Chapter 10

Valuation of Income Properties: Appraisal and the Market for Capital

Introduction

Chapter 9 introduced property markets and discussed the supply and demand for space, leases, rents, and expense recoveries. It also introduced how concepts affecting users of real estate and locations interact to impact the value of income-producing property. Property value also depends on the cost and availability of capital for real estate investments. In this chapter, we will focus on various methods that can be used to estimate the market value of a property.

Valuation Fundamentals

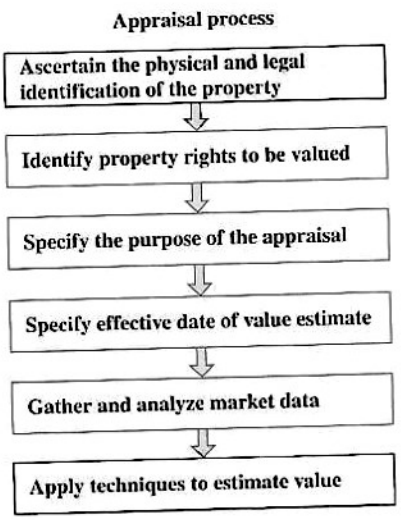
Market value is a key consideration when financing or investing in income-producing properties. It is defined as follows:

> The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from the seller to the buyer under conditions, whereby
>
> 1. The buyer and the seller are typically motivated;
> 2. Both parties are well informed or well advised, and acting in what they consider their best interests;
> 3. A reasonable time is allowed for exposure in the open market;
> 4. Payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
> 5. The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

A property's market value is also the basis for the *lending decision* because the property will be either the full or partial security for the loan. When making investment decisions, the investor will not normally want to pay more than the market value of the property. Similarly, the lender will not want to lend more than a proportion of the market value of the property because if the property must eventually be sold due to foreclosure of the loan, it would probably not sell for more than its market value. In the context of real estate finance, appraisal reports on properties are a part of the documentation required by lenders when considering whether to make mortgage loans. Because lenders and borrowers or investors use appraisals in decision making, they should be familiar with the generally accepted approaches to appraisal or valuation. There are many other instances when estimates of property values must be made after a property is acquired. These include valuations for insurance purposes, property tax assessments, investment performance reports for investors, and so on. These estimates may have to be made annually or even more frequently regardless of whether or not a property is sold. The purpose of this chapter is to explain the appraisal process and the three approaches ordinarily used in valuation.

Appraisal Process and Approaches to Valuation

An appraisal is an *estimate* of value. In making this estimate, appraisers use a systematic approach, referred to as the **appraisal process.** First, they ascertain the physical and legal identification of the property involved. Second, they identify the property rights to be appraised or valued. For example, the property rights being valued may involve fee simple ownership of the property or something other than fee simple such as a leased fee estate. Third, appraisers specify the purpose of the appraisal. Besides an estimate of market value for lending and investment decisions, appraisals are also made in situations involving condemnation of property, insurance losses, and property tax assessments. Fourth, appraisers specify the effective date of the estimate of value. Since market conditions change over time, the estimate must be related to a specific date. Fifth, appraisers must gather and analyze market data, and then sixth, apply appropriate techniques to derive the estimate of value. This process is the primary concern of this chapter.



In the appraisal process, a considerable amount of market data must be collected and analyzed. Market data on rents, costs, vacancies, supply and demand factors, expenses, and any other data considered to be an important influence on property values must be

collected, summarized, and interpreted by the analyst when making an estimate of value. It is not the intent of this book to cover how to conduct market studies and collect data for making appraisals. In real estate finance, it is more commonly the case that lenders, borrowers, and investors will use the appraisal report to make lending and investment decisions. However, the user must understand the approach used by the appraiser in estimating value. By understanding these approaches, the user will be in a better position to decide whether the appropriate market data have been used and whether appropriate techniques have been used to estimate the value.

The role of appraisals cannot be overemphasized because appraised values are used as a basis for lending and investing. Methods and procedures used in establishing values are thoroughly reviewed and evaluated by lenders to prevent overborrowing on properties and by investors to avoid overpaying for properties. Lenders want to be assured that both the initial property value and the pattern of property value over time exceed the outstanding loan balance for any given property over the term of the loan.

In income property appraisals, at least two of three approaches are normally used: the *sales comparison approach,* the *income capitalization approach,* and/or the *cost approach.* We review the essentials of each approach here to provide insight into the process followed by appraisers in establishing the market value of income property.

Sales Comparison Approach

The **sales comparison approach** to value is based on data provided from recent sales of properties *highly comparable* to the property being appraised. These sales must be "arm's-length" transactions or sales between unrelated individuals. They should represent normal market transactions with no unusual circumstances, such as foreclosure, sales involving public entities, and so on. In short, when market value for a property is established, current transaction prices are important benchmarks to use because they indicate what investors have paid to acquire properties.

To the extent that there are differences in size, scale, location, age, and quality of construction between the project being valued and recent sales of comparable properties, adjustments must be made to compensate for such differences. Obviously, when this approach is used, the more differences that must be adjusted for, the more dissimilar are the properties being compared, and the less reliable the sales comparison approach. The *rationale for the sales comparison approach* lies in the principle that an informed investor would never pay more for a property than what other investors have recently paid for comparable properties. Selection of data on properties that are truly comparable along all important dimensions, and that require relatively minor adjustments because of differences in building or locational characteristics, is critical to the successful use of this approach.

In developing the sales comparison approach to valuation, the appraiser summarizes and uses sales transaction data on comparable properties from the market area analysis in the development of expected rents and value estimates for the property being appraised. Exhibit 10–1 illustrates an example of some of the data that could be used in the development of a sales comparison approach for a hypothetical small office building and three comparable properties.

Based on the data developed from the market area analysis shown in Exhibit 10–1, we see that the subject property being appraised is very comparable to three small office buildings that have recently sold. A careful analysis of the data reveals relatively minor deviations in gross square footage, location, front footage on major streets, construction type and quality, landscaping, and age of structures. The procedure used to estimate value

EXHIBIT 10–1
Market Area Analysis and Sales Data (Sales Comparison Approach, Hypothetical Office Building)

Item	Subject Property	Comparable Properties 1	2	3
Sale date	—	Recent	1 year ago	2 years ago
Price	—	$355,000	$375,000	$413,300
Gross annual rent	—	$58,000	$61,000	$69,000
Gross square feet	13,300	14,500	13,750	15,390
Price per square foot*	—	$24.48	$27.27	$26.86
Rent per square foot*	—	$4.00	$4.44	$4.48
Proximity to subject†	—	2 miles	2.5 miles	3.5 miles
Frontage lineal feet	300	240	310	350
Number floors	2	2	2	2
Number elevators	1	1	1	1
Age	New	3 years	4 years	6 years
Exterior	Brick	Brick	Stucco	Brick
Construction‡	Average	Average	Average	Average
Landscaping‡	Average	Average	Average	Average

*Gross square footage (rounded).
†In this example, the subject property is considered to be at the best location, and locations further away are less desirable.
‡Quality.

EXHIBIT 10–2
Adjustments from Comparables to Subject Property

	Comparable Properties 1	2	3
Sale price	$355,000	$375,000	$413,300
Square footage	14,500	13,750	15,390
Sale price per square foot	$ 24.48	$ 27.27	$ 26.86
Adjustments:			
Sale date	–	+4%	–7%
Square footage	–5%	–4%	–12%
Location	+7%	+12%	+15%
Frontage	+10%	–14%	–15%
Age of structure	+8%	+10%	+15%
Net difference	+20%	+8%	+10%
Adjusted price	$426,000	$405,000	$454,630
Adjusted price per square foot	$ 29.38	$ 29.45	$ 29.54
Estimated price per square foot for subject	= $ 29.50		
Indicated market value $29.50 x 13,300 square feet	= $392,350		

via the sales comparison approach, is to attempt to adjust for the deviations between the property being appraised and the comparables. This adjustment can usually be accomplished in one of the two ways. The price per square foot paid for each comparable can be adjusted to determine the market value for the subject, or the relationship between gross rental income and sale price on the comparable can be applied to the subject with appropriate adjustment. Exhibit 10–2 shows how the price-per-square-foot adjustment could be carried out. In both cases, adjustments are based on the appraiser's judgment as to how the market value should be changed after doing a comprehensive analysis of how differences in property characteristics are being priced in the submarket.

Adjustments on a square footage basis must be made for any major physical or locational deviations between the property being valued and the comparables recently sold. Adjustments should be made *relative to* the property being valued; that is, the comparable data must be adjusted as though one wants to make the comparables identical to the subject property. Positive features that comparables possess relative to the subject property require negative adjustments, and negative features require positive adjustments. The appraiser makes all percentage adjustments based on the knowledge of current market values and how various favorable and unfavorable attributes of comparable properties would affect the value of the subject. When adjusting for age differentials, front footage, or differences in the percentage of leasable square footage, the appraiser must be able to estimate the value of such attributes and how the addition or deletion of those attributes affects the value of properties. *It should be stressed that the cost of these attributes should not always be added or subtracted to ascertain value. This is because buyers of properties establish what the market value for each attribute of a property is and also how each attribute may interact with others. Hence, the appraiser should be concerned with the effect that the addition or deletion of an attribute will have on total property value, holding all other attributes constant. In other words, the appraiser is concerned with the marginal change in value. This marginal change in value may not correspond to the cost of adding or deleting an attribute.* This is a subjective process and such adjustments should be justified with evidence based on recent experience with highly comparable properties; otherwise, serious errors can result.

In the above example, the price of each of the comparable properties was divided by the number of square feet of the building to adjust for differences in the size of the property. This adjustment was made under the assumption that the market price for an office building is directly related to its size(in square feet). In this case, the price per square foot is considered a **unit of comparison**. Other examples of units of comparison are number of apartment units in an apartment building and number of cubic feet in a warehouse.

Income Approach

The **income approach** to property valuation is based on the principle that the value of a property is related to its ability to produce cash flow. When attempting to estimate value using this approach, the analyst must take into account the many market influences that affect cash flows as well as extracting data from the sale of competitive properties deemed comparable to the property being evaluated. In this section, three commonly used techniques are discussed. Two of the techniques, the *gross income multiplier* and *direct capitalization methods,* rely heavily on current market transactions involving the sale of comparable properties. These techniques resemble the sales comparison method discussed in the previous section in many ways. However, these techniques focus more on how to determine a market value that is consistent with prices being paid for comparable properties trading in the marketplace. However, rather than giving priority to adjusting for differences in value by adding and subtracting directly from the prices of comparable properties for physical and locational attributes, these two methods tend to focus first on the income-producing aspect of comparable properties relative to the prices for which they were sold. Adjustments are then made for physical and locational dissimilarities.

The third income capitalization technique discussed in connection with the income approach is the *discounted present value method.* This method differs considerably from the gross income multiplier and direct capitalization techniques in that a forecast of future income production and expected investment return is used. The point of view utilized is more like that of an investor trying to value properties by using a technique that

incorporates many of the same steps and information that he would use to make an investment decision. The following is a discussion of these three techniques.

Gross Income Multipliers

One technique used in conjunction with the income capitalization approach to valuation is to develop what are referred to as **gross income multipliers.** These are relationships between gross income and sale prices for all comparable properties that are applied to the subject property. This technique also requires that an estimate of the gross income be made for the subject property. The gross income multiplier (*GIM*) is defined as

$$GIM = \frac{\text{Sales price}}{\text{Gross income}}$$

or, simply, the ratio of sale price to gross income. Such multipliers can be developed for the properties comparable to the office building being valued in Exhibit 10–1. In this case, gross income can be considered a unit of comparison. From the data developed in Exhibit 10–3, we can see that the *GIM*s range from 5.99 to 6.15, which means that the comparable properties are sold for 5.99 to 6.15 *times* the current gross income. If the subject property is comparable, it too should sell for roughly a price that bears the same relationship to its gross income.

In arriving at a value for the subject property, the appraiser must develop an estimate of gross income based on the market data on comparables shown in Exhibit 10–3. For the comparable properties the gross income should be the annual income at the time the property is sold (i.e., what it will be during the first year for the purchaser). Similarly, gross income for the subject will be for the first year of operation after the date for which the property is being appraised.

Some appraisers use **potential gross income** (which assumes all the space is occupied) when developing *GIM*s. Others use **effective gross income,** which is based on occupied space (potential gross income less vacancies). The results should be similar if the appraiser is consistent for the comparable and subject properties. If there are significant differences in the vacancy rates among the comparable properties, then using effective gross income may be more appropriate. Of course, this may indicate that the properties are not really very comparable and may be in *different market segments.*

This method relies on gross income. Therefore, an additional assumption critical to the use of this method is that the operating expenses are about the same proportion of gross income for all properties. *In many situations, particularly when smaller, older properties are being valued, information regarding operating expenses may not be available.* If for some reason this assumption is not valid, then this technique should not be used.

Care should be taken here to ensure that significant changes in *lease agreements* are not expected to occur. For example, if a major increase in rent is expected on a comparable due to a lease expiration in the near future, this must be taken into account and adjusted for. In addition to comparability in physical attributes, location, and leases, it is also assumed that no material differences in operating expenses exist between comparables. If material differences do exist, this technique should not be relied on.

