

PRICING RISK: CHOOSING A DISCOUNT RATE*

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The discounted cash flow (DCF) is the most widely used and reliable method of simulating the performance of an institutional real estate investment over its holding period. Yet a key factor in DCF valuation, the discount rate continues to generate debate and often appears to receive inadequate consideration in the real world where irrational behavior seems to dominate. For some professionals a discount rate analysis is more a gut instinct than a systematic analysis. From a theoretical standpoint, in-depth analysis incorporates modern portfolio theory but, unfortunately, it relies too heavily on historical data and assumes a high level of available current data. There is a rate derivation between “trust me”, and modern portfolio theory’s Capital Asset Pricing Model (CAPM).

In analyzing a property’s value to a particular investor, the analyst identifies the components of future benefits—cash flows and reversionary value—and determines their variability and timing over a specific holding period. The future benefits then are discounted to present value, which represents the price a typical investor should be willing to pay for the investment at the date of valuation. The discount factor used in this process must reflect the total required return to the investment position—both income and capital appreciation—as well as the degree of risk associated with the investment.

How does an analyst arrive at an appropriate and logical discount rate? In this article the framework is presented from a qualitative and quantitative (actual data) perspective, and commonly used approaches are explored.

Transaction Data

The best indicators for required investment return are the discount rates currently employed in actual real estate transactions. Two significant problems associated with this source of data are obtaining the data and the infrequency of real estate transactions. Real estate, by its nature, does not lend itself to continuous efficient trading mechanisms, such as those used by the stock and bond markets. Real estate trades are infrequent, and their terms are highly property specific; the number of trades germane to a particular analysis is limited. Moreover, details on transactions rarely are available to the public. Although institutional real estate advisors and investors usually compile performance reports internally and many participate in public databases,

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these data typically are retrospective and involve realized returns rather than rates currently anticipated or targeted. In most instances, information about prospective investment criteria is available only to those involved in the transaction.

When such proprietary transaction data can be secured by an analyst, it is preferable to other sources since it attests to actual transactions made under current market conditions. Even then, however, transaction data has its limitations. DCF analysis is complicated, and its supportability is weakened by not being able to compare individual earning structures. In addition, researching transaction data is extremely time-consuming, whether the analyst is examining historic returns or discussing investment criteria with investors currently active in the market. Remember, the analyst is estimating an unleveraged discount rate for private market transactions; transactions or return data from alternative sources need to be adjusted.

Transaction data provide the best support for discount rate assumptions, but their value to the analyst is clearly dependent on the quantity and quality of data available. Generally, an analyst can find samples of sales with the targeted internal rate of return (IRR) or discount rate. The following excerpt is an analysis of a recent consultation.

Our analysis considered available information regarding rate expectations from shopping mall sales. The rate information from the comparable sales—higher risk profile sales—indicate discount rates of 11.5% to 13.3% for unleveraged transactions. The subject is consistent to slightly better in both earning structure and location relative to the comparable sales, indicating a discount rate toward the lower end of the range. The buyers involved in the acquisition of these regional shopping malls were interviewed by the analyst. The interviewees strongly concur that a yield of 10.5% to 11.0% is appropriate for high quality malls, and a yield of 11.0% to 11.5% is appropriate for lower quality but market dominant malls. Further, these buyers add that older/riskier properties, similar to the subject, in today's retail environment would have discount rates in excess of this range, or 11.5% to 13.0%. This brings a current view into the analysis and confirms the range indicated by the sale data. For the subject analysis, we conclude that based on actual transactions, a discount rate of 11.5%-13.0% to be appropriate.

Real Estate Indexes

The most widely utilized database of historic real estate equity returns is the NCREIF Real Estate Property Index published by the National Council of Real Estate Investment Fiduciaries. Other sources for these data are the National Association of Real Estate Investment Trusts [NAREIT] and Evaluation Associates, Inc. The NCREIF Classic Property Index (NCPI) is the most relevant, despite

some limitations, for the purposes described in this article. The index is widely available, and the time series covers a lengthy real estate cycle, although it may not suffice to filter out unusual cycles. Although the NAREIT Index is market based, we cannot use its return data for real estate discount rate derivation purposes because a NAREIT data reflects returns from leveraged real estate and returns are based on trading of operating company shares rather than property returns.

