LINKAGES AMONG CAPITALIZATION RATES, DISCOUNT RATES AND REAL ESTATE CYCLES

Adjustments must be made in capitalization and discount rates to account for differences in the real estate cycle.

by David C. Ling
and Halbert C. Smith, CRE

The current real estate recession has created serious problems in the valuation of many income-producing properties. Appraisers and analysts have estimated market values of properties only to find that investors will not purchase the properties at those prices, or at any price that is acceptable to the seller. Property owners, particularly large institutions, have found themselves holding properties they would like to sell, but not at prices investors are willing to pay. Owners apparently are waiting for the market to return to more normal levels that will produce prices more consistent with replacement costs and their own investment.

While owners' reluctance to accept large losses may be understandable, the widely noted overvaluation of Resolution Trust Corporation (RTC) and other properties by appraisers and analysts during the early part of the real estate recession is not. We contend that this phenomenon results, at least in part, from analysts' failure to recognize the asymmetric effects of real estate cycles on risk-adjusted discount rates and capitalization rates. More specifically we argue that point estimates of future cash flows are less certain in overbuilt markets than in underbuilt markets, all else remaining the same. Thus, we believe that a given level of excess supply *adds* a larger amount to the required risk premium, and therefore to discount rates and capitalization rates, than a shortage of the same magnitude *subtracts* from the required risk premium.

Capitalization Rate Components

As real estate counselors we know that capitalization rates are comprised of two parts—a return on investment and recapture of investment capital. The portion of the capitalization rate that represents return on investment is an interest rate or yield (usually called the discount rate) which compensates investors for the use of their capital. This discount rate must be high enough to compete with yields from other capital and financial investments of similar quality and risk. Often the discount rate is viewed as a rate that combines a riskless rate and an increment to compensate for the expected variability of real estate cash flows. The riskless rate usually is assumed to be the contemporaneous rate available on a U.S. Government security of comparable maturity.[1]

David C. Ling, *is the William A. Hussey Professor of Real Estate Finance in the Graduate School of Business at the University of Florida. He received an MBA in finance and a Ph.D. in real estate economics from Ohio State University. He is a director of the American Real Estate and Urban Economics Association and serves as a consultant to several national organizations.*

Halbert C. Smith, *CRE, is professor and chairman in the Department of Finance, Insurance, and Real Estate in the Graduate School of Busines at the University of Florida. He is a director of the Homer Hoyt Institute and was formerly chief economist for the Federal Home Loan Bank Board. He serves as a counselor to several business firms and governmental agencies.*

In discounted cash flow (DCF) analysis the discount rate is applied to projected (i.e., most likely) cash flows over a holding period. Accurate quantification of the risk component is crucial to the realistic valuation of a property. Whereas yields on government securities can be found quickly and easily, yields on real estate investments require judgments to be made about the comparability of a given investment alternative to other investments and about the effects of future events on the investment's cash flow stream. Sophisticated models have been formulated for identifying and measuring risk, e.g., the capital asset pricing model (CAPM) and the arbitrage pricing model (APM). However, these models do not foretell the future; they are limited by their use of historical data to make inferences about the appropriate size of the required risk premium. Moreover, the applicability of these standard finance models of risk quantification to real estate valuation has been questioned by numerous researchers, and, as a practical matter, it has been limited severely by the availability of reliable real estate return data. The counselor's or investor's judgment therefore must be applied to the direct quantification of risk or the application of the models for measuring risk.

The other component of the capitalization rate, recapture of capital, is a percentage that is added to the discount rate to reduce the amount that otherwise would be paid for an investment. This amount, when converted to an annual figure, is sufficient to repay the capital that has been invested over the asset's expected useful life or holding period. A sinking fund factor usually is used to represent capital recapture under the assumption that annualized amounts will accumulate at compound interest. Use of a recapture rate is based on an inflationless economy in which investment values decline over time.

When investment values, in nominal terms, are expected to increase over time, an annualized amount must be subtracted from the discount rate to form the capitalization rate. The amount subtracted from the discount rate may be termed the allowance for appreciation. Both situations are represented by the general capitalization rate formula for real estate:

$$R_o = y_o - \triangle_o a \qquad \text{Equation 1}$$

where:

R_o is the overall cap rate.
y_o is the discount rate (overall yield rate).
$\triangle_o$ the expected change in property value (which can be either positive or negative).
a is an annualizer (usually a SFF).