EXHIBIT 10–3
Development of *GIM* (Comparable Properties)

	Subject Property	Comparable Properties		
		1	2	3
Sale price	?	$355,000	$375,000	$413,300
Current gross income	$36,600	58,000	61,000	69,000
GIM	?	6.12×	6.15×	5.99×

From the range of *GIM*s shown in Exhibit 10–3, the appraiser also must select an appropriate *GIM* for the subject property. This is done by observing the range in *GIM*s for the comparable properties, as shown in Exhibit 10–3. Rather than simply averaging the *GIM*s in the table, the appraiser would normally give more or less weight to a particular comparable when choosing a rate to apply to the subject property. For example, the appraiser may believe that of the three comparable properties, the first one should be given the most weight because it was the most recent sale. Thus, the appraiser might believe that the *GIM* for the subject should be closer to that of property one, than the GIM obtained for the second and the third comparable properties. The experience and judgment of the appraiser are important parts of this process. In this case, assuming that the appraiser chooses a *GIM* of six times as "appropriate" for the subject property, its indicated value would be $59,185 \times 6$ or $355,110.

Capitalization Rate

In cases where it is suspected that differences in operating expenses exist between comparables, the focus of the analysis should be shifted from gross income multipliers to *net operating income* (*NOI*). Additional information that may be used in this analysis and definitions of common income and expense items are summarized in Exhibit 10–4. This information centers on aspects of the net operating income-producing capability of the subject property and the three properties selected as comparables from market transactions data.

As shown in Exhibit 10–4, the price, rent, and operating expense ratios for the three comparable properties have been obtained from brokers who were involved in the sale of the comparable properties. (Data were obtained by the broker who obtained permission from the the buyer and the seller of the comparable properties to provide it to the appraiser.) In each case, the **net operating income (NOI)** was obtained by subtracting operating expenses from rents reported on the comparables at the time of sale. The reader should note the definitions used to identify all items of rent, income, and expenses in Exhibit 10–5. After determining the *NOI*, it is then divided by the transaction price to obtain what is defined in the industry as the **capitalization rate** (sometimes referred to as the *cap rate* and designated as *R*) for the three comparable properties. This method is referred to as the **direct capitalization method.** Note that the cap rates, or *R*s, for the three comparables range from .094 to .099.

Given that the *NOI* for the subject property is $366,000, we would like to determine its value using the following relationship:

$$\text{Value} = NOI \div R$$

By substituting $366,000 for *NOI* for our subject property and dividing by an *estimate* of *R* which we obtain from the comparable sales data, we hope to estimate the value for the office building that we are analyzing. The question is, which *R* should be selected from which comparable sale? Should we select an average of three *R*s, or put more weight on some of the comparables than others?

The best procedure to follow at this point is to choose an *R* based on a careful reexamination of the data in Exhibit 10–4 to determine the comparables that are *most* like the subject property. To complete this example, we see that cap rates for the three comparables range between .094 and .099. Assuming that comparable (2) is most similar and a slightly higher cap rate of .095 is chosen, the value for our subject may be estimated as follows:

$$\begin{aligned}\text{Subject property value} &= \$366{,}000 \div .095 \\ &= \$3{,}852{,}631 \text{ or } \$3{,}853{,}000 \text{ (rounded)}\end{aligned}$$

EXHIBIT 10–4
Income, Expense, and Price Relationships

	Subject Property	Comparable Properties		
		1	2	3
Price	?	$3,078,000	$3,764,000	$4,112,000
Effective gross income	$600,000	503,000	610,000	690,000
% operating expense	39%	40%	42%	41%
NOI	366,000	301,600	353,800	407,100
NOI ÷ Price = (*R*)	?	.098	.094	.099

Definitions of Common Income and Expense Items

Rental Income at Full Occupancy. An estimate of revenues expected to be received from existing tenants based on lease terms plus any vacant space priced at market rents.

\+ **Other Income.** Examples may include revenues from parking, laundry and cable TV fees, application fees, net deposits, and so on.

= **Potential Gross Income (PGI).** Total cash flow possible from all sources and activities relative to the property ownership.

– **Vacancy and Collection Losses.** Estimated rent losses from unoccupied space or due to unpaid rents and losses from other sources.

= **Effective Gross Income (EGI).** All sources of potential income less vacancy and collection losses.

– **Real Estate Taxes.** Based on assessed value by the county and/or other tax assessing entities.

– **Insurance.** Property owners usually provide for insurance on the premises (building, parking lots, etc.) for property damage and for personal injury.

– **Utilities.** Cost of electric, water, and so on, that may be paid in full or part by property owners, depending on lease terms.

– **Repair and Maintenance.** Estimates of cash outlays for recurring items expected to be replaced within three years or less of economic use.

– **Salaries.** On-site employees who maintain, "make ready," and repair the property.

– **Administrative and General.** Allocations of costs for personnel and expenses from an off-site activity. That is, a real estate company with many properties under its ownership may allocate a percentage of certain costs (e.g., human resources, payroll, accounting) to the operating expenses of its individual properties.

– **Management and Leasing Expenses.** Supervisory on-site management employees who lease, collect rents, pay expenses, and so on. These may be the employees of the property owner or include payment by the property owner for services outsourced to other companies who specialize in property management and leasing and earn fees and commissions.

– **CAPEX/Improve Allowance.** An average annual estimate of cost of tenant improvements and expected outlays for replacement of capital items that are recurring but have a useful life less than that of the entire building improvement.

= **(*NOI*) Net Operating Income.** An annual estimate of the net operating income resulting from the compilation of all of the above items.

Further Interpretation—Application and Limitations

Essentially, this method uses income and expense data from current sales comparisons as market *benchmarks*. This only assures that if a price of $3,853,000 is paid for the subject property, this price appears to be reasonable, or "in line" with prices currently being paid for comparable properties. In this case, buyers of properties should not expect to pay less and sellers should not expect to receive more than this estimated market price. It should be stressed, however, that this approach to valuation *does not assure that this property will be a good investment if purchased.* It only assures the buyer that it is a competitive

Allowances for Leasing Commissions, Tenant Improvements, and Capital Items

Concept Box 10.1

When developing pro forma statements of cash flow, certain cash outlays must be reflected in the statements that are not coincident with the regular operating cycle* of a property. Even though these outlays are not *operating* expenses, they should be included in cash flow projections.

LEASING COMMISSIONS

As tenants vacate space and leases expire, property owners may engage brokers for marketing, providing property tours, and identifying potential tenants. Estimates of commissions for these brokerage services may vary from year to year, depending on tenant turnover. Estimates of such turnover and related expenses, which may be substantial, should be made in projections each year.

*An operating cycle for income-producing real estate is usually one year. During this time, rents are usually received and operating expenses paid monthly. Although certain expenses, such as insurance, property taxes, payments on maintenance contracts, and so on may not be paid monthly, all are usually paid within one year.

market price and that if the method is applied correctly, the buyer is probably not overpaying or underpaying for the property relative to what other investors have paid for similar properties. The question of *whether or not it is a good investment will depend on the future growth in rents, income, and property values.* These aspects are not specifically considered as a part of this or the gross income multiplier technique and, therefore, no conclusions can be drawn as to the *investment potential* of this property. That must be determined by estimating the future course of the economic base in the market in which the property is located—the leases, rents, expenses, major repairs, and so on. We will consider these factors when we address *investment analysis* in the next chapter.

EXHIBIT 10–5
Pro Forma Statement of Cash Flow—Subject Property

Rental Income		$615,000
Add: Other Income		20,000
Potential Gross Income		$635,000
Less: Vacancy and Collection Loss (5%)		$ 35,000
Effective Gross Income		$600,000
Less: Operating Expenses		
Real Estate Taxes		40,000
Insurance	15,000	
Utilities	30,000	
Repair/Maintenance	20,000	
Administrative	20,000	
Management/Leasing Commissions*	30,000	
Salaries	20,000	
Total Operating Expenses	175,000	
CAPEX/Improve Allowance*	59,000	234,000
Net Operating Income (*NOI*)		$366,000

*The reader should be aware that, in practice, there is considerable nonuniformity in how certain expenses are treated in the determination of *NOI*. This is particularly true for (1) *leasing commissions*, (2) allowances for *tenant improvements*, and (3) *major capital outlays* for items that may have a shorter useful life (e.g., 3–5 years) than the economic life of the property improvement (e.g., 50 years or more). These items can be material in amount and may vary considerably from year to year. Inconsistencies will depend whether or not these items are included in the determination of *NOI*. The choice of treatment may have a material effect on the estimate of property value because the level of *NOI* will be affected. Therefore, when valuing a property, the reader should always carefully review how these items were treated in determining *NOI* for the subject property and for all comparables used in the analysis. In our example, when determining *NOI*, we included these items. Leasing commissions, which are estimated based on lease maturities and turnover rates, were included as part of the $30,000 shown as management and leasing expenses. Also, we included outlays for tenant improvements (also based on lease expiration rates and tenant turnover) and expected capital expenditures in the $59,000 amount shown for CAPEX/Improve Allowance. For a detailed discussion, see Concept Box 10.1.

TENANT IMPROVEMENTS

Property owners usually negotiate an *allowance* with tenants toward the cost of making space ready for occupancy. Typically tenants must construct cubicles, wall partitions, carpet, and so on, before occupancy. Generally, the property owner will negotiate a specific dollar allowance toward the cost of these improvements with the tenant. As is the case for leasing commissions, tenant improvement costs may be material and will vary from year to year depending on lease turnover-renewal rates. In some cases, even when existing tenants renew leases, an amount may be negotiated for some improvements to "update" the leased space.

CAPITAL EXPENDITURE ALLOWANCE

Includes expenditures for *recurring* replacement of items such as hot water heaters, countertops, electric lighting fixtures, and so on. Major expenditures of *nonrecurring* nature would include replacement of roofs, HVAC, parking lots, and so on.

Capitalization Rates—A Note of Caution

The above discussion of direct capitalization that concerns the relationship between value and *NOI* and cap rates derived from comparable sales is an important one. However, it must be stressed that when direct capitalization is used, properties chosen as comparables must be *truly comparable* to, and/or competitive with, the property under consideration for investment. The term *comparability* means very similar in quality, construction, size, age, functionality, location, and operating efficiency. It also means the properties are comparable in terms of lease maturities, lease options, rent escalators, and any other major lease attributes such as easements, title restrictions, and so on. While these attributes may be similar for many property investments, they may not be for many other investments. An example of the importance of the latter might be two office properties that have sold at the same time and that are locationally and functionally comparable. However, one office property may be leased by *four* tenants on a long-term lease basis with many lease options, and the other property may be leased to 30 small tenants with shorter-term average lease maturities and with many other different lease characteristics. It may be possible that the *NOI*s for the two properties were similar when they were sold. However, because of the differences in the *leases* and *attendant risk*, the prices for both, and therefore the cap rates, should be different. This also means that if an investor chooses to develop a cap rate (R) based on these two sales to use in pricing a property being considered for purchase, many adjustments will have to be made to reflect differences in the leases, in addition to any additional differences in physical, locational, and other attributes among the comparables. Making such adjustments is not always easy. As a result, assigning the correct cap rate is difficult and an incorrect one could result in a serious pricing error.

Another area of caution has to do with the treatment of nonrecurring outlays for any necessary replacement of building components that are of a nonoperating nature. Other items such as tenant improvements and commissions should also be accounted for. When making estimates of value based on the *NOI* obtained from the sales of comparable properties, the reader *must* determine whether or not, or how, outlays for tenant improvements and capital requirements were included in the data. *Industry practice varies on this issue.* Many appraisers estimate an *annual average outlay* for such items and adjust *NOI* downward by deducting such outlays much like an annual expense. In cases where properties are *highly comparable*, this practice may not materially affect the

estimate of value as long as its treatment is consistent for all properties being used in the analysis. However, when properties used in this approach are somewhat dissimilar in that material differences in outlays of a nonrecurring nature are expected, then the reader must make adjustments for such items. If such adjustments are believed to be material and difficult to make, then this generally implies that the properties in question may really not be that comparable. Therefore, the results of this approach should be interpreted with caution.

When is it appropriate to use direct capitalization? Cap rates are important market benchmarks that are widely used in the real estate industry. However, it should be stressed again that estimating a property's value on a forecast of *NOI* for only one year and applying a cap rate generated from data collected on the sales of comparable properties can prove to be problematic.

Discounted Cash Flow Techniques

The **discounted cash flow method**, the final income capitalization technique, is based on the principle that investors will pay no more for a property than the present value of all *future NOIs*. Finding the value for a property that is expected to produce income over a very long economic life requires many assumptions and in-depth knowledge of discounted cash flow techniques and *approximations* that make finding present values over long economic lives manageable. It is also necessary to understand the assumptions underlying present value mechanics when such approximations are used. For these reasons, most professionals who value properties prefer to use direct capitalization or one of the sales comparison approaches when possible. However, this method is used by professionals when necessary. To illustrate this method, we use an apartment example. Our forecast of *NOI* is made for a time period during which we can foresee any material change in market supply or demand conditions that could affect rents. In short, we want to forecast and analyze cash flow over a period for which we have knowledge regarding existing tenants, lease terms, and supply and demand market conditions.