The NCREIF quarterly time series, which runs from 1978 to the present, reflects the performance of income-producing properties owned by commingled funds on behalf of qualified pension and profit-sharing plans or owned directly by these trusts and managed on a separate account basis. As of December 1995, 1,850 properties valued at \$28.94 billion were included in the index. The data represents returns from unleveraged properties. Returns are given for all property types, excluding hotels, and are broken down by income and appreciation on a national and regional basis.

NCREIF return data are based on the actual sale prices or appraised values of real estate properties. However, the use of appraisal data raises the issue of inherent biases with respect to the capital component. Critics have argued that appraisal-based conclusions do not mark the properties to market every year. Based on the few statistical studies that have addressed this issue, appraisal bias is evident in the short term but not the long term.¹ Thus, the return variances would not be pronounced over the entire holding period. However, because returns are reported quarterly, the income component is fairly reliable.

Another consideration with NCREIF data is that it represents actual or realized total returns rather than the expected or promised returns required for DCF analysis. The difference between the expected rate at the time of investment and the rate achieved upon sale is known as the *loss attributable to default*. By the pure nature and historical period of this index, default risk does not appear to be reflected in NCREIF data, whereas in prospective or expected return data, a risk premium has to be embedded in the rate. The analyst must adjust for this factor if the NCREIF Index is to serve as a useful benchmark for discount rates. Alternative market indexes, stocks and bonds are argued to have this default premium reflected in their historical data due to long periods, per the market, that reflect equally below average and above average return periods. This canceling effect creates a historical return that will be consistent with future returns.

TABLE 1

Annualized Historical Quarterly Return Series

Year & Quarter	NCREIF Classic Index			S&P 500	Lehman G/C	T-Bills	CPI
	Income	Capital	Total				
841	7.49	6.89	14.76	8.63	5.23	9.12	4.74
842	7.42	7.79	15.63	-4.69	1.77	9.44	4.22
843	7.37	7.12	14.87	4.69	8.60	9.77	4.20
844	7.37	5.38	13.04	6.10	15.00	9.97	3.95
851	7.40	4.23	11.86	18.73	16.88	9.77	3.75
852	7.43	3.04	10.65	30.75	28.71	9.25	3.74
853	7.54	2.97	10.68	14.31	21.18	8.44	3.18
854	7.52	2.45	10.10	31.57	21.33	7.68	3.77
861	7.56	2.07	9.75	37.42	28.91	7.25	2.26
862	7.49	1.49	9.06	35.41	20.66	6.90	1.74
863	7.35	0.50	7.88	31.44	20.67	6.53	1.75
864	7.27	-0.60	6.63	18.21	15.60	6.17	1.13
871	7.22	-0.76	6.42	25.74	8.09	5.90	3.04
872	7.08	-2.10	4.86	25.08	4.68	5.72	3.72
873	7.06	-1.23	5.77	43.31	-0.38	5.83	4.30
874	7.03	-1.47	5.49	5.17	2.30	5.91	4.40
881	6.99	-1.42	5.50	-8.32	4.43	5.93	3.89
882	7.06	-0.03	7.03	-7.11	7.48	6.05	3.93
883	7.02	-0.20	6.81	-12.55	12.78	6.28	4.20
884	7.05	-0.01	7.04	16.50	7.59	6.76	4.42
891	7.03	0.01	7.03	17.90	5.01	7.50	4.98
892	6.91	-0.04	6.86	20.40	12.35	8.22	5.17
893	6.80	-0.11	6.69	32.73	11.32	8.54	4.34
894	6.71	-0.48	6.21	31.43	14.24	8.64	4.65
901	6.63	-0.61	5.99	19.05	11.70	8.46	5.23
902	6.61	-0.80	5.76	16.32	7.11	8.22	4.67
903	6.61	-2.08	4.43	-9.38	6.75	8.11	6.16
904	6.71	-4.99	1.47	-3.19	8.28	7.90	6.11
911	6.74	-6.29	0.14	14.40	12.49	7.53	4.90
912	6.44	-7.67	-1.23	7.40	10.22	6.93	4.70
913	6.91	-8.96	-2.51	31.29	15.86	6.37	3.39
914	6.90	-12.34	-6.07	30.55	16.13	5.75	3.07
921	7.06	-12.49	-6.09	11.04	11.38	5.14	3.18
922	7.69	-13.39	-6.83	13.46	14.17	4.65	3.09
923	7.49	-13.52	-6.81	11.01	13.23	4.06	2.99
924	7.73	-11.66	-4.60	7.68	7.58	3.61	2.90
931	8.03	-11.16	-3.81	15.27	14.30	3.35	3.04
932	8.14	-11.21	-3.76	13.60	13.15	3.13	2.87
933	8.43	-9.69	-1.97	13.01	11.45	3.07	2.58
934	8.76	-7.39	0.88	9.99	11.03	3.07	2.64
941	8.86	-6.72	1.70	1.43	2.78	3.10	2.39
942	8.94	-4.56	4.08	1.33	-1.45	3.33	2.41
943	9.05	-4.22	4.55	3.66	-4.13	3.67	2.86
944	9.16	-2.28	6.73	1.33	-3.50	4.21	2.53
951	9.27	-2.00	7.14	15.59	4.59	4.85	2.99
952	9.34	-1.30	7.95	26.11	12.77	5.35	3.05
953	9.41	-0.82	8.53	29.80	14.35	5.68	2.55
954	9.46	-0.50	8.93	37.50	19.24	5.75	2.72
Average	7.57	-2.52	4.90	15.44	10.91	6.39	3.59
Standard Deviation	0.84	5.50*	5.79	13.72	7.25	2.01	1.09