Put another way:

R_o is the required annual dividend rate on the property.
y_o is the required holding period return (expressed in annual terms).

The investor's required return during the holding period may be obtained from two sources: (1) the periodic dividend (i.e., net operating income); and (2) appreciation in the value of the real estate. If a larger portion of y_o will be obtained from capital appreciation, then a smaller portion of y_o must be provided in the form of current yield. Thus, for a given y_o, increases in expected capital appreciation decrease the required R_o.

Why Multiperiod Discount Rates Drive Capitalization Rates

With direct income capitalization, estimated first-year (or stabilized) net operating income of the subject property (NOI) is converted into an estimate of market value by dividing NOI by the appropriate capitalization rate (R_o). The appropriate capitalization rate in this exercise typically is abstracted from the market by calculating first-year NOI as a percentage of the selling price from recent transactions of properties thought to be comparable to the subject property. Note that the application of direct income capitalization does not require explicit estimates of cash inflows and outflows beyond the first year.

Unlike direct income capitalization DCF techniques require the investor, appraiser or counselor to make explicit projections of future cash flow. The cash inflows and outflows associated with the acquisition of an existing income property may be represented by the following expression:

Equation 2

$$V_o = \sum_{t=1}^{N} \frac{EGI_1 (1 + \pi_r + \delta_t)^{t-1}}{[1 + y_o]^t} - OE_1 \sum_{t=1}^{N} \frac{(1 + \pi_o)^{t-1}}{[1 + y_o]^t} + \frac{P_N(1 - B)}{[1 + y_o]^N}$$

where:

V_0 is the estimated value of the subject property.

Effective gross income in the first year of operations, EGI_1, is expected to grow at the average annual nominal rate π_r.

π_r is the expected rate of general inflation in the economy adjusted downward for economic depreciation of the property.

δ_t is a rental adjustment factor intended to capture the effects of current supply and demand conditions in the market on future increases or decreases in *real* (i.e., inflation-adjusted) rental income.

OE_1 represents first-year operating expenses (primarily maintenance and property tax expenditures) that are assumed to increase at the annual rate of π_o.

The final term in Equation 2 represents the present value of the cash flow from the sale of the property at the end of the projected N-year holding period, at which time proportional selling costs equal to B will be incurred. P_N in Equation 2 is determined by dividing NOI in year N + 1 by the appropriate terminal (or going-out) capitalization rate. The mean or expected value of all future cash

flows is converted to present value by discounting at y_o, the required return for the holding period.

Although direct income capitalization does not require explicit estimates of cash flow streams beyond the first year, *implicit* estimates of future cash flows are reflected in the capitalization rates that have been abstracted from the market in the comparable sales analysis. This is because transaction prices in a competitive market reflect the investment valuations of willing buyers and sellers which, in turn, reflect *their* projections and assumptions about future cash flows. For example, more optimistic assessments of future EGI_t's and P_N's in a local market increase investment values and thus the prices investors are willing to pay per dollar of first-year NOI, all else remaining the same. In terms of Equation 2 V_o is a function of π_r; as expected inflation increases, V_o increases, thus decreasing abstracted capitalization rates.

It is important to recognize that in a competitive market y_o is exogenously determined; i.e., it is a function of the returns that are available from other capital and financial investments of similar risk. Given current competitively determined rental rates, transaction prices adjust to provide potential investors with a holding period return equal to y_o. Capitalization rates do not determine value; they *react* to changes in cash flow projections and/or changes in required returns on competing investment alternatives. This integration of real estate markets with other capital and financial asset markets can cause a variation in local real estate values and observed capitalization rates even in the absence of a change in current or projected supply and demand conditions. Said differently, values in a local real estate market may decline even if projected cash flow streams are unaltered, e.g., if yields on risky corporate bonds increase. The point is that y_o (in conjunction with rental income appreciation and other assumptions) determines V_o which, in turn, determines actual transaction prices and thus R_o.