Forecasting NOI

Based on our knowledge of market supply and demand, lease terms, as well as income and expenses, we have made a forecast for the Hypothetical Hills apartment complex. We believe that a forecast for a 10-year period is appropriate and this forecast is shown in Exhibit 10–6. We believe that because Hypothetical Hills is relatively new and unique in terms of both location and design, there are very few comparable properties that have been sold recently with which to compare it. Therefore, the sales comparison method described in the preceding section may not produce a reliable estimate of value. In our forecast, we believe that vacancy rates for Hypothetical Hills will remain below average relative to other apartment properties. Furthermore, the sales comparison method would probably not be useful because our estimate that cash flows are expected to grow at an *above-average* rate ranging from 5 percent to 3 percent for the first eight years is not characteristic of growth expected for other apartment investment opportunities. *NOI* will then stabilize at

EXHIBIT 10–6
Ten-Year *NOI* Forecast, Hypothetical Hills Apartments

Year	*NOI*	% Growth	Year	*NOI*	% Growth
1	$338,800	—	6	$416,127	3%
2	355,740	5%	7	428,611	3
3	373,527	5	8	441,469	3
4	388,468	4	9	450,299	2
5	404,007	4	10	459,304	2

a long-term rate of about 2 percent in year 9 and thereafter. We also believe that this 2 percent growth rate will eventually become consistent with long-run supply and demand conditions and those for competing apartment projects. Based on our forecast of cash flows and knowledge of market conditions, we conclude that other apartment properties are not as comparable as would be desired in order to use the sales comparison method.

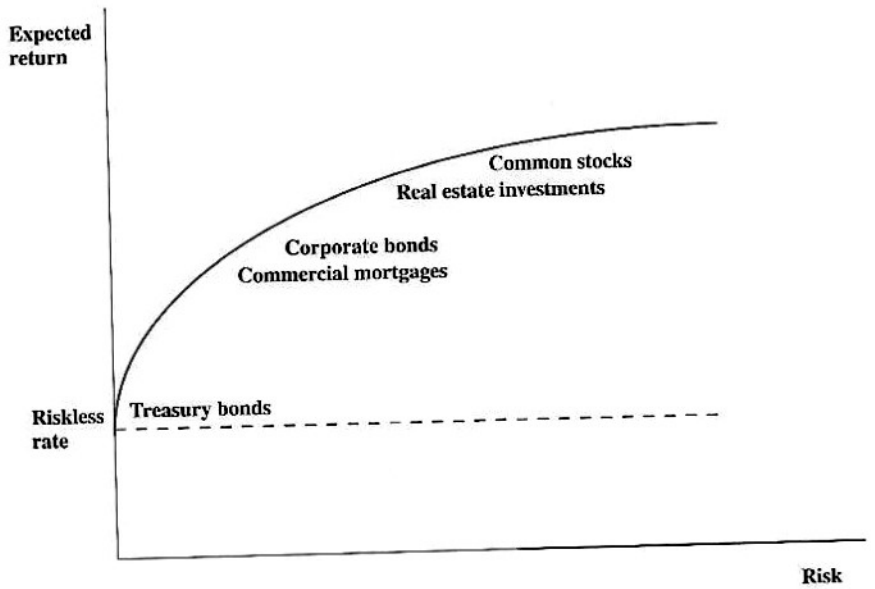
Expected Future Capital Improvements

In the case of Hypothetical Hills, we do not expect any nonrecurring capital outlays during the forecast period.

Selection of a Discount Rate (r)

After estimating *NOI* over an expected period of analysis in the preceding section, step 3 in the present value approach to income capitalization requires the selection of a **discount rate** or **required internal rate of return** (r) over the investment period. Conceptually, this discount rate should be thought of as a required return for a real estate investment based on its risk when compared with returns earned on competing investments and other capital market benchmarks. For example, if the period of analysis is 10 years for our prospective real estate investment, the discount rate selected should be greater than (1) the interest rate on a 10-year U.S. Treasury bond, (2) the interest rate on a 10-year commercial mortgage loan, and (3) the weighted average of corporate bond rates, or the borrowing rates for tenants in the property being evaluated.[1] A risk premium for real estate ownership and its attendant risks related to operation and disposition should also be included to arrive at a reasonable discount rate. Exhibit 10–7 depicts the above discussion conceptually in terms of expected returns relative to the risk that may be expected on different asset classes.

EXHIBIT 10–7
Risk and Return Trade-Off by Type of Investment



[1] This is because when properties are leased, tenants are, in a sense, substituting lease obligations created by renting for loans that would be used if tenants chose to build and finance properties using bank debt. Therefore, in addition to credit risks, because real estate investors take the added risk associated with operating real estate, they should earn a return greater than the interest rate that tenants would otherwise pay on mortgage debt. If real estate investors could not earn more than this rate, real estate investors would be better off being lenders and making loans to tenants.

In the case of income-producing real estate, the diagram indicates that expected returns should be above expected returns for Treasury bonds, commercial mortgages, and corporate bonds, but below expected returns on riskier common stocks. It should be stressed, however, that this conceptualization depicts the average returns for all income-producing real estate as a sector. Risk on individual properties may be higher or lower than risk relative to the "average" property; therefore, expected returns on individual properties may be greater or less than this average. In our example, after considering the risk on other competing properties, we have selected 12 percent as the internal rate of return that we should expect to earn if we invest in Hypothetical Hills.

Thus far, we have completed three of the *four* steps that we need in order to estimate present value, that is

1. A forecast of *NOI*.
2. Selection of a relevant period of analysis, or the **holding period**, for the investment.
3. Selection of a discount rate or required rate of return (r) for the period selected in (2).

In the fourth step, we must deal with the present value of expected *NOI beyond the 10-year period* of analysis. We will represent these cash flows with a **reversion value** (*REV*), or *resale price*. Returning to our estimate of cash flow in Exhibit 10–6, note that we have estimated that *NOI* will *stabilize* from year 9 and beyond at a rate of 2 percent per year. In our example, we assume that the property value or *REV* will be established at the end of year 9. As you will see, this will require a cash flow forecast beginning in year 10 and a long-term growth assumption from that point until the end of the economic life of the property. In making this estimate for *REV*, we make the following major assumptions:

1. The demand for apartments in this market region will tend to grow in a stable, long-term relationship with growth in the U.S. economy.
2. There will be no *major* or *structural* changes in the determinants of supply and/or demand for apartments from year 10 and thereafter.

If these assumptions cannot be made, a year-by-year forecast of *NOI* beyond year 10 must be made until a period of stability is expected to be reached.

Using Approximations to Estimate Reversion Values

At this point, the reader is probably wondering how the value for *REV* will be estimated at the end of year 9, particularly for an asset such as Hypothetical Hills, a new apartment community that is expected to have a long economic life, perhaps 50 years or more. Following are three techniques that are used frequently to do this.

(A) Estimating REV by Developing a Terminal Cap Rate Based on Required Rate of Return (r) and Expected Growth in Long-Term Cash Flows (g) Clearly, forecasting cash flows each year from year 10 through 50 would not be practical. One approach that could be used is to *approximate* the present value of cash flow for the remaining economic life of the asset by using a **terminal cap rate** (R_T). This approach may be used only under very restrictive assumptions regarding the pattern of cash flow that is expected from the end of the holding period through the end of the useful life of the asset and its relationship to the *required rate of return* (r) that investors expect to earn over the entire period of investment. These are

Case 1: $R_T = (r - g)$ when average *long-run growth* (g) in *NOI* is expected to be *positive.*

Case 2: $R_T = (r)$ when *long-run growth* (g) in *NOI* is expected to be level or zero.

Case 3: $R_T = (r + g)$ when average *long-run growth* (g) in *NOI* is expected to be negative or to decline.

Depending on the long-run scenario chosen for the remaining economic life *after* the holding period, an estimate for g must be selected in order to estimate *REV*. In our case, we have estimated that from *year 10 until the end of the economic life, NOI* will tend toward an average growth rate (g) of 2 percent per year. Based on this set of assumptions, the reversion value (*REV*) for Hypothetical Hills at the end of year 9, based on a 10-year projection period, can be approximated as follows:

$$REV_9 = (NOI_{10}) \div (r - g)$$

This means that the estimated resale price or reversion value REV_9 is equal to *NOI* in year 10, which is shown in Exhibit 10–6 as $459,304 divided by r, which is the 12 percent discount rate or required rate of return that we have selected, minus the stabilized or long-term expected growth rate in cash flow, designated as g, or 2 percent. The relationship $(r - g)$ in period 9 is also referred to by industry practitioners as a *terminal* capitalization rate, designated as R_T.

$$REV_9 = NOI_{10} \div (R_T) \qquad \text{Note: } R_T = (r - g)$$
$$REV_9 = \$459{,}304 \div (.12 - .02) \qquad R_T = .10$$
$$REV_9 = \$459{,}304 \div .10, \text{ or}$$
$$REV_9 = \$4{,}593{,}040$$

Now that we have estimated the reversion value in year 9, or REV_9, which is the present value of expected cash flows from year 10 through the end of the expected economic life of the property, we can now estimate the present value for the property over its *entire economic life* beginning in year 1, as shown in Exhibit 10–8.

To summarize, the present value (*PV*) of estimated cash flows for this property can be illustrated as

$$PV = PVNOI + PVREV$$
$$PV = 2{,}073{,}475 + 1{,}656{,}296$$
$$PV = \$3{,}729{,}771$$

This exercise completes our analysis, which, based on our assumptions, yields a present value, or property value *today*, of $3,729,771 for Hypothetical Hills. If an investor were to

EXHIBIT 10–8
Final Calculation of Present Value for Hypothetical Hills Apartments

End of Year	(a) *NOI*	(b) *PVNOI* @ 12%	(c) *REV*	(d) *PVREV* @ 12%	(e) (*b* + *d*) Total *PV*
1	$338,800	$302,500			$ 302,500
2	355,740	283,594			283,594
3	373,527	265,869			265,869
4	388,468	246,878			246,878
5	404,007	229,244			229,244
6	416,127	210,823			210,823
7	428,611	193,882			193,882
8	441,469	178,302			178,302
9	450,299	162,382	$4,593,040*	$1,656,296	1,818,676†
Note: *PV* of *NOI* Σ2,073,475 + *PV* of *REV* $1,656,296					= $ 3,729,771

*Calculated as $450,299 × 1.02 = $459,304, and $459,304 ÷ .10 = $4,593,040.
†In year 9, *NOI* of $450,299 and *REV* of $4,593,040 when discounted at 12% produce $1,818,676.

pay this price for the property and own it for nine years and then sell it for $4,593,040, she would earn an *IRR* of 12 percent on the initial investment of $3,729,771. We should again point out that using the *terminal cap rate* of R_T, or .10, produces an REV_9 of $4,593,040. This result is heavily dependent on the *NOI* continuing to grow at 2 percent per year from years 10 through 50, discounted at 12 percent.

(B) Estimating REV with a Terminal Cap Rate from Sales of Older "Comparable" Properties This second approach is based on the concept that over time, as properties age and depreciate, the production of income declines; therefore, the expected growth in *NOI* for an older property should be less than that of a new property. This also means that, *holding all else constant,* when compared to newly developed properties, a property that is 10 years old should sell for a lower price relative to its *NOI* (higher cap rate) than a new one (lower cap rate). *An analyst may be able to verify today that this is the case by comparing cap rates from the sale of older properties with cap rates on newer properties.* Holding all else constant, the current difference between cap rates on older properties and newer properties should reflect differences in the amount of economic depreciation, and therefore lower rents and income, that will occur in the future.

Referring again to our Hypothetical Hills example, recall that when we made our estimates of cash flows in Exhibit 10–6, we recognized that because of its somewhat unique attributes, the expected growth for Hypothetical Hills would be significantly higher than that of other properties for the first eight years. After that period, *NOI* would be expected to take on a long-run growth rate of about 2 percent. In other words, when making these estimates of *NOI,* we recognize that Hypothetical Hills will not be able to sustain above-normal growth relative to its competition forever. This is because (1) more competing properties are likley to be developed, thereby increasing supply and reducing the ability of Hypothetical Hills to earn rent premiums and (2) Hypothetical Hills will be older and its functions and style are likely to become somewhat obsolete and its ability to produce rent growth will be diminished. As a result, its uniqueness relative to the competition may also diminish. Recognizing this likelihood, the analyst may choose to estimate the terminal cap rate for Hypothetical Hills directly by adjusting the going-in cap rate upward based on sales data for properties that are *now 10 years old, that are likely to be representative of how Hypothetical Hills will compete in the apartment market 10 years from now.* Below, we show data from the sale of three properties that are very comparable to Hypothetical Hills in every way except that these properties are *10 years older.* From these sales data, we can calculate cap rates from the sale price and *NOI* for these properties and consider them as a possible input for estimating the terminal cap rate for Hypothetical Hills.

	Sales of Otherwise Comparable Properties 10 Years Older than Hypothetical Hills		
	Comparable 1	Comparable 2	Comparable 3
Current *NOI*	$400,000	$425,000	$450,000
Current Sale Price	$4,000,000	$4,100,000	$4,300,000
Current Cap Rate (*R*)	0.100	0.104	0.105

Based on this information, sales indicate current cap rates ranging from .10 to .105. If the analyst, after reviewing all available data on sales of these older properties, *chooses* a "terminal" cap rate of .1025 as an indicative terminal cap rate for Hypothetical Hills, then the terminal cap rate to be used in estimating the reversion value (*REV*) would be

$$NOI_{10} \div \text{Terminal cap rate} = REV$$
$$\$459{,}304 \div .1025 = \$4{,}481{,}014$$

Using a cap rate based on comparable sales of older properties for estimating *REV* in year 10 for Hypothetical Hills produces a *reversion value* of $4,481,014. When we find the discounted present value for *REV* in our analysis, we obtain $1,615,899. We can then calculate the *present value* of all cash flows as

$$PV_0 = PVNOI + PVREV_n$$
$$PV_0 = \$2{,}073{,}475 + \$4{,}481{,}014\left(\frac{1}{1+.12}\right)^9$$
$$PV_0 = \$2{,}073{,}475 + \$1{,}615{,}899$$
$$PV_0 = \$3{,}689{,}374$$

Using this approach to estimating the terminal value for Hypothetical Hills, we estimate the present value for the property today to be $3,689,374.