*subject to appraisal smoothing

Source: NCREIF Classic Property Index; RERC

TABLE 2

Annualized Performance, Periods Ending December 31, 1995

Period	NCREIF Classic Retail Index							NAREIT Share Price Equity	NCREIF Classic Property Index			
	Income	Capital	Total	S&P 500	Lehman G/C	T-Bills	CPI		Lehman 10 Year	Income	Capital	Total
13 years	7.40	0.72	8.16	15.87	10.78	6.47	3.56			7.63	-2.34	5.16
12 years	7.28	0.31	7.60	15.34	11.02	6.27	3.54			7.62	-2.94	4.51
11 years	7.20	-0.33	6.85	16.22	10.66	5.94	3.50	9.70	11.02	7.64	-3.67	3.77
10 years	7.15	-0.75	6.36	14.79	9.65	5.77	3.47	8.79	10.24	7.66	-4.26	3.16
9 years	7.12	-1.26	5.80	14.41	9.01	5.72	3.74	7.69	9.29	7.70	-4.66	2.78
8 years	7.16	-1.95	5.10	15.62	9.88	5.69	3.65	8.56	11.03	7.78	-5.05	2.44
7 years	7.17	-3.04	3.97	15.49	10.21	5.54	3.54	8.80	10.68	7.89	-5.75	1.80
6 years	7.29	-4.15	2.91	13.03	9.55	5.03	3.36	8.57	10.99	8.09	-6.60	1.08
5 years	7.46	-4.90	2.28	16.59	9.81	4.47	2.82	8.87	17.17	8.36	-6.91	1.01
4 years	7.72	-4.03	3.46	13.34	8.28	4.15	2.76	8.17	12.98	8.73	-5.51	2.86
3 years	7.96	-2.58	5.23	15.29	8.51	4.34	2.71	7.92	12.48	9.07	-3.45	5.39
2 years	8.14	-2.44	5.55	18.04	7.27	4.98	2.69	5.45	9.05	9.28	-1.31	7.88
1 year	8.44	-2.42	5.86	37.50	19.24	5.75	2.72	17.14	15.26	9.46	-0.50	8.93

Source: NCREIF Classic Property Index; RERC

Finally, the index is an aid for analyzing risk-adjusted returns (as measured by the standard deviation) of various classes of real estate. This analysis, which can be disaggregated between income and capital components, allows for a more quantitative comparison with alternative investment returns. Adjustment of the appraised capital values (unsmoothing) may be employed to determine a more representative measure of volatility. In sum, the NCREIF Property Index, if thoroughly understood and properly used, can serve as a basis for the selection of an appropriate discount rate.

The following applies the index data to a retail center.

Tables 1 and 2 reflect data for NCREIF, along with other relevant return series. Table 1 depicts the annual returns by quarter for all real estate property types from the first quarter of 1984 to the fourth quarter of 1995. The table also shows the annual returns by quarter for competitive assets such as stocks and bonds. In sum, the NCREIF Property Index can serve as a rough proxy for the selection of a discount rate; however, a longer term average is preferable, since the recent data is skewed by significant write downs.