Risk And Multiperiod Cash Flows

A multiperiod DCF approach to income property valuation is an application of mean/variance analysis, a standard approach to the incorporation of risk into the valuation of many financial assets. Mean/variance analysis presumes investors weigh the advantages of expected benefits from alternative courses of action against the disadvantages of particular risks. More specifically mean/variance analysis explicitly recognizes that the expected variability, as well as the expected amount, of future cash flows is fundamental to the determination of market values in a competitive market. Other things being equal, mean/variance investors presumably prefer assets with higher mean returns (given comparable levels of risk) and avoid assets with more volatile (less predictable) cash flows and returns.

This risk/return tradeoff in the context of DCF analysis requires analysts to plug their best guess of future cash flows, such as EGI_t and P_N , into Equation 2. If an analyst is uncertain about the point estimates of expected future cash flows, he should be penalized by using a higher discount rate than the one used with a similar but less risky property. In short an internally consistent application of DCF requires adjustments in the discount rate for properties perceived to be relatively risky; DCF should not incorporate overly conservative or worst-case cash flow forecasts.

It is important to note that risk is defined as the potential *variation* between actual future cash flows and projected cash flows used in calculating V_o in Equation 2. Thus, investments in existing income properties in overbuilt markets are not necessarily more risky just because their previous owners realized a holding period return that was less than expected at the time of acquisition. Potential purchasers care only about the relationship between their required return (y_o) and the return they expect to earn if they pay the asking price for the property. Investors do not shy away from overbuilt markets because current values are below construction costs. In fact their exogenously determined yield requirements may be partially responsible for the fact that properties are selling at discounts to replacement costs. Said differently, risk does not depend on the current *level* of rents or values; it is a function of the degree of certainty market participants place on their estimates of future cash flows.

Real Estate Cycles And Risk

Real estate cycles may be characterized as the periods during which the market moves from high demand for space, supply constraints and rent and price increases to low demand, perhaps excess supply and flat prices. At some point in the cycle new construction decreases, and it may come to a standstill if overbuilding occurs. Property values may fall below replacement costs. At some point exogenous factors may begin to stimulate the demand for space. For example, after a recovery in the general economy or the relocation of a large corporation to a local market, competitive rental rates and therefore prices may begin to rise, and the vacancy rate may decline. Entrepreneurs and builders may respond to the increase in rents and prices by beginning new construction.

A primary determinant of the pace of new construction in a local market is the relationship between current rental rates and required (or equilibrium) rental rates. The required level of effective rental income in the first year is the level that equates the net present value (NPV) of the income with zero for typical investors who employ a typical set of assumptions about future rental rates, operating expenses and resale values. This required first-year effective gross rent per dollar of investment serves as a hurdle rate for prospective developers and investors in income-producing properties. If current supply and demand conditions in the market are such that properties earn rents greater than the required minimum, then investors will add new construction to the existing stock in an attempt to capture these excess rents.

Put another way, prices or values in the asset market are multiples of the rental rates that have been competitively determined in the space market. If current rents exceed the required minimum, then market values will exceed construction costs (including the price of land and a fair profit for the developer), and developers will have an incentive to add to the existing stock. Ultimately the expansion of supply causes *real* rents (current rents less inflation) to decrease toward the required or equilibrium level.[2]

Thus, although inelastic in the short run, the supply of space is elastic (price responsive) over long time periods. Short-run equilibrium in the asset market requires only that the market clears; i.e., willing property sellers find willing buyers. However, long-run equilibrium in the asset market requires that market-clearing asset prices equal the costs of replacement less accrued depreciation.

If current rental rates are below the required minimum, as is the case in an overbuilt market, construction will be cut back until market rents rise to the required level. Only then will developers be able to recover construction costs from the sale of new properties and earn a rate of return comparable to the return on alternative investments of similar risk. Note that if the supply of space in a local market could be adjusted instantaneously to the current level of tenant demand (i.e., if the short-run supply of space were highly elastic), current rental rates would equal the minimum required, and properties would sell for their replacement costs less accrued depreciation. In effect real estate cycles would be eliminated if the supply of space were perfectly elastic. However, the supply of space and therefore current rental rates cannot adjust immediately to changing market conditions. Thus, a combination of: (1) reduced construction; (2) normal growth in demand for space; and (3) steady depreciation of the existing stock is required before higher real rents can be generated for income-producing properties in overbuilt markets.