Obviously, the major assumption being made is that conditions currently affecting the pricing of older properties relative to Hypothetical Hills today will generally be the same when Hypothetical Hills is sold nine years from now. If this is the case, then the terminal cap rate for Hypothetical Hills should be the same as current cap rates for older, otherwise comparable properties being sold in the marketplace at the present time. While making such an assumption is very problematic, one general principle follows from this example. This principle is that, holding all else constant, as a property loses its capacity to produce income as it ages, the "terminal" cap rate used to value a specific property should *generally* be *greater* than its **going-in cap rate.** (The going-in cap rate can be defined as the ratio of the first-year *NOI* to the current value.) In the above example, the going-in cap rate is $338,800/$3,689,374, or 9.18 percent. This is lower than the 10.25 percent terminal cap rate. To assume that significantly lower or higher terminal cap rates will exist for properties 10 years from now generally implies that (1) a general, exogenous economic influence or event (inflation, change in interest rates, risk premiums, etc.) will occur, *thereby affecting all property values* or (2) a more specific event will affect the value of the subject property relative to other properties (e.g., a major loss of employment in the submarket in which the subject property is located). In such cases, the analyst would have to justify and incorporate these changes in the analysis. Clearly, these assumptions should be considered carefully by an investor relying on this approach to value.

While the above discussion may be helpful to you in understanding terminal cap rates, this approach will only hold when other major influences affecting the value of properties, such as investor expectations regarding interest rates, economic growth, and so on, are not expected to change. If, at the time a property is being valued, investors expect interest rates, economic growth, rents, risk, and so on, to change for all properties, then these changes also must be included in the analysis. Therefore, it may be possible that, when combined with such economic changes, terminal cap rates may be *greater or less than* those indicated by older properties that have recently sold. We will address the combined effects of such influences later in this chapter.

(C) Estimating the Resale Price Based on an Expected Change in Property Values An alternative that is sometimes used in *lieu of using a terminal cap rate* (R_T) to estimate the resale price of a property is to simply assume that *property values* will change at a specified compound rate of increase or decrease each year. If, for example, we estimate that the long-run value of a property and its *net operating income* will increase by 2 percent per year, we can estimate the value of the property based on this assumption using the information below. Recall from Exhibits 10–6 and 10–8 that, based on our desired return of 12 percent, the present value of *NOI* over nine years for our property is expected to be $2,073,475. Using a more direct approach to determining *REV,* we use this information

combined with an algebraic manipulation to determine the present value (*PV*) of the property as follows:

$$PV_0 = PVNOI + PVREV_n$$
$$PV_0 = \$2{,}073{,}475 + REV_n$$

Using this approach for value, we must estimate PV_0 and REV_n simultaneously. This must be done because both values, that is, the *current property value* PV_0 *and the future property value* (REV_n), *are unknown.* However, based on this approach, we are assuming that whatever the property value is at the present time, it will appreciate at an annual rate of (g) during the next nine years. Therefore, $REV_n = PV_0(1 + g)^n$. *In other words, we are saying that, instead of using a terminal cap rate, REV at the end of year 9 will simply be whatever the value of the property is today* (PV_0) *compounded at an expected appreciation rate of* (g). Previously, we have assumed that the long-run growth rate (g) will be 2 percent. Using 2 percent as the appreciation rate, we have

$$REV_n = PV_0(1 + g)^n$$
then $$REV_n = PV_0(1 + .02)^9$$
and $$REV_n = PV_0(1.195093)$$

This simply states that *REV* in period (n) will be whatever the present value of the property is today, PV_0, compounded at a long-term growth rate of 2 percent annually for the next nine years. However, because we do not know *PV* today, we also do not know *REV* in year 9. However, if we assume that *PV* will appreciate at 2 percent per year, then the property will be 1.195093 greater in value than it is today. Using 12 percent as the discount rate of return and some simple algebra, we now can solve for *PV, REV,* and *PVREV* as follows:

$$PV_0 = PVNOI + PVREV_n$$
$$PV_0 = \$2{,}073{,}475 + PV_0(1 + g)^n \left(\frac{1}{1 + .12}\right)^n$$
$$PV_0 = \$2{,}073{,}475 + PV_0(1.02)^9 \left(\frac{1}{1 + .12}\right)^9$$
$$PV_0 = \$2{,}073{,}475 + PV(1.195093) \left(\frac{1}{1.12}\right)^9$$
$$PV_0 = \$2{,}073{,}475 + PV(1.195093)(.360610)$$
$$PV_0 = \$2{,}073{,}475 + PV(.430962)$$
$$.569038\, PV_0 = \$2{,}073{,}475$$
$$PV_0 = \$3{,}643{,}825$$

This calculation provides a present value, or estimated property value, of $3,643,825. Also, since we assume that *REV* will be equal to the present value, or today's value, compounded at 2 percent per year for nine years, then *REV* in year 9 must be today's value compounded at 2 percent for nine years, or $\$3{,}643{,}825(1.02)^9 = \$4{,}354{,}708$. We can now "prove" our approach as follows:

$$PV_0 = PVNOI + PVREV_n$$
$$PV = \$2{,}073{,}475 + \$4{,}354{,}708\frac{1}{(1 + .12)^9}$$
$$PV = \$3{,}643{,}826$$

In summary, if we believe that (1) we will receive *NOI* from Hypothetical Hills as shown in Exhibit 10–8 each year in years 1–9, (2) the sale price (*REV*) at the end of year 9 will be equal to whatever the value of the property is today compounded at an appreciation rate of 2 percent, and (3) the desired rate of return is 12 percent, then the present value or the value of the property today will be $3,643,826.

Reconciliation of Estimates of REV and Present Value

We have provided three approaches to estimating *REV* for Hypothetical Hills, summarized as follows:

Method Used to Estimate *REV*	Estimated *REV* at the End of Year 9	Present Value of Property	Implied Going-In Capitalization Rate
A. Use terminal cap rate based on an assumed required return (*n*) and long term (*g*)	$4,593,040	$3,729,771	.098
B. Use terminal cap rate based on cap rates from sale of older "comparables"	4,481,014	3,689,374	.099
C. Use expected appreciation in property value	4,354,708	3,643,826	.100

In summary, the three approaches that we have developed to estimate *REV* and resultant *PV* are compared above. Obviously, the reader should be aware that many assumptions have been made in the analysis. Nonetheless, when making estimates of property values using the discounted present value approach, these approaches provide both conceptual frameworks and techniques that may be useful. As we have shown, various estimates should be tried to ascertain whether or not convergence in the estimates of property value occurs. If not, the analyst should re-examine the assumptions and review the methods applied for logical consistency.

In addition to the range in values that were calculated based on the three approaches to estimating the property value (PV), we have added a column showing the implied going-in cap rates for our Hypothetical Property. Recall that the first year NOI was $366,000 and when divided by the three estimates of PV, we obtain implied cap rates of .098, .099 and .100, respectively. We use the term *implied* because they are based on future income and property values, not current income and current transaction prices. We carry out these calculations to reconcile our estimates with transactions occurring in the market to the extent possible to determine whether our range in values is reasonable. For example, even though we used the discounted present value approach here, we can compare these implied going-in cap rates to determine how they compare with actual transactions currently occurring in the market. This process helps us to decide the extent to which there is market validation for our estimates based on discounted cash flows. Our results can be compared with the range in cap rates displayed in Exhibit 10-4. (The reader may now be asking why we don't use the direct capitalization method and omit the discounted cash flow method altogether. The reason is that this method provides us with another "check" on value using *future* income and *future* property values. Results shown corresponded to *current* property values that are based on *current* transactions. We should add that we may also use other comparisons such as gross income multipliers, price per square foot, etc. which helps us decide whether, or not, our values are reasonable.)

Land Values: Highest and Best Use Analysis

In this section, we raise the question, "What determines land values?" What causes land prices to move up and down? There is a framework underlying the process that should help us to better understand land markets and their relationship to supply, demand, vacancies,

and rents. To illustrate, we consider an example of a new office building on a site that is expected to produce *NOI* of $500,000 for the coming operating year. The improvements are expected to last for 75 years, *NOI* is expected to *grow* each year by 3 percent and investors expect an *IRR* of 13 percent. We would value the property as

$$PV = \frac{NOI_1}{r - g} \text{ or } \frac{NOI_1}{R}$$

$$PV = \frac{\$500{,}000}{.13 - .03} \text{ or } \frac{\$500{,}000}{0.10}$$

$$PV = \$5{,}000{,}000$$

In our example, an office building on the site would produce $500,000 in year 1 and grow at 3 percent (g) per year thereafter. Investors in similar office buildings are expecting 13 percent (r) on their total investment and/or comparable office buildings are trading based on cap rates (R) of 10 percent, thereby producing a present value of $5,000,000. Now *assuming that this new building would cost $4,000,000 to construct,* the implied, or residual, land value would be $5,000,000 – $4,000,000, or $1,000,000. The idea here is that the **residual land value** is the difference between the total property value, which is driven by rents and cash flows, and the cost of constructing an improvement on a given site.

Volatility in Land Prices

It may be useful to introduce at this point the causes of land price volatility. Many readers can probably relate to times when land prices in certain areas increase suddenly, and then subside and perhaps increase again. One observation may be that it is simply investor speculation causing such price fluctuations. While this may be the case from time to time, it is more likely that a fundamental change in a location has occurred, or is expected to occur, thereby changing one of the variables in our present value equation. To illustrate, we return to our office property example discussed earlier and two alternative scenarios for expected *NOI*.

Recall that expected *NOI* for our office property was $500,000 and the land value was $1,000,000. Now assume that because of unanticipated demand, our initial estimate of rents and, hence, *NOI* increases by 10 percent to $550,000. Holding all else constant, the total property value would rise to $5,500,000. However, building construction costs would be unaffected in the short run and remain at $4,000,000, thereby producing a land value of $1,500,000. The latter value represents a 50 percent increase in land value given only a 10 percent increase in the expected *NOI*. Conversely, if *NOI* was initially overestimated and declined to $450,000, then the value would fall to $4,500,000 and cause land value to drop by 50 percent. Similarly, if in addition to the difference in initial *NOI*, other changes in our present value equation were to occur (such as higher or lower growth rates, g), the resultant effect on land value could be more pronounced. These changes in expected *NOI* and/or expected values for r and/or g are the basic causes of volatility in land prices.

"Highest and Best Use" Analysis—Vacant Site

One additional use of the land residual method of valuation is to establish the type of property improvement that should be developed on the land. In our example, we used an office project; however, would the land be better used for a retail, warehouse, or apartment project? The answer lies in determining what use will provide the *highest total land value.* This analysis is also called the **highest and best use** of the land. For example, in Exhibit 10–9, we provide estimates of *NOI* for each property type that *could* be constructed on the Albert tract. We assume that a market study has been conducted, that rents and expenses have been estimated, and that investors must have a rate of return consistent

with the risk associated with the possible uses shown in Exhibit 10–9. Construction costs include labor, materials, architect and engineering fees, and any other costs to develop the building, including a profit to the developer.

The results in Exhibit 10–9 indicate that an apartment project would be the highest and the best use of the Albert tract. Such a development would be expected to produce a total property value of $4,500,000 and an implied land value of $1,500,000. Note that although retail produces a higher total property value ($7,500,000), its construction cost is higher. To develop a retail project and earn the required return, then, a developer would pay no more than $750,000 for the land. In summary, it is the *expected use* of the land and its future income that determine its value. As developers and investors envision what will bring the highest property value, competition for sites and prices paid based on expected site developments will ultimately determine land values. Land value is determined by its highest and best use, which is the use that results in the highest residual land value.

We should also add that a review of recent, undeveloped land sales for parcels of similar size and location may be undertaken to provide evidence that we are making the appropriate analysis. If comparable land sales are occurring for $1,500,000, this would help to validate our analysis.

"Highest and Best Use" Analysis—Improved Property

In the last section, we determined that apartments seemed to be the highest and best use of a *vacant* site. In our example, the apartment scenario produced a residual land value of $1,500,000. This would be the maximum price that a developer would pay for the land if it were vacant. But what if the site was not vacant and there were already improvements on the site? For example, assume that there is an old warehouse on the site that is currently producing *NOI* of $192,000 per year. Because it is older, the *NOI* is expected to increase by only 1 percent per year, and investors currently require a 13 percent rate of return. Based on this information, the value of the old warehouse (land and building) would be $192,000/(.13 − .01) = $1,600,000.

Should the old warehouse be torn down and apartments built? In this case, the answer is that the warehouse should *not* be torn down. An investor would be willing to pay $1,600,000 for the old warehouse, whereas a developer of apartments could only afford to pay $1,500,000 for the land. Thus, the apartment developer would be outbid. The existing building is currently adding $100,000 to the land value that would be lost if the building were to be demolished and the site left vacant.