Table 1 indicates that actual, annualized, quarterly reported returns for the period of 1984 through 1995 have averaged 4.90% for the NCREIF Index. In contrast, stocks have averaged approximately 15.44% per year and government T-bills approximately 6.39%. The standard deviation for stocks, as represented in the S&P 500, demonstrated the greatest volatility at approximately 13.72%. Income returns (i.e., cash-on-cash yields) for real estate are significantly more stable, exhibiting a standard deviation of only 0.85% and a return of 7.57%.

A derivative approach in using the series is to use the property-specific income component with an adjustment made for required capital changes and default risk. Table 2 entitled "Annual Performance" indicates a 13-year average income return of 7.40% for retail properties, though recent returns were 8.44%. Given the recent investment characteristics of the asset class and the location of the subject, we have chosen to use 8.0% as a property-specific income component in our derivative calculation. Adjusting this figure 400 to 500 basis points (based upon historical information and judgment) for default risk, anticipated capital changes and the high earning structure risk of the subject, results in a discount rate estimate ranging from 12.0% to 13.0%.

Investment Surveys

Surveys of pension funds, pension fund advisors, lending institutions, corporate and other investors provide timely insights into current investment criteria. Real Estate Research Corporation (RERC) has conducted and published this type of investment survey since 1979.² The RERC's quarterly survey augments the expectation yield rate responses with personal interviews and monitors change in market fundamentals, such as capital availability, supply and demand in each asset class and overall investment strategies. The investment criteria detailed in the survey include current property-type preferences, income and expense growth rates and the targeted (ex ante) yield rates used by real estate investors in discounted cash flow analyses. Within the context of this analysis, an expected (ex ante) yield rate is equal to the discount rate that is being estimated. The following provides an elementary discussion on the use of a survey to estimate an appropriate discount rate.

TABLE 3

Real Estate Investment Criteria by Property Type. First Quarter 1996*

	INDUSTRIAL		RETAIL			OFFICE		APARTMENT	HOTEL
	Warehouse	R&D	Regional Mall	Power Center	Neighborhood/Community	CBD	Suburban	Apartment	Hotel
Pre-tax yield (IRR) (%)									
Range**	10.5 - 12.0	11.3 - 12.5	10.3 - 12.0	10.8 - 12.0	10.8 - 12.0	11.0 - 14.0	10.5 - 14.0	10.5 - 12.0	12.0 - 15.0
Average	11.2	11.8	11.3	11.4	11.4	11.9	11.6	11.1	13.1
Going-in cap rate (%)									
Range**	8.5 - 10.0	9.3 - 10.5	7.5 - 9.5	8.5 - 10.0	8.8 - 10.5	8.8 - 10.0	8.0 - 10.0	8.5 - 9.3	10.0 - 12.0
Average	9.0	9.7	8.5	9.4	9.4	9.6	9.3	8.8	10.4
Terminal cap rate (%)									
Range**	9.0 - 10.0	9.5 - 10.8	7.8 - 10.0	9.3 - 11.0	9.3 - 11.0	9.0 - 11.0	9.0 - 11.0	8.8 - 9.5	10.0 - 13.0
Average	9.5	10.1	9.0	9.8	9.8	10.0	9.8	9.2	11.0
Rental Growth									
Range**	1.0 - 4.5	1.0 - 6.0	1.0 - 4.0	2.0 - 4.0	0.0 - 4.5	1.0 - 4.0	1.0 - 5.0	2.0 - 5.0	3.5 - 4.0
Average	3.4	3.4	3.3	3.5	3.0	3.0	3.4	3.4	3.9
Expense Growth									
Range**	3.0 - 4.0	3.0 - 6.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.5 - 4.0
Average	3.5	3.8	3.6	3.7	3.6	3.6	3.5	3.6	3.7

* The survey was conducted in January, February and March 1996 and reflects expected returns for first quarter 1996 investments.

** Ranges and other data reflect the central tendencies of respondents; high and low responses have generally been eliminated.

Source: Real Estate Research Corporation

Tables 3 through 5 and Exhibit I reflect RERC's most recent survey of institutional investment criteria. Table 3 is used in this section with the balance of the data analyzed in the capital market approach, presented next. Real estate yield expectations increased for all but one property type in the first quarter 1996. As shown in Table 3, reported yield requirements range from 10.5% to 15.0% with property averages ranging from 11.1% to 13.1%. The mean required yield for all property types moved up to 11.5% from 11.4% from the previous quarter.