In many applications of the multiperiod valuation model the rental adjustment factor in Equation 2, (δ_t) is equal to zero; i.e., effective gross rental income is expected to grow at the rate of expected general inflation minus the effects of economic depreciation. This pattern of projected rental income invokes the often unrealistic assumption that the local real estate market has obtained long-run equilibrium; i.e., market values are equal to construction costs, and current and expected rents are sufficient to provide investors with a competitive (risk-adjusted) rate of return. In effect projecting that rental income will increase at the rate of general inflation is akin to assuming that any recent upturns or downturns in the local market have played themselves out and that underbuilding or overbuilding will not occur in the future.

A Sample Property

To facilitate discussion of these concepts, consider the following example. The subject property is a newly constructed office building with 55,500 leasable square feet. The rate of general inflation (less economic depreciation) is 4% per year over the projected ten-year holding period ($\pi_r = 0.04$). Operating expenses are $180,000 in the first year and will grow at an annual rate of 5% ($\pi_o = 0.05$). The market value of the property at the end of any year is equal to NOI in the subsequent year capitalized at 9%. Selling expenses are 4% (B = 0.04). The projected stream of NOI, including the selling price net of expenses, is converted into an estimate of current market value using a 12% discount rate ($y_o = 0.12$). Replacement cost, including land and developer profit, is $11,721,700.

Using these assumptions, the analyst can calculate that first-year EGI of $1,200,000 (or $21.6 per square foot) is required to equate current market value with replacement costs of $11,721,700 when rental income grows at the rate of general inflation. As shown in Panel A of Figure 1, the slope of the line defined by points RR and B reflects nominal income growth of 4% per year. Suppose, however, that the local market is at or near the top of a cycle and EGI_1 is $1,440,000 or 20% above ($25.92 vs. $21.6) required rental rates. If EGI_t increases at 4% per year, then the amount of projected excess income over the ten-year holding period is represented by the area bounded by CR, A, B and RR, which has a present value of $2,790,000.

Is it reasonable for the investor or counselor to assume that increases in effective rental income will keep pace with inflation in this underbuilt market? Will the typical investor be willing to pay a $2,790,000 premium to acquire the property? The answer to these questions is clearly no. Participants recognize that the market is at or near the top of a cycle. Because current rents are above the minimum required rents, investors anticipate that builders will increase the new products they bring to the market. Increased new construction will reduce the excess supply of space over time. As supply increases relative to demand, lower effective rents will be generated for the existing stock. Market participants understand that this process will continue until effective rents fall to required levels. In fact if analysts expect, perhaps based on prior experience, that the market will continue to be cyclical, they may project that EGI_t eventually will fall below required levels.

How quickly will effective gross rents fall from current to required levels (or below)? The fall in real rents will occur as quickly as new construction can be added to the existing stock. Because effective rents will not fall instantaneously to required levels, existing properties in underbuilt markets will sell at a premium over reproduction costs. The magnitude of the premium will depend on how quickly investors *believe* rents will fall to equilibrium levels. The longer the expected adjustment period, the greater the present value of excess rental income and the greater the premium over reproduction costs. Investors' expectations should vary with the expected growth rate of the area and the extent of the initial disequilibrium. However, even in fast-growing,

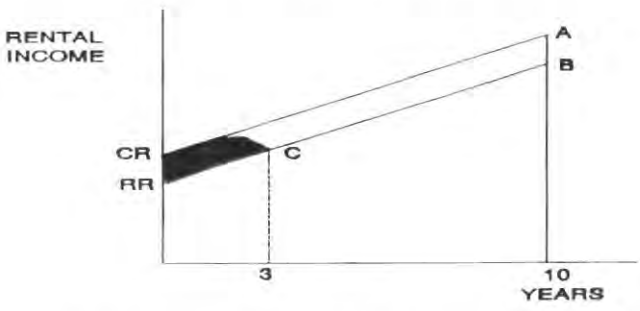
underbuilt markets, participants expect that supply eventually will catch up with demand and that real, though perhaps not nominal, decreases in effective rental income will occur; i.e., they expect that δ_t in Equation 2 will be negative for a period of years. The shaded area in Panel A reflects the excess rental income that will occur if the shortage is eliminated in three years and the real rents decrease gradually over that three-year period. In terms of Equation 2 the shaded area has a present value of $299,371 and assumes that δ_t is equal to -0.0954 in years two and three.