However, now suppose that, instead of producing *NOI* of $192,000 per year, the warehouse property only produces *NOI* of $168,000. We would now have a value for the warehouse (land and building) of $168,000/(.13 − .01) = $1,400,000. This value is less

EXHIBIT 10–9 Highest and Best Use Analysis—Albert Tract

www.mhhe.com/bf16e

Use	(a) Year 1 *NOI*	(b) $(r - g)$	(c) R	$(a \div c = d)$ Implied Property Value (*PV*)	(e) Construction Cost of Bldg.	$(d) - (e)$ Implied Land Value (Residual)
Office	$500,000	.13 − .03	.10	$5,000,000	$4,000,000	$1,000,000
Retail	600,000	.13 − .05	.08	7,500,000	6,750,000	750,000
Apartment	405,000	.12 − .03	.09	4,500,000	3,000,000	1,500,000
Warehouse	400,000	.10 − .02	.08	5,000,000	4,000,000	1,000,000

than the value of the land if it was vacant and available to be developed. The apartment developer can afford to pay more for the land to develop apartments than an investor could pay for the existing warehouse. One additional consideration is the demolition costs. Since the land is not actually vacant, the developer would have to incur some costs to demolish the existing warehouse. But as long as these costs are less than $100,000, the warehouse should still be demolished. For example, suppose that the demolition costs were $50,000. The developer of apartments could pay $1,500,000 − $50,000, or $1,450,000 for the site. This is still more than the $1,400,000 that could be paid to keep the warehouse.

It should be clear that highest and best use analysis is a very important concept because it is the basis for determining the value of the land and how it will be optimally used. It also provides guidance as to whether existing improvements on the land should be kept or demolished.

Mortgage-Equity Capitalization

In our recent discussion, value was found by discounting the *NOI* and resale proceeds for the property. *The discount rate chosen was a "free and clear" discount rate; that is, it did not consider whether the property was to be financed, for example, or how much debt versus equity was used.* In effect, we discounted the entire income available from the property as though the investor were paying cash for the entire purchase price. We did not consider the possibility of financing and how that income may be split among holders of debt (mortgage lenders) and equity investors. When financing is considered, the discount rate used to value a property subject to debt must be consistent with this assumption; that is, the discount rate must reflect rates of return expected on equity invested. As we will see in Chapter 13, it must reflect the *risk* associated with financial leverage. We now discuss how the value of a property can be estimated by explicitly taking into consideration the requirements of the mortgage lender and equity investor—hence the term **mortgage-equity capitalization.**

This method for estimating value is based on the concept that total property value (*PV*) must be equal to the present value of expected mortgage financing (*M*) and the present value of equity investment (*E*) made by investors. That is,

$$PV = M + E$$

To illustrate, suppose that the *NOI* for a small income property is expected to be $50,000 for the first year. Financing will be based on a 1.2 *DCR* (debt coverage ratio) applied to the first-year *NOI*, will have an 11 percent interest rate, and will be amortized over 20 years with monthly payments. We will see in Chapter 11 that financing for real estate income property is frequently based on a target first-year debt coverage ratio. In our example, the *NOI* will increase 3 percent per year after the first year. The investor expects to hold the property for five years. The resale price is estimated by applying an 11 percent terminal capitalization rate to the sixth year *NOI*. Investors require a 12 percent rate of return on equity (yield rate) for this type of property. Note that the discount rate of 12 percent and terminal capitalization rate of 11 percent imply an average annual compound growth in income after year 5 (for the remaining economic life of the property) of 1 percent per year. This is less than the 3 percent growth assumed for the first five years. As we have discussed, growth rates and capitalization rates can change over time.

We first determine the annual debt service (*DS*) as follows:

$$DS = NOI_1 \div DCR$$
$$DS = \$50{,}000 \div 1.20 = \$41{,}667$$

[illegible] Property Values

Thus far, we have illustrated the *mechanics* or approaches to valuation by using case examples. Investors who are active in real estate valuation and investing must always try to interpret changing market conditions and the effect that these changes are having on cap rates and property values. In other words, as analysts track the sales of properties [illegible]

This equation results in a monthly mortgage payment of $41,667 ÷ 12 = $3,472.22. The amount of the mortgage can be found by discounting the monthly payments at the mortgage rate of 11 percent over the 20-year term. The amount of the mortgage can be thought of as the value of the mortgage (*M*) assuming that 11 percent is the current market rate for the mortgage.

observe that cap rates (*NOI* ÷ *V*) from these transactions may be increasing or decreasing. What does this mean? What causes cap rates to rise and fall? In this section, we introduce certain changes in market conditions and try to interpret the effects of those changes on property values and cap rates.

Scenario 1. Effects of Changes in Going-In Cap Rates in Response to Supply and Demand

To illustrate what effects short-run conditions of excess *supply and demand*, or real market forces, may have on cap rates both in the current time period as well as in future time periods, we consider scenarios relative to a base case. Exhibit 10–10 summarizes these cases. In the base case, we assume that market supply and demand *are currently in balance*, and that long-term growth in rents and *NOI* is expected to be 3 percent and that investors expect returns of $r = 12$ percent. *To simplify the discussion and for purposes of illustration, we are assuming that NOI and cash flows in all examples that follow are equal.* Returning to our discussion, we show *NOI* to be $100,000 in year 1, which is expected to grow at 3 percent per year. At the end of year 5, we show *REV*, which is based on year 6 *NOI*, divided by $(r - g)$, or $115,927 ÷ (.12 − .03) = $1,288,082. Because of the short period of analysis in our example, we do not consider the possible influence of economic depreciation on the terminal cap rate. However, if the period of analysis were longer, or if the analyst believed that economic depreciation would occur, then it should be considered. Note that in panel B, these base case assumptions produce a *present value* of $1,111,111, and a going-in cap

EXHIBIT 10–10 Scenario 1: Short-Run Relationships between Supply and Demand, Investor Returns, and Going-In Cap Rates

Panel A: Market Scenario		Year (1)	(2)	(3)	(4)	(5)	(6)
Base Case: Market in balance, $g = 3\%$	*NOI*	$100,000	$103,000	$106,090	$109,273	$ 112,551	$115,927
	REV					1,288,082	
Case A: *Excess supply*	*NOI*	100,000	100,000	100,000	103,000	106,090	109,273
	REV					1,214,141	
Case B: *Excess demand*	*NOI*	100,000	105,000	110,250	115,762	119,235	122,812
	REV					1,364,578	

Panel B: Expected Result			Commentary
Base Case:	*NOI*	$ 100,000	*Market supply/demand in balance.* Long-term growth in *NOI* = 3% and investor expected return (*r*) = 12%.
	PV @ 12%	$1,111,111	
	Cap rate (*R*)	.090	
Case A:	*NOI*	$ 100,000	*Excess supply* expected for three years. Rents remain flat, and then increase to long-term growth of 3% in year 4 and thereafter. Therefore, property values would be expected to *fall* and cap rates would be expected to *rise* relative to the base case.
	PV @ 12%	$1,054,776	
	Cap rate (*R*)	.095	
Case B:	*NOI*	$ 100,000	*Excess demand* causes *NOI* to rise at above normal growth (5%) for four years. Rents then revert to long-term growth (3%) beginning in year 5 and thereafter. Therefore, property values would be expected to *rise* and cap rates would be expected to *fall* relative to the base case.
	PV @ 12%	$1,166,989	
	Cap rate (*R*)	.086	

rate (R) of .09. This result is consistent with the condition of market equilibrium, or when supply and demand are thought to be in balance. Furthermore, investors have no reason to believe that market imbalances are likely for the foreseeable future. They believe that future growth is expected to produce real increases in *NOI* at the rate of 3 percent per year, and investors in properties such as the one illustrated expect to continue to earn a return of 12 percent. We now consider a change in cap rates brought on by *unexpected changes* that bring on market conditions of excess supply and demand.

In case A, we show the effects of an unexpected change in short-run conditions relative to the base case. This is a condition of *oversupply* which we now expect to last for three years and during which time rents are expected to be flat. Note that *NOI* remains at $100,000 for three years. Then, demand increases and *NOI* resumes a long-run growth pattern of 3 percent per year beginning in year 4. This assumption, in turn, produces the results shown in panel B for case A. Note that under conditions of three years of excess supply (holding all else constant), *present value declines* to $1,054,776 and *cap rates (R) rise* to .095. Obviously, R is now greater than .09 shown in the base case. *In short, conditions of excess supply produce rising cap rates.* Therefore, market conditions should show comparable property values falling because of higher market cap rates.

In case B, we show the effects of an unexpected short-run condition of *excess demand* that lasts for a period of four years, after which supply adjusts and a long-term growth pattern at 3 percent per year is restored. Such a condition could be brought about by a sudden increase in employment in a market, thereby increasing demand relative to supply. Note in panel B, case B, that present value increases to $1,166,989 and *cap rates fall* to .086 relative to results in the base case. Therefore, when demand exceeds supply of available rental space, this tends to reduce cap rates and increase property values.

In summary, the goal of this exercise is to demonstrate the effects of changes in market conditions on property values and cap rates. *Holding all else constant, excess supply tends to drive PV down and cap rates up.* Investors are discounting lower rents and, therefore, future cash flows are brought on by excess supply and are only willing to purchase properties at lower prices and higher cap rates. Conversely, *excess demand tends to drive PV higher and cap rates lower* as investors discount higher than normal cash flows, thereby producing higher property values and lower cap rates.

Scenario 2: Effects of Changes in Capital Market Conditions on "Going-In" Cap Rates

In the previous section, we illustrated the effects of how *real* market influences, that is, the *supply* of new space available for occupancy and the *demand* for such space, affect both property values and capitalization rates. In this section, we use the same base case to illustrate the effects of changes in the market for capital or *financial markets*, primarily through changes in interest rates, on property values and capitalization rates. In Exhibit 10–11, case C, we show the effect of an unanticipated *increase* in long-term interest rates that also causes expected returns (r) to increase from 12 percent to 13 percent. Note that this increase is assumed to occur *holding all else constant.* This means that future rents, *NOI*, and so on, remain unaffected. The results of this increase in interest rates are shown in panel B, where present value declines to $1,000,000 relative to the base case of $1,111,111 and cap rates rise to .10 from .09 in the base case.[2]

In case D, we consider a decrease in interest rates and therefore required returns of 11 percent relative to the 12 percent used in the base case. Again, holding all else constant, property values *rise* ($1,250,000) relative to the base case ($1,111,111) because *NOI*

[2] Of course, in reality, the *exact* effect on present value may be different than what we have depicted. The reader should view this exercise more in terms of *direction of impact*, not in terms of exact dollar magnitudes.

EXHIBIT 10–11 Scenario 2: Relationship between Changes in Interest Rates, Investor Returns, and "Going-In" Cap Rates

Panel A: Market Scenario		Year					
		(1)	(2)	(3)	(4)	(5)	(6)
Base Case:	*NOI*	$100,000	$103,000	$106,090	$109,273	$ 112,551	$115,927
	REV					1,288,082	
Case C: Interest Rates Rise, r = 13%	*NOI*	100,000	103,000	106,090	109,273	112,551	115,927
	REV					1,159,274	
Case D: Interest Rates Fall, r = 11%	*NOI*	100,000	103,000	106,090	109,273	112,551	115,927
	REV					1,449,093	

Panel B: Expected Result			Commentary
Base Case:	*NOI*	$ 100,000	Base case: Market supply/demand in balance. Long-term growth in *NOI* = 3% and investor expected return r = 12%.
	PV @ 12%	$1,111,111	
	Cap rate (*R*)	.09	
Case C:	*NOI*	$ 100,000	Relative to the base case, property values *decline* because of a higher discount rate (13%) and cap rates rise.
	PV @ 13%	$1,000,000	
	Cap rate (*R*)	.10	
Case D:	*NOI*	$ 100,000	Relative to the base case, property values rise because of lower discount rates (11%) and cap rates *fall*.
	PV @ 11%	$1,250,000	
	Cap rate (*R*)	.08	

remains the same, while investors' expected returns fall to 11 percent. Also, cap rates fall from .09 in the base case to .08.

The conclusions to be drawn here are that, holding all else constant, *rising* interest rates generally result in higher required returns (r) and higher cap rates. This, in turn, results in lower property values than would otherwise be the case if interest rates had not changed. Conversely, when interest rates *decline*, required returns also decline and property values rise. This tends to produce *lower cap rates*.

Scenario 3: Effects of Combining: (1) Changes in Capital Market Conditions and (2) Supply-Demand Influences on Going-In Cap Rates

In Exhibit 10–12, we consider the effects of an unanticipated increase in *interest rates*, coupled with market conditions consisting of real market changes, including short-run excess supply and short-run excess demand. The base case shows that both real and financial market forces affecting supply and demand are currently producing a balanced market. However, in case E, because of an increase of 1 percent in long-term interest rates, investors now expect to earn 13 percent. When coupled with a market condition of excess supply, the combined results produce a major *decline in property values* and a significant *increase in cap rates*. Note that this combination of excess supply and rising interest rates produces the lowest present values when compared to all other scenarios. This is because investors demand greater returns on real estate investments in a market that is being oversupplied by developers. This produces flat rents and *NOI* that are discounted by a larger discount rate. Case F, which depicts a combination of rising demand and rising interest

rates, tends to produce a slightly lower *PV* and higher cap rate than in the base case because the condition of excess demand is producing both higher rents and *NOI;* however, these higher cash flows are being discounted at a higher discount rate because of rising interest rates.

Cases G and H shown in Exhibit 10–12 show the effects of falling interest rates under conditions of excess supply and demand, respectively. In these cases, the combination of excess demand and falling interest rates (case H) produces the greatest effect, resulting in dramatically lower cap rates relative to the base case and all other cases. Case G also produces a favorable result in terms of lower cap rates; however, the excess supply condition produces a present value that is somewhat lower than that shown in case H because of lower rents.