The largest changes in yield expectations were an increase of 40 basis points for CBD office and 30 basis points for neighborhood/community shopping centers. All other movements were 20 basis points or less. Hotels lead all property types with the highest average yield requirement (13.1%), followed by CBD office (11.9%), industrial R&D (11.8%) and suburban office buildings (11.6%). Neighborhood/community shopping centers and power centers follow with discount rates of 11.4%. Apartments have the lowest discount rate (11.1%), closely followed by industrial warehouses (11.2%), and regional malls (11.3%). As always, we underline that these rates represent unleveraged yield expectations, not realized returns.

Table 3 reflects general underwriting criteria, but discussions with targeted participants suggest that these indications are sometimes reduced if the quality of the property is significantly higher than average. That is not the case for the subject and actually the subject is considered a 'hard sell' in today's real estate market. The overall

discount rates based on inflated dollars range from 10.3% to 12.0% for the retail categories. Given the risk profile of the subject, a discount rate of 11.0% to 12.5% was deemed most appropriate.

Capital Markets Analysis

Investment in real estate can provide critical diversification for a stock, bond and bill portfolio. However, investment officers must carefully consider all alternatives in order to optimize the risk/return balance. Ten-year U.S. bonds, corporate bonds, real estate debt instruments and stocks are typically used as benchmarks. Since such investments are continuously traded on the open market, interest rate and/or return data for each is readily available. Real estate, however, has different risk characteristics than these alternatives. Investors require an adjustment of their return expectations from real property investments to match the risk differences.

When comparing fixed-income securities—bonds and debt—with real estate, the returns are analyzed on a historical basis to arrive at yield spreads. The estimated spreads then are applied to the respective current fixed-income rate to derive a benchmark real estate discount rate. If the comparison is between stock returns and real estate, an analysis of return volatility, as measured by its standard deviation, provides the risk-adjusted basis for arriving at a real estate discount rate. This type of analysis can also be applied to fixed-income securities.

TABLE 4

Intermarket Yield Spreads:
Real Estate Vis-À-Vis Capital Markets

	1Q 1996	4Q 1995	3Q 1995	4Q 1994	4Q 1993	4Q 1992
Mean real estate yield (%)	11.5	11.4	11.5	11.7	11.7	12.1
Yield Spread (percentage points)*						
Moody's Baa Corporate (%)	3.4	4.0	3.5	2.6	4.0	3.3
Moody's Aaa Corporate (%)	4.1	4.6	4.2	3.2	4.8	4.2
10-Year Treasuries (%)	5.2	5.8	5.2	3.9	5.9	5.3

* Real estate over other investments.

Source: Real Estate Research Corporation

The following provides a capital market comparison.

Table 4 shows historic spreads between the average targeted yield for real estate and actual yields for alternative investments. The gap between real estate and capital market returns is wide. The current range in spreads is from 520 basis points on 10-year Treasuries to 340 basis points on Moody's Baa Corporate. The gap only serves to underline the relative attractiveness and perceived risk of real estate vis-à-vis other asset classes. A normative spread for a well-positioned real estate asset would be a range of 350 to 450 basis points above equal term bonds. The spread comprises several adjustment components, including management fees above financial instruments. A visual picture is given of our spread analysis in Exhibit I.

Table 5 reflects current yields ranging from 6.3% to 8.1% for alternative investments. Adding a market-derived spread (350-450) for the real estate already discussed, the alternative market analysis indicates a rate range of 9.80% to 12.6% for the well-positioned property. Given the increased risk position of the subject asset, an additional adjustment of 100 basis points was deemed appropriate or a concluded rate of 10.8% to 13.6%.

TABLE 5

Real Estate Vis-À-Vis Capital Market Returns*

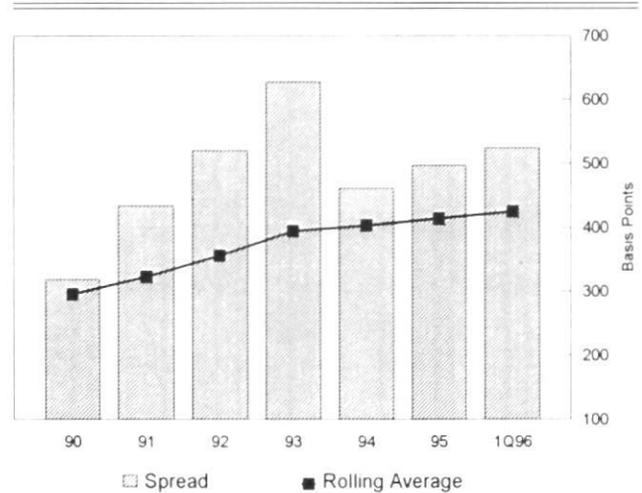
	1Q 1996	4Q 1995	3Q 1995	4Q 1994	4Q 1993	4Q 1992
Real estate yield (%)	11.5	11.4	11.5	11.7	11.7	12.1
Moody's Baa Corporate (%)	8.1	7.4	8.0	9.1	7.7	8.8
Moody's Aaa Corporate (%)	7.4	6.8	7.3	8.5	6.9	7.9
10-Year Treasuries (%)	6.3	5.6	6.3	7.8	5.8	6.8