Panel B in Figure 1 depicts the situation if EGI_1 is $18.00 per square foot, or $1,000,000, i.e., 20% below the minimum required rental level. If EGI_t increases at 4% per year, then the amount of lost income from the excess supply of space is represented by the area bounded by RR, E, F and CR, which has a present value of $2,325,245.

FIGURE 1

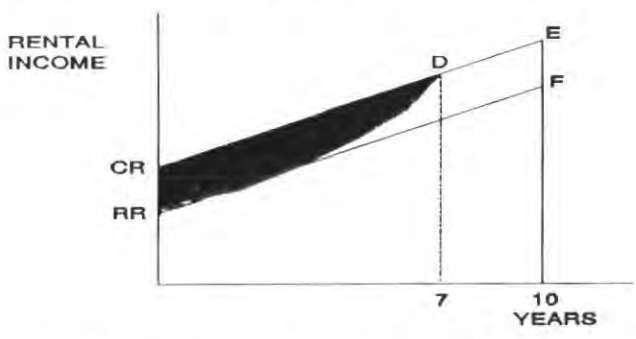
The Asymmetric Effects of Underbuilding and Overbuilding on the Value of Existing Properties

Panel A. Excess Rental Income in Underbuilt Market



Shaded area represents the amount of excess rental income due to the supply shortage that will be capitalized into the prices of existing properties. CR equals $1,440,000 for example property.

Panel B. Loss in Rental Income in Overbuilt Market



Shaded area represents the amount of lost rental income from the excess supply that will be capitalized into the prices of existing properties. CR = $1,000,000 for example property.

RR = Current effective gross income required for capitalized value of cash flows to equal construction costs (equal to 1,200,000 for example property)

CR = Actual first year effective gross income (EGI)

Because current rents are below the required minimum, builders will sharply reduce, if not totally eliminate, the new products they bring to the market. The combination of reduced new construction, growth in demand for space and steady depreciation of existing stock will reduce the excess supply of space over time. As supply falls relative to demand, higher effective rents will be generated for the existing stock. Market participants understand that this process will continue until effective rents catch up with required rents, because only then will developers have an incentive to bring new products to the market.

The rise in real rents will occur at the most rapid rate in fast-growing local markets with higher absorption rates, and the smaller the difference between current market and required rents, the sooner the asset market will obtain long-run equilibrium. Substantially overbuilt markets with slower economic growth may not allow any significant increases in real rents for a number of years, even if there is a near cessation of new construction.

Existing properties in overbuilt markets will sell at a discount to replacement costs; the magnitude of this discount will depend on how slowly investors think rents will rise toward equilibrium levels. Again investors' expectations should vary with both the expected growth rate of the area and the extent of the initial disequilibrium. The shaded area in Panel B reflects lost rental income over a seven-year recovery period, and it has a present value of $565,545.

Forecasting Rental Income

How should investors or analysts incorporate future changes in real rental income into their cash flow forecasts? First, they must make an assumption about the length of time the market will be over- or underbuilt. Second, they must forecast the *pattern* of real rent changes over the expected period of disequilibrium. In terms of Equation 2, the analyst must specify δ_t for each year of the expected holding period. We argue that these forecasts can be made with more certainty in an underbuilt market than in an overbuilt market.

When analysts project future rental income they must incorporate expected changes in the *demand* as well as the *supply* of space over time. We argue that the former is more difficult to predict than the latter. The argument is based on the assertion that the supply of space is more responsive to changes in price when markets are at or near the top of a cycle than when markets are bottoming out. More formally we argue that the supply of space in underbuilt markets is elastic (price responsive) because builders and investors quickly respond to rents that are excessive and prices that are above replacement costs by adding to the existing stock. For example, even large shortages of office space can be corrected in several years. Shortages of many other property types (e.g., multifamily space) can be corrected in an even shorter time period. Thus, in underbuilt

markets forecasted changes in real rental income (the δ_t's in Equation 2) are driven primarily by expected changes in supply.