EXHIBIT 10–12 Scenario 3: Relationship between Excess Supply/Demand Conditions, Interest Rates, Investor Returns, and Going-In Cap Rates

Panel A: Market Scenario

		Year					
		(1)	(2)	(3)	(4)	(5)	(6)
Base Case:	*NOI*	$100,000	$103,000	$106,090	$109,273	$ 112,551	$115,927
	REV					1,288,082	
Case E: Oversupply and 13% return	*NOI*	100,000	100,000	100,000	103,000	106,090	109,273
	REV					1,092,727	
Case F: Excess demand and 13% return	*NOI*	100,000	105,000	110,250	115,762	119,235	122,812
	REV					1,228,120	
Case G: Oversupply and 11% return	*NOI*	100,000	100,000	100,000	103,000	106,090	109,273
	REV					1,365,909	
Case H: Excess demand and 11% return	*NOI*	100,000	105,000	110,250	115,762	119,235	122,812
	REV					1,535,150	

Panel B: Expected Result

			Commentary
Base Case:	*NOI*	$ 100,000	Market supply and demand are in balance. Long-term growth in *NOI* = 3% and the investor expected return = 12%.
	PV @ 12%	$1,111,111	
	Cap rate (R)	.09	
Case E:	*NOI*	$ 100,000	Oversupply *and* rising interest rates cause property values to *decline* and cap rates (R) to *increase* relative to the base case.
	PV @ 13%	$ 949,957	
	Cap rate (R)	.105	
Case F:	*NOI*	$ 100,000	Although excess demand exists, when combined with rising interest rates, property values rise although by not as much as in the base case.
	PV @ 13%	$1,049,424	
	Cap rate (R)	.095	
Case G:	*NOI*	$ 100,000	Falling interest rates exert a *positive* effect on property values; however, this effect is offset to some extent by an oversupplied market. The result is *slightly higher* property values and *slightly lower* cap rates relative to the base case.
	PV @ 11%	$1,185,780	
	Cap rate (R)	.084	
Case H:	*NOI*	$ 100,000	Both falling interest rates and excess demand combine to produce the most *positive* effect on property values and dramatically *lower* cap rates relative to the base case.
	PV @ 11%	$1,313,977	
	Cap rate (R)	.076	

A Closing Note on Cap Rates and Market Conditions

In the above scenarios, we may summarize as follows:

Lower market cap rates (higher property values) tend to be brought about by

1. Unanticipated increases in the demand for real estate relative to supply.
2. Unanticipated decreases in interest rates.
3. Both (1) and (2).

Higher market cap rates (lower property values) tend to be brought about by

1. Unanticipated increases in the supply of real estate relative to demand.
2. Unanticipated increases in interest rates.
3. Both (1) and (2).

There are obviously *many other factors* that contribute to increases and decreases in cap rates. These could include changes in the risk associated with a given property or could be due to changes in neighborhood characteristics and/or many other factors.

A Word of Caution—Simultaneous Effects of Real Market Forces and Interest Rates on Property Values

It should be stressed that the above illustrations were developed under strict assumptions regarding the timing and duration of conditions of excess supply and demand as well as the extent and duration of interest rate changes. These examples were developed to demonstrate the effects of changes in market conditions on property values and cap rates by using the benefit of numerical examples. In practice, projections of these relationships are difficult to make, as are the forecasts of the dollar magnitude of such changes on property values. There are many combinations of real market forces and interest rates that may be considered. Furthermore, we have not considered the possible *interaction* between changes in any one of these market forces on other market influences. For example, the effects of changes in interest rates may persist for a long period of time and affect the *long-term* growth in supply and demand and the pattern in *NOI* far beyond three years. Nonetheless, we believe that understanding these relationships is useful.

In practice, investors must know how to incorporate these relationships into forecasts. When valuing specific properties, the investors must consider

1. Current market supply and demand conditions and how long such conditions will last.
2. The effects of such conditions on rents and *NOI*.
3. The future course of interest rates that may be affected by more global, non–real estate specific influences such as global economic growth and inflationary pressures.
4. The contents of leases that have been executed on the property being evaluated and whether conditions in (1), (2), and (3) will materially affect rents, expenses, and tenant default rates.

Leases: Valuation of a Leased Fee Estate

The previous examples in this chapter assumed that the properties being valued could be leased at current market rents. In these cases, it can be said that properties are valued as **fee simple estates.** However, in many situations when properties are being considered for purchase, there are existing leases in place that have below (or above) market rents.

Such properties are purchased as **leased fee estates.** Similarly, when valuing properties and selecting comparable properties from recent sales, we find that many of these properties will also have existing leases. When such comparables are used, it is very important to investigate whether or not existing leases are present and the contents of such leases. Failure to investigate these cases can result in serious errors when estimating value.

For example, let us assume that property A has an existing net lease with payments for the next five years at $400,000 per year. At the end of the five-year period, the lease is scheduled to expire and rents could then be negotiated on a year-to-year basis at market rates. Alternatively, property B, which is exactly comparable to A, can be expected to produce net rent of $500,000 per year with an escalation of 3 percent per year because it has no existing leases, and market rents can be earned each year. Assuming this to be the case, we have

	Cash Flow—Year 5					
PV	(1)	(2)	(3)	(4)	(5)	REV_5
Property A = $4,461,296	$400,000	$400,000	$400,000	$400,000	$400,000	$5,627,540
Property B = $4,908,366	500,000	515,000	530,450	546,364	562,754	5,627,540

We should also note that the reversion value at the end of year 5 (REV_5) is assumed to be the same in both cases because the lease on property A will have expired and the rents can be adjusted up to market rates at the end of that year and every year thereafter, thereby making the reversion value the same as in case B from year 6 into the future. Therefore, from year 5 on, cash flows are assumed to be the same in both cases and will produce the same *REV* at that time. We assume that the same required return of 13 percent is to be earned on both properties. However, note that both the present value and going-in cap rates for both sales are very different. After discounting, we show a value of $4.46 million for A versus $4.91 million for B, or a difference of about $450,000. Furthermore, the cap rates are .09 for property A and .102 for property B, respectively. One point to be made, then, is that if a property is under consideration for purchase (say, property C) and it is highly comparable to both properties A and B, but very little information is available on the existing leases for A and B, then using cap rates from either sale could produce very different estimates of value. Indeed, if the *NOI* for property C was $450,00, then depending on which cap rate was chosen, the estimated value could range from ($450,000 ÷ .09), or $5,000,000, to ($450,000 ÷ .102), or $4,411,765. This would be a difference of $588,235. *Therefore, it is important when selecting comparable properties for valuation purposes to be certain that, in addition to the physical and locational characteristics of the properties, the contents of existing leases on such comparables are also very similar to the lease contents of the property under consideration for purchase.*

Cost Approach

The rationale for using the **cost approach** to valuing (appraising) properties is that any informed buyer of real estate would not pay more for a property than what it would cost to buy the land and build the structure. For a new property, the cost approach ordinarily involves determining the construction cost of building a given improvement, then adding the market value of the land. In the case of existing buildings, the appraiser first estimates the cost of replacing the building. This estimate is reduced by estimating any **physical deterioration, functional obsolescence,** or **external obsolescence** (discussed below) in arriving at the estimated value of the building. This approach is procedurally identical to the cost approach detailed in Chapter 7 for residential financing. In the case of

income-producing property, however, structural design and equipment variations and locational influences make the cost estimation process much more complex. Consequently, the cost approach may at times be difficult to apply, particularly if the property is not new.

Many techniques can be used in conjunction with the cost approach to value. The technique chosen to estimate value will generally depend on (1) the age of the structure being valued, (2) whether the structure is highly specialized in design or function, and (3) the availability of data to be used for cost estimating. Generally, if a project is in the proposal stage, cost data will be developed from plans and drawings by an appraiser or estimator. Cost estimation services are available for appraisers from the Marshall and Swift Company and the Boeckh Division of the American Appraisal Company.

If a project is in the proposal stage, specifications for material and equipment will have been set out in detail, usually making it possible to arrive at a relatively accurate cost estimate. Exhibit 10–13 contains a breakdown of hard and soft costs for a hypothetical office-warehouse complex in the proposal stage of development. The cost breakdown shown in Exhibit 10–13 is based on categories that generally correspond to how various subcontractors would make bid estimates on improvements. This procedure is quite common for new, nontechnical construction.

In addition to the hard-cost categories shown in Exhibit 10–13 for our hypothetical office-warehouse complex, we see two additional categories. One represents a soft-cost category, which includes estimated outlays for services and intangible costs necessary when designing and developing a project. The other category represents land cost. Estimates of

EXHIBIT 10–13
Cost Breakdown—Hypothetical Office-Warehouse Complex (73,500 Square Feet: 8,000 Office; 65,500 Warehouse; 3 Land Acres; Projected Economic Life, 50 Years)

Component	Cost	PSF
	Hard Costs	
Excavation—back fill	$ 31,500	
Foundation	47,250	
Framing (steel)	160,500	
Corrugated steel exterior walls	267,750	
Brick facade (front)—glass	51,000	
Floor finishing, concrete	61,000	
Floor covering, offices	17,500	
Roof trusses, covering	115,040	
Interior finish, offices	57,400	
Lighting fixtures, electrical work	83,400	
Plumbing	114,500	
Heating–A/C	157,500	
Interior cranes, scales	139,060	
Loading docks, rail extension	96,000	
On-site parking, streets, gutters	176,000	
Subtotal	$1,575,000	$21.43
	Soft Costs	
Architect, attorney, accounting	$ 200,000	
Construction interest	125,000	
Builder profit	250,000	
Subtotal	$ 575,000	
Comparable land cost (from comparable land sale)	$ 350,000	
Value per cost approach	$2,500,000	$34.00

land value are made from comparisons with other recent land sales. The sales chosen to estimate value should be **comparable properties** to the land underlying the improvement being valued.

In cases where the project to be appraised includes an *existing* improvement, the detailed cost breakdown shown in Exhibit 10–13 is more difficult to use because the appraiser must estimate physical and economic depreciation on the component parts. Generally, when the cost approach to value is used for an existing improvement, the cost to replace the improvement is estimated and adjusted downward for depreciation caused by (1) physical deterioration, (2) functional or structural obsolescence due to the availability of more efficient layout designs and technological changes that reduce operating costs, and (3) external obsolescence that may result from changes outside of the property such as excessive traffic, noise, or pollution. These three categories of depreciation are very difficult to determine and, in many cases, require the judgment of appraisers who specialize in such problems. Adjusting downward for depreciation is especially difficult for industrial properties, special-use facilities such as public buildings, and properties that are bought and sold infrequently.

To illustrate how adjustments must be made to reflect physical, functional, and economic depreciation, we consider a different property, a 15-year-old office-warehouse complex. The improvement, if constructed today and "costed out" at *current prices* using a procedure similar to that shown in Exhibit 10–13, would be $1,750,000. However, because the structure is 15 years old, certain adjustments must be made for necessary repairs, changes in design technology, and depreciation, as shown in Exhibit 10–14.

The essence of the cost approach for existing properties is first to price the improvement at its current **replacement cost.** Then, that amount is reduced by any costs (1) that can be expended to upgrade the improvement or to cure obvious deterioration due mainly to needed maintenance or (2) that correspond to the economic loss associated with nonrepairable (or incurable) factors due to changes in design or layout efficiency that may make newer buildings less expensive to operate.

Hence, in our example, the appraiser estimates that a purchaser of the property would have to incur a cost of $47,700 simply to replace worn-out items, the result of deferred maintenance and replacement (curable physical deterioration). However, because the structure is 15 years old and the economic life was 50 years when the building was constructed, the appraiser estimates that structural nonrepairable or incurable depreciation due to wear

EXHIBIT 10–14
Estimates of Depreciation and Obsolescence on Improved Property

Replacement cost estimate	$1,750,000
1. Physical deterioration	
a. Repairable (curable)	
Interior finish	25,500
Floor covering	5,200
Lighting fixtures	17,000
Total	$ 47,700
b. Nonrepairable (incurable)	
15 years divided by 50 years (age to economic life)	30%
2. Functional obsolescence	
Layout design (inefficiency)	
Increasing operating cost (annually)	$ 15,600
3. External obsolescence	
Loss in rent per year*	4,000
Site value by comparison	$ 200,000

*Portion attributable to the building.

and tear (incurable physical deterioration) would represent about 30 percent of current reproduction cost. This percentage was developed in the example by the ratio of age to economic life, or 15 divided by 50. This estimate assumes that the building will wear out evenly (at a rate of 2% per year—100% divided by 50 years) over its 50-year life. Because 15 years have passed, based on these assumptions, the building would be 30 percent depreciated. *Estimates of physical depreciation are not always based on these simple assumptions. Many structures may wear out faster or slower over time. In such cases, the appraiser should consider the* **effective age** *of the property rather than its actual age.*

As for functional obsolescence in our example, the appraiser estimates that operating costs will be $15,600 higher on the existing structure when compared with a completely new building. The higher costs could be caused, for example, by the lack of suspended ceilings in an older structure, by posts and columns that might affect traffic and storage patterns, or by an older conveyor system designed into the initial structure. This $15,600 additional annual expense could represent added costs in manpower, machinery, and so on, due to functional inadequacies. This additional expense is treated as a discounted annuity because the increase in operating costs is expected to be $15,600 per year for the next 35 years. Assuming the buyer could earn 10 percent annually on other investments, the adjustment for functional obsolescence would reduce the total operating costs to a present value of $150,449. It is assumed that the owner could invest in a similar real estate venture or an investment of equal risk and earn 10 percent on total investment. This was discussed in more detail in our consideration of the income capitalization approach earlier in the chapter.