* This survey was conducted in January, February and March 1996 and reflects desired returns for First Quarter 1996 investments. Capital markets rates are for the last month of the respective quarter.

Source: Real Estate Research Corporation

EXHIBIT 1

Historical Real Estate Yield Spreads
Over 10-Year Treasuries



Source: RERC, Federal Reserve Data

Data Conclusion

The criteria outlined in this article served as the directional foundation for the selection of an appropriate discount rate analysis. Appraisal-based return series do not appear to capture appropriate variability parameters and have to be used carefully, if at all. Given available data, the best foundation for a discount rate is achieved by rigorous analyses of transaction data, investor surveys and alternative investment returns. Given the active data presented in this article, a summary would be as follows.

The discount rate to be applied to the cash flows of the subject property must reflect the quality and durability of the income projections, as well as the likelihood of long-term gain in asset value. As discussed, the yield to the investor (Internal Rate of Return) must be at a level commensurate with alternative investment vehicles.

The most comparable rates, as previously analyzed, include:

Transaction Data	11.5% to 13.0%
Real Estate Indexes	12.0% to 13.0%
Investor Surveys	11.0% to 12.5%
Capital Markets	10.8% to 13.6%

Based on this analysis, a rate of 12% was used to discount the future benefits to a present worth.

All that analysis and still a 12.0% conclusion? This article is intended to convey the importance of developing risk-adjusted returns for real estate and understanding that there is a practical approach to rate analysis. The reader may still wonder why it is necessary to use multiple analyses to reach this discount rate conclusion. The value of this analysis is to exercise a systematic and consistent method



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for deriving an appropriate discount rate and to justify and defend it when challenged.

The foregoing discussion relies ultimately on the analyst's judgment in determining an appropriate discount rate, within a market-established range whether derived from transaction data or other methods. The adjustment for risk is the most difficult judgment to make. The analyst must consider the entire spectrum of physical, financial and sociological factors. Additionally, this discount rate is not mutually exclusive of estimated inflation or variables in the cash flow that create volatility, such as rents, expenses, etc.

Finally, deriving a discount rate relies on historical data, e.g., transaction information. In contrast, the discounted cash flow analysis is a prospective model. In this context, building a discount rate must adjust for historical bias. Applying a consistent framework to the adjustment process often leads to meaningful and consistent discount rates. Though in need of further analysis, it is apparent that the adjustment process should consider the following factors:

1. **Current conditions.** Focus on current returns as the base for building a discount rate. Analyze the current expectations for inflation, real risk-free return, term structure of interest rates, etc.
2. **Distortions in historical returns.** Appraisal biased indexes or write-downs are possible distortions requiring particular attention. Although a longer history of realized returns are now available (approximately 20 years for indexes and more than 25 years for specific funds), this time period may not suffice to filter out unusual cycles unlikely to be repeated in the future.
3. **Current biases.** Other asset types could be relatively overpriced, so that the future might produce a better performance from real estate, the unfavored asset.
4. **Future changes.** What is the impact on the recapitalization of real estate with public money? What risk(s) does technology present to real estate? What does the divestiture of investment in real estate by corporate companies mean to returns?

Incorporating all available data and using sound judgment is the key to deriving a relevant discount rate. We would suggest developing a market finance theory to account for investors who focus more on return characteristics and intuitively measure risk. The author believes that real estate analysts should continue to develop this style of analysis.

NOTES

1. Fisher, J., Geltner, D., Webb, R.B., "Value Indices of Commercial Real Estate: A Comparison of Index Construction Method," *Journal of Real Estate Finance and Economics*, 1994, 463-481.
2. Real Estate Research Corporation (RERC), *Real Estate Report*, 1979-1996.



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- Public Policy Disputes

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