An excess supply of space, however, is not eliminated as quickly, even if new construction in the market comes to a standstill. Absorption of the excess supply requires that demand for space increase over time. Demand for office, retail, industrial and multifamily space depends on numerous factors, many of which are largely independent of supply and demand conditions in the local real estate market. For example, the demand for office space in the local real estate market is affected by national and regional economic forces that are difficult to predict.

The shaded area of Panel A, Figure 1 depicts the time period required for new construction to drive current rents down to the required rent level. The larger shaded area in Panel B depicts the time period over which current rents will increase to the required level in an overbuilt market. The time period in Panel B is longer and more uncertain than the period depicted in Panel A because it depends almost completely on exogenous changes in demand. Speculative construction in the overbuilt market already has come to a stop; thus, changes in supply will be limited largely to demolitions.

We conclude, therefore, that a given level of excess capacity (say, 20%) adds a larger amount to the risk premium than a shortage of the same magnitude (20%) subtracts from the risk premium. Future rental flows are more difficult to predict in overbuilt markets because the rate of change in real rents will be driven primarily by hard-to-predict demand-side variables. This asymmetric effect may help explain the widely noted overvaluation of properties held by the RTC during the early part of the real estate recession when it was not unusual for properties to sell for prices 25% to 50% below appraised values. We believe that appraisers may not have added sufficiently high risk premiums to the discount rate to reflect the uncertainty of both: (1) the duration of the gap between required rents and current rents; and (2) the level of current rents over the forecast period. Rather it appears that appraisers applied risk premiums more reflective of stable or underbuilt markets. Discount rates were too low; capitalization rates also were too low, since they are driven by discount rates.

Summary And Conclusions

Our conclusions from the foregoing analysis may be summarized in four points:

1. When analysts use capitalization rates derived by comparison with competing real estate investments, they make implicit assumptions about the risk, timing and duration of the cash flows for the property they are analyzing. They assume that the market participants in comparable transactions are correct in their assessments of these characteristics. However, when properties are comparable in physical and transactional respects but the transactions occur in different phases of the real estate cycle, the indicated discount rates, capitalization rates and values will not accurately reflect the market.

2. Since the riskiness of investment in a given parcel or type of real estate varies over the real estate cycle, analysts must adjust the discount rate for use in the multiperiod DCF model. This adjustment is separate from any adjustment for the risk associated with general inflation in the economy. We have demonstrated that the discount rate adjustment can be annualized and included in the standard DCF model. By specifically including this adjustment analysts allow local market conditions to bear directly on the valuation of income-producing properties.

3. We conclude that the uncertainty associated with cash flow projections typically is greater during the overbuilt phase of the real estate cycle than during the underbuilt phase. The uncertainty is greater during the overbuilt phase of the cycle because the length of time required to rebalance the supply and demand for space in the local market is more uncertain. Market participants expect that space shortages will be eliminated quickly by profit-seeking builders and investors. Analysts, however, find it difficult to estimate the time of recovery for an overbuilt market. They must project demand-side responses to the overbuilding, because changes in supply will follow the removal of depreciated properties from the stock. The rate that excess space is absorbed depends on numerous factors, many of which are exogenous to the local market (e.g., national and regional economic factors). The adjustment to the rate should be estimated separately for each year of the cash flow forecast.

4. We suspect that some properties have been overvalued during the currently overbuilt phase of the real estate cycle for two reasons: First, in obtaining an overall rate appraisers have used comparable transactions that did not occur in the same phase of the cycle as the appraisal. Second, analysts did not adjust the discount rate in the multiperiod DCF model for the real estate cycle. We believe that further research is warranted to confirm and quantify the effects of the real estate cycle.

NOTES

1. Government securities are not, of course, riskless because realized real returns are affected by the level of general inflation. They are, however, free from default and prepayment (i.e., call) risk.

2. Discounted cash flow analyses contain estimates of future nominal cash flow. Even if basic demand and supply relationships in the local space market are not expected to change (i.e., the asset market has obtained long-run equilibrium), nominal cash flows may be expected to change over time simply as a result of general inflation in the economy. A decrease in real or inflation-adjusted rental income occurs when increases in nominal rents keep pace with general inflation. Real increases occur only when percentage changes in rental income exceed the general inflation rate.