Finally, the appraiser estimates $4,000 per year for external obsolescence. This cost accounts for environmental changes, such as pollution, noise, neighborhood changes, and other *external* influences that result in lower rents (or higher expenses) when present. Estimates for these characteristics must be obtained from comparable sites where none of these external influences are present. Because the land value is being estimated separately from the building value, the effect of economic obsolescence on the land value will already be accounted for in the estimated land value. Thus, during the adjustment for the effect of locational obsolescence on the *building* value, the estimated rent loss should represent only that portion of the total rent loss (land and building) that applies to the building. For example, the appraiser might estimate that the rent for the entire property will be $5,000 per year less due to the locational obsolescence. However, if there were separate leases on the building and the land, the appraiser might expect that the building would rent for $4,000 less, whereas the land would rent for $1,000 less. This loss in building rent is capitalized and used to reduce the building value. In our example, we assume this rent loss to be $4,000 per year. As was the case with functional obsolescence, this loss in income will also be discounted at 10 percent. The discounted value of this loss is $38,577. In practice, this estimate is extremely difficult to make. The appraiser must often use considerable judgment as to what the total rent loss would be and how much would be allocated to the building.

Adjustments to the replacement cost estimate for the existing improvement in our example are shown in Exhibit 10–15. Note that any repairable or curable depreciation or obsolescence should be subtracted from the replacement cost estimate before any reduction is made for nonrepairable or incurable costs (30% in our example). In other words, even after adjusting for the curable items, productivity loss due to functional obsolescence and structural depreciation would still exist. The estimate for those incurable items must be made based on the assumption that all curable items are repaired.

In summary, the cost approach is most reliable where the structure is relatively new and depreciation does not present serious complications. However (1) when older properties are being valued, adjustments have to be made for depreciation and obsolescence, and/or (2) when it is difficult to find comparable land sales, the cost approach is less desirable. Both usually occur when older, improved properties in well developed submarkets with

EXHIBIT 10–15
Adjustment of Replacement Cost Estimate

Replacement costs at current prices	$1,750,000
Less: Repairable physical depreciation	47,700
Subtotal	$1,702,300
Nonrepairable (incurable) physical depreciation, 30%	510,690
Functional obsolescence (incurable):	
$15,600(*PV*, 10%, 35 years)	
$15,600(9.644159)	150,449
Economic-locational obsolescence:	
$4,000(*PV*, 10%, 35 years)	
$4,000(9.644159)	38,577
Add: Site value (by comparison)	200,000
Value per cost approach	$1,202,584
or (rounded)	$1,200,000

few land sales are being valued. However, when there are very few sales and market data are scarce, the cost approach to valuing older properties may be the only method available.

Valuation Case Study—Oakwood Apartments

Oakwood Apartments is a luxury apartment community. It is being appraised for an investor who has contracted to purchase the property and needs to obtain financing. The bank has had its own staff appraisers estimate the value of the property but wants an independent appraiser to also provide an estimate using a "limited appraisal" that focuses only the income approach.

The bank has provided Exhibit 10–16, which summarizes information about the property. The appraiser has confirmed the expected rent per unit with the present owner, and she has also done an analysis of comparable apartment communities that is summarized in Exhibit 10–17.

Oakwood consists entirely of two-bedroom units. A competitive analysis indicates that Oakwood is very similar to comparables 1 and 2 even though they each have some one- and three-bedroom units. It appears that owners of apartment buildings with a greater proportion of two-bedroom units are able to get a higher average monthly rent per unit. Comparable 3 is more densely developed with one-bedroom apartments, and its parking ratios are lower than all others. It appears that the average rent for Oakwood is reasonable relative to the competition. In addition to rent, other cash flows may be realized from laundry facilities. Comparable 2 sold for $100,000 per unit, and comparable 1, which is most like Oakwood, sold for $110,000 per unit. Although the appraiser is not doing a formal sales comparison approach, she notes that a price of $110,000 per unit would suggest a value of Oakwood of $110,000 × 95 units = $10,450,000. The gross rent multipliers of two of the comps are around 95 but the third is around 91. The average would be around 93.8. Using this multiplier would suggest a value for Oakwood Apartments of 93.8 × $1,250 × 95 units = $11,139.000 (rounded to nearest thousand).

The appraiser has determined that the number of units per acre (usually set by zoning) is currently the maximum allowable. This may be important if zoning laws have changed and now allow development of 20 or more units per acre. The average number of parking spaces (2.10) per unit, or 400 spaces, seems reasonable relative to the competition, and the appraiser has determined that the amenity package is appropriate relative to rental rates and to what the competition is currently offering in the way of exercise and recreation

EXHIBIT 10–16
Property Information: Oakwood Apartments

Name of Property:
Oakwood Apartments
Location:
Suburbia, USA
Improvement Description:
A 95-unit luxury garden apartment community located on a major north-south arterial. The property is newly constructed and has a high level of amenities, including 100% direct-access garages. All buildings are of two-story construction with 90% brick exteriors.
Lender:
Bank of USA
Rent and Income Escalation = 3%

Principal Amenities:
Direct access garages with automatic garage door openers. Swimming pool and heated spa, fitness center, business center, jogging trail, limited-access gates, 200 parking spaces-some covered.
Land Area/Density:
4.75 acres
Unit Type:
95 two-bedroom units
1,100 square feet with two bedrooms and two baths
Age:
Three years old
Average Current Monthly Rent:
$1,250.00 plus other income of $120 per unit per year

EXHIBIT 10–17
Oakwood Apartments: Comparables

		Comparables/Competitors		
	Oakwood	(1)	(2)	(3)
Units per acre	20	20.0	21.0	25.0
Unit mix:				
1BR/1Bath	–0–	10%	10%	60%
2BR/2Bath	100%	85%	80%	40%
3BR/2Bath	–0–	5%	10%	–0–
Parking spaces/unit	2.10	2.00	1.95	1.50
Age	3 years	3 years	3 years	5 years
Condition/amenities	Excellent	Excellent	Good	Good
Avg. monthly rent per unit	$1,250	$1,150	$1,100	$950
Price per unit	—	$110,000	$100,000	$90,000
Gross rent multiplier	—	95.65	90.91	94.74

facilities, TV cable/satellite services, high-speed Internet connectivity, washer/dryer hook-ups, and so on.

On-site expenses will include salaries for on-site personnel who maintain and "make units ready" for tenants in the community. An operating risk that must be considered by apartment investors is the relatively short nature of lease maturities, the potential tenant turnover, and downtime due to vacancies. Experience in large metropolitan areas indicates that as many as 60 percent of apartments in a given property may turn over each year. In making cash flow projections, analysts must consider turnover-related losses in revenue because of vacancies, in conjunction with recurring repairs and maintenance expenses involved in making units ready for new tenants. For Oakwood Apartments, these items are included in repair and maintenance expense. A management fee for oversight of all leasing, rent collection, tenant relations, and so on, and office expenses for payroll, insurance, tax property, and other bookkeeping services necessary for operations have also been estimated. These items should be validated from payment records and/or the appropriate agency or vendors.

Vacancy is expected to be 5 percent of potential income, and credit loss due to tenants who default on their lease is expected to be an additional 1 percent of potential income. The property is to be valued using an 11 percent discount rate and assuming the property

will be sold after five years. The resale price will be estimated by using a 9 percent terminal capitalization rate applied to year 6 *NOI*. The rate reflects lower growth expectations after year 5. Selling costs when the property is sold will be 5 percent of the sale price.

Rents are expected to increase at the expected inflation rate of 3 percent per year. Additional revenue of $120 per unit is expected from the laundry machines that are included in a laundry area of the apartment complex. This income will also increase at 3 percent per year.

Contrary to most other property types, tenants occupying apartment properties usually sign leases with terms for either 6 or 12 months. Furthermore, tenants usually pay for their own utilities, insurance, and so on, which usually relieves the investor of making payments for these items and recovering expenses from tenants. However, there are utility costs for common areas in the apartment community that must be paid by the owner.

Expenses for next year are projected as follows:

Real estate taxes	$87,000
Office expenses (accounting administrative)	$20,000
Insurance	$150 per unit
Repairs and maintenance	$550 per unit
Advertising	$8,000
Utilities	$45,000
Miscellaneous expenses	$15,000

Expenses are projected to increase at the rate of 3 percent per year.

In addition to the above expenses, a property management firm is paid 12 percent of effective gross income (rents less vacancy and credit loss) to find tenants, sign leases, handle tenant relations, and oversee repairs and maintenance.

Based on the assumptions above, cash flows for Oakwood Apartments are projected in Exhibit 10–18.

NOI is projected through year 6 since year 6 is used to estimate the resale price. Exhibit 10–19 shows the projected resale price by applying the 9 percent terminal capitalization rate to the year 6 *NOI* and subtracting the selling costs of 5 percent of the sale price.

Exhibit 10–20 shows the present value of the NOI over the five-year holding period plus the present value of the resale calculated above. Present values are based on an 11 percent discount rate. The total value is $10,573,934, or $10,574,000 (rounded). This is just slightly more than the replacement cost of $10,000,000 and in the range estimated by using the price per unit and gross rent multiplier from the comparable sales which was from $10,450,000 to $11,139,000.

Thus, based on the income approach, the appraiser will provide the bank with an estimated value for Oakwood Apartments of $10,574,000.[3]

RealNex Solution

RealNex MarketEdge (formerly REIWise) is a cloud-based program that is used for investment analysis and valuation of real estate income properties like apartments, office buildings, shopping centers, and industrial properties. We will show how it replicates our apartment example in this chapter, and in Chapter 11 we will show how it replicates an office building example.

Students using this textbook have a free subscription to RealNex MarketEdge while enrolled in the course. The program can be used with any web browser on desktops,

[3] Rounding the number conveys the fact that a high degree of precision is not possible given the nature of the assumptions that must be made in the appraisal process.

EXHIBIT 10–18 Projection of Net Operating Income for Oakwood Apartments

eXcel www.mhhe.com/bf16e

Year	1	2	3	4	5	6
Income:						
Market Rent from Lease Renewals	$1,425,000	$1,467,750	$1,511,783	$1,557,136	$1,603,850	$1,651,966
Laundry Income	$ 11,400	$ 11,742	$ 12,094	$ 12,457	$ 12,831	$ 13,216
Potential Gross Income (PGI)	$1,436,400	$1,479,492	$1,523,877	$1,569,593	$1,616,681	$1,665,181
Less: Vacancy	$ 71,250	$ 73,388	$ 75,589	$ 77,857	$ 80,193	$ 82,598
Less: Credit Loss	$ 14,250	$ 14,678	$ 15,118	$ 15,571	$ 16,039	$ 16,520
Effective Gross Income (EGI)	$1,350,900	$1,391,427	$1,433,170	$1,476,165	$1,520,450	$1,566,063
	$ 85,500	$ 88,065	$ 90,707	$ 93,428	$ 96,231	$ 99,118
Expenses:						
Real Estate Taxes	$ 87,000	$ 89,610	$ 92,298	$ 95,067	$ 97,919	$ 100,857
Office Expenses	$ 20,000	$ 20,600	$ 21,218	$ 21,855	$ 22,510	$ 23,185
Insurance	$ 14,250	$ 14,678	$ 15,118	$ 15,571	$ 16,039	$ 16,520
Repairs and Maintenance	$ 52,250	$ 53,818	$ 55,432	$ 57,095	$ 58,808	$ 60,572
Advertising	$ 8,000	$ 8,240	$ 8,487	$ 8,742	$ 9,004	$ 9,274
Management	$ 162,108	$ 166,971	$ 171,980	$ 177,140	$ 182,454	$ 187,928
Utilities	$ 45,000	$ 46,350	$ 47,741	$ 49,173	$ 50,648	$ 52,167
Miscellaneous Expenses	$ 15,000	$ 15,450	$ 15,914	$ 16,391	$ 16,883	$ 17,389
Total Expenses	$ 403,608	$ 415,716	$ 428,188	$ 441,033	$ 454,264	$ 467,892
Net Operating Income (NOI)	$ 947,292	$ 975,711	$1,004,982	$1,035,132	$1,066,185	$1,098,171

EXHIBIT 10–19 Projection of Resale Proceeds for Oakwood Apartments

Resale	$12,201,901
Selling cost	610,095
Net resale	$11,591,806

EXHIBIT 10–20 Present Value of *NOI* and Resale Proceeds

PV of *NOI*	$ 3,694,762
PV of resale	6,879,172
Total value	$10,573,934

laptops, and mobile devices such as an iPad. All you need is an Internet connection. To get your free subscription, see **http://info.realnex.com/edu.** The appendix to this chapter will show the inputs to RealNex MarketEdge necessary to replicate the Oakwood Apartments example and load the input data from the cloud.

Exhibit 10–21 shows one of the RealNex MarketEdge screens that shows the projected cash flows for Oakwood. The NOI is the same as we projected previously.

Exhibit 10–22 shows the estimated values from RealNex as if sold during each of the five-year holding periods shown. The results are shown as if the property was sold during each of the possible holding periods shown but we will focus on year 5. The result for a five-year holding period is exactly the same as we calculated earlier.

EXHIBIT 10–21 RealNex Screen for Oakwood Apartments

Source: RealNex, 2014.

