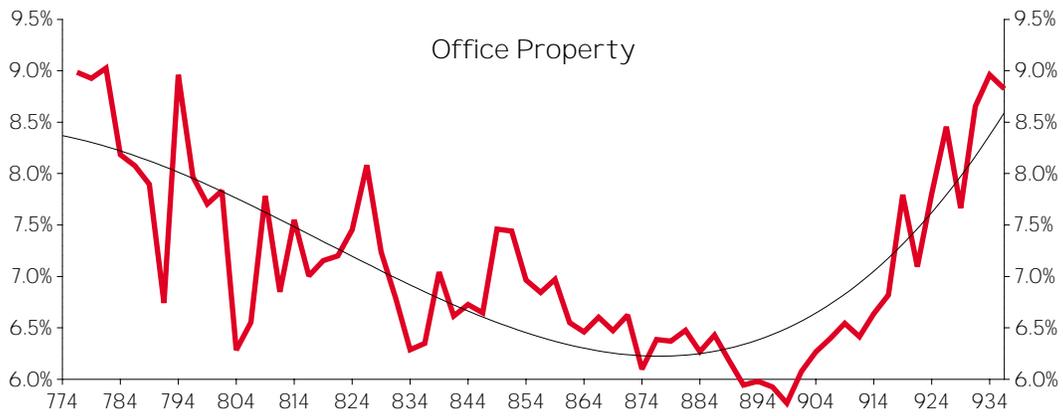
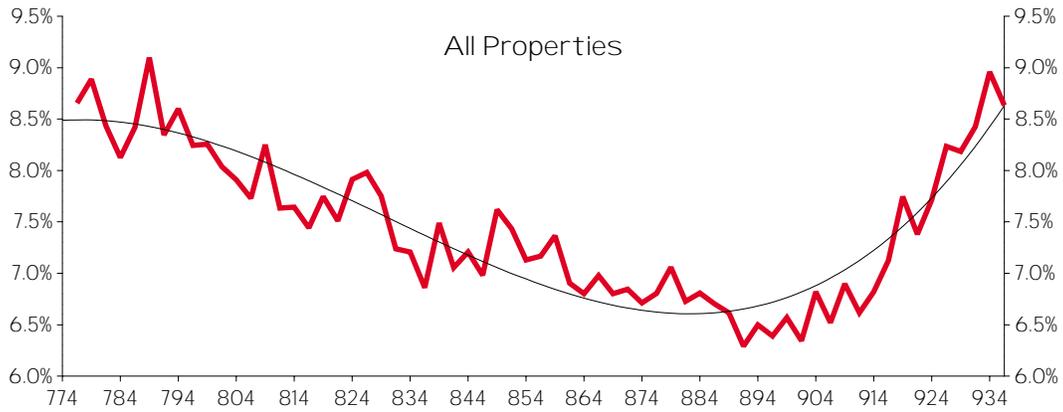


Exhibit 7 (continued)
 Current Capitalization Rates
 NPI All Properties and by Property Type, 1978:1 to 1994:1