RealNex
The Technology Behind the Deal

Home | Property ▾ | Analysis ▾ | Managers ▾ | Services

Oakwood Apartments

General | Financials | Income | Expenses | Projections | Charts | Dashboard | Proposals

Select Projection: Cash Flow Analysis ▾

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
GROSS SCHEDULED INCOME	$1,436,400	$1,479,492	$1,523,877	$1,569,593	$1,616,681	$1,665,181	$1,715,137
Turnover Vacancy	($85,500)	($88,065)	($90,707)	($93,428)	($96,231)	($99,118)	($102,091)
Total Operating Expenses	($403,608)	($415,716)	($428,188)	($441,033)	($454,264)	($467,892)	($481,929)
NET OPERATING INCOME	($947,292)	($947,711)	($1,004,982)	$1,035,132	$1,066,185	$1,098,171	$1,131,116

EXHIBIT 10–22 RealNex Screen for Oakwood Apartments

Source: RealNex, 2014

RealNex
The Technology Behind the Deal

Home | Property ▾ | Analysis ▾

Oakwood Apartments

General | Financials | Income | Expenses | Projections | Charts | Dashboard | P

Select Projection: Investment Return Analysis ▾

Description	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flow - To Date	$947,292	$1,923,003	$2,927,985	$3,963,116	$5,029,302
Net Resale Proceeds	$10,299,169	$10,608,144	$10,926,389	$11,254,180	$11,591,806
Invested Capital	($10,548,557)	($10,548,557)	($10,548,557)	($10,548,557)	($10,548,557)
Net Return on Investment	$697,904	$1,982,590	$3,305,816	$4,668,740	$6,072,550
Internal Rate of Return	6.62%	9.38%	10.31%	10.78%	11.06%
Modified IRR	6.62%	9.45%	10.37%	10.81%	11.05%
NPV (cash flow + reversion)	($416,610)	($293,424)	($179,117)	($73,048)	$25,377
PV (NOI + reversion)	$10,131,947	$10,255,133	$10,369,440	$10,475,509	$10,573,934

Web App

There are many sites that provide articles related to the current real estate investment climate. Go to a site like Institutional Real Estate, Inc. (**www.irei.com**) or one that you find by using a search engine like Google (**www.google.com**) to search for a phrase like "real estate capital market trends" and find an article related to the current investment climate. Summarize the current investment climate either for the national market or for a particular property type and /or location. Can you find examples of recent deals that provide insights into the investment climate?

Conclusion

We have demonstrated three approaches to valuation along with many of the techniques used in conjunction with each. Many combinations of approaches and techniques to valuation could be used; approaches and techniques should be chosen that best complement the data available for estimation. Stated another way, *the availability and quality of data should always dictate the methods and approaches chosen for valuation.* If perfect information were available, then theoretically the same value would result regardless of the method chosen, be it cost, market, or income capitalization. Even with imperfect information, the three approaches to value should correspond to some extent, which is the reason appraisal reports will typically contain estimates of value based on at least two approaches to determining value. While this procedure helps to corroborate the opinion of value, in the final analysis, it is up to the user of the report to interpret, understand, and critically analyze the assumptions, techniques, and methods used to estimate value. Appraisals are only estimates of market value based on market conditions and information available at the time of the appraisal. Economic conditions are subject to much uncertainty, and appraisals should be interpreted and used in light of that uncertainty. Lenders and investors should be familiar with the techniques used by appraisers and with the assumptions made in developing the estimate of value. The appraisal should be viewed as a complement, not a substitute, for sound underwriting or investment analysis by the particular lender or investor.

Key Terms

appraisal process *298*
capitalization rate *303*
comparable properties *327*
cost approach *325*
direct capitalization method *303*
discount rate *308*
discounted cash flow method *307*
effective age *328*
effective gross income *302*
external obsolescence *325*
fee simple estate *324*
functional obsolescence *325*
going-in cap rate (R) *312*
gross income multipliers *302*
highest and best use *315*
holding period *309*
income approach *301*
leased fee estates *325*
mortgage-equity capitalization *317*
net operating income (*NOI*) *303*
physical deterioration *325*
potential gross income *302*
replacement cost *327*
required internal rate of return *308*
residual land value *315*
reversion value *309*
sales comparison approach *299*
terminal cap rate (R_T) *309*
unit of comparison *301*

Useful Web sites

www.appraisalinstitute.org—The Appraisal Institute gives information on appraisal education, products, news, and conferences.

www.naifa.com/consumerassistance—The National Association of Independent Fee Appraisers, which includes a link to a discussion of the appraisal process.

www.nreionline.com—National Real Estate Investor—a good source of current trends.

www.irei.com—Institutional Real Estate, Inc., provides current news and the research page includes links to research reports provided by several institutional investment firms.

www.buildings.com—*Buildings Magazine* web site. Good source of articles on buildings and trends affecting the value of buildings.

www.crea.ca—This site, home page for The Canadian Real Estate Association, gives the average housing prices in different Canadian cities and provinces. It also gives recent news related to real estate in Canada.

www.cbre.com/research-and-reports—This site gives U.S. office and industrial vacancy reports. Its Insight Reports section gives information about conditions and forces that shape the United States and Canadian real estate market in industrial, office, and retail areas. Its Global Market View report helps in finding commercial real estate trends including prime office yield and rent, availability and vacancy in the office, industrial, and retail sectors for Asia Pacific, Europe, North America, Latin America, and the Caribbean.

www.realestate-tokyo.com—This site is a good source for residential and commercial real estate properties in Tokyo. It also offers information on apartments and houses to rent in the Tokyo area, properties for sale, offices for rent, and, in general, life in Japan and the real estate market.

www.naea.co.uk—This site is hosted by The National Association of Estate Agents (NAEA), which is the United Kingdom's leading professional body for estate agency personnel, representing the interests of approximately 10,000 members who practice across all aspects of property services both in the United Kingdom and overseas. These include residential and commercial sales and lettings, property management, business transfer, and auctioneering.

www.epra.com—This site is hosted by The European Public Real Estate Association (EPRA), which is a not-for-profit body established under Dutch law. This website gives quarterly review reports of developments in the European real estate sector. It also provides different research reports published related to real estate.

www.demographia.com—This site is a very good resource for finding relevant demographic information about different markets spread across the world. Some of the main features of this site are that it gives international housing affordability rankings, different surveys, different economic reports, and different trends related to real estate. It's also a good source to find regulations and policies related to real estate.

www.fedstats.sites.usa.gov—This federal government-sponsored site is a very good resource for finding relevant demographic information about different states in the United States. This site is a gateway to statistics for more than 100 U.S. federal agencies.

www.city-data.com—This site gives very descriptive and interesting profiles of all U.S. cities. It has tens of thousands of city photos not found anywhere else, hundreds of thousands of maps, satellite photos, stats about residents (race, income, ancestries, education, employment, etc.), geographical data, state profiles, crime data, housing, businesses, birthplaces of famous people, political contributions, city government employment, weather, hospitals, schools, libraries, houses, airports, radio and TV stations, zip codes, area codes, user-submitted facts, similar cities list, and comparisons to averages. In sum, it is a very good site for doing real estate analysis.

Questions

1. What is the economic rationale for the cost approach? Under what conditions would the cost approach tend to give the best value estimate?
2. What is the economic rationale for the sales comparison approach? What information is necessary to use this approach? What does it mean for a property to be comparable?
3. What is a capitalization rate? What are the different ways of arriving at this rate for an appraisal?
4. If investors buy properties based on expected future benefits, what is the rationale for appraising a property based on current cap rates without making any income or resale price projections?
5. What is the relationship between a discount rate (or *IRR*) and a capitalization rate? What causes differences between them?
6. What is meant by a unit of comparison? Why is it important?
7. Why do you think appraisers usually use three different approaches when estimating value?
8. Under what conditions should financing be explicitly considered when estimating the value of a property?
9. What is meant by depreciation in the cost approach?
10. When may a terminal cap rate be lower than a going-in cap rate? When may it be higher?

11. In general, what effect would a *reduction in risk* have on going-in cap rates? What would this effect be if it occurred at the same time as an unexpected increase in demand? What would the effect on property values be?
12. What are some of the potential problems with using a going-in capitalization rate that is obtained from previous property sales transactions to value a property being offered for sale today?
13. When estimating the reversion value in the year of sale, why is the terminal cap rate applied to *NOI* for the year *after* the holding period?
14. Is a cap rate the same as an *IRR*? Which is generally greater? Why?
15. Discuss the differences between using (1) a terminal cap rate and (2) an appreciation rate in property value when estimating reversion values.

Problems

1. Zenith Investment Company is considering the purchase of an office property. It has done an extensive market analysis and has estimated that based on current market supply/demand relationships, rents, and its estimate of operating expenses, annual *NOI* will be as follows:

Year	*NOI*
1	$1,000,000
2	1,000,000
3	1,000,000
4	1,200,000
5	1,250,000
6	1,300,000
7	1,339,000
8	1,379,170

A market that is *currently oversupplied* is expected to result in cash flows remaining *flat* for the next three years at $1,000,000. During years 4, 5, and 6, market rents are expected to be higher. It is further expected that beginning in year 7 and every year thereafter, *NOI* will tend to reflect a stable, balanced market and should grow at 3 percent per year indefinitely. Zenith believes that investors should earn a 12 percent return (r) on an investment of this kind.

   a. Assuming that the investment is expected to produce *NOI* in years 1–8 and is expected to be owned for seven years and then sold, what would be the value for this property today? (*Hint:* Begin by estimating the reversion value at the end of year 7. Recall that the expected $IRP = 12\%$ and the growth rate (g) in year 8 and beyond is estimated to remain level at 3%.)

   b. What would the terminal capitalization rate (R_T) be at the end of year 7?

   c. What would the going-in capitalization rate (R) be based on year 1 *NOI*?

   d. What explains the difference between the going-in and terminal cap rates?

2. Ace Investment Company is considering the purchase of the Apartment Arms project. Next year's *NOI* and cash flow is expected to be $2,000,000, and based on Ace's economic forecast, market supply and demand and vacancy levels appear to be in balance. As a result, *NOI* should increase at 4 percent each year for the foreseeable future. Ace believes that it should earn at least a 13 percent return on its investment.

   a. Assuming the above facts, what would the estimated value for the property be now?

   b. What going-in cap rates *should* be indicated from recently sold properties that are comparable to Apartment Arms?

   c. Assuming that in part (*a*) the required return changes to 12 percent, what would the value be now?

   d. Assume results in part (*c*). What should the investor now be observing regarding the price of comparable sales? What market forces may be accounting for the differences in value between (*a*) and (*c*)?

3. Acme Investors is considering the purchase of the undeveloped Baker Tract of land. It is currently zoned for agricultural use. If purchased, however, Acme must decide how to have the

property rezoned for commercial use and then how to develop the site. Based on its market study, Acme has made estimates for the two uses that it deems possible, that is, office or retail. Based on its estimates, the land could be developed as follows:

	Office	Retail
Rentable square feet	100,000	80,000
Rents per square foot	$24.00	$30.00
Operating expense ratio	40%	50%
Avg. growth in *NOI* per annum	3%	3%
Required return (*r*)	13%	14%
Total construction cost per square foot	$100	$100

Which would be the highest and best use of this site?

4. Ajax Investment Company is considering the purchase of land that could be developed into a class A office project. At the present time, Ajax believes that the site could support a 300,000 rentable square foot project with average rents of $20 per square foot and operating expenses equal to 40 percent of that amount. It also expects rents to grow at 3 percent indefinitely and believes that Ajax should earn a 12 percent return (*r*) on investment. The building would cost $100 per square foot to build:
   a. What would the estimated property value *and* land value be under the above assumptions?
   b. If rents are suddenly expected to *grow* at 4 percent indefinitely, what would the property value and land value be now? What percentage change in land value would this be relative to the land value in (*a*)?
   c. Instead of (*b*), suppose that rents will grow by only 1 percent because of excessive supply. What would land value be now? What percentage change would this be relative to the land value in (*a*)?
   d. Suppose that the land owner is asking $12,000,000 for the land. *Under assumptions in part (a)* would this project be feasible?
   e. If the land *must* be acquired for $12,000,000, returning to the assumptions in (*a*), how much of a change in the following would have to occur to make the project feasible? (Consider each item one at a time and hold all other variables constant.)
      (1) Expected return on investment (*r*).
      (2) Expected growth (*g*) in cash flows.
      (3) Building cost.
      (4) Rents.
5. Armor Investment Company is considering the acquisition of a heavily depreciated building on 10 acres of land. It expects to rent the building as a storage facility and expects to collect cash flows equal to $100,000 next year. However, because depreciation is expected to increase, Armor expects cash flows to decline at a rate of 4 percent per year *indefinitely*. Armor expects to earn an *IRR* on investment return (*r*) at 13 percent.
   a. What is the value of this property?
   b. Assume that after five years the building could be demolished and the land could be redeveloped with a strip retail improvement. The latter would produce *NOI* of $200,000 per year, grow at 3 percent per year, and cost $1 million to build. Investors currently earn a 10 percent *IRR* on such investments. How would this affect your estimate of value in (*a*)?
6. Athena Investment Company is considering the purchase of an office property. After a careful review of the market and the leases that are in place, Athena believes that next year's cash flow will be $100,000. It also believes that the cash flow will rise in the amount of $7,000 each year for the foreseeable future. It plans to own the property for at least 10 years. Based on a review of sales of properties that are *now* 10 years older than the subject property, Athena has determined

that cap rates are in a range of .10. Athena believes that it should earn an *IRR* (required return) of at least 12 percent.

a. What is the estimated value of this office property (assume a .10 terminal cap rate)?

b. What is the current, or going-in, cap rate for this property?

c. What accounts for the difference between the cap rate in (*b*) and the .10 terminal cap rate in (*a*)?

d. What assumptions are being made regarding future economic conditions when using current comparable sales to estimate terminal cap rates?

7. An investor is considering the purchase of an existing suburban office building approximately five years old. The building, when constructed, was estimated to have an economic life of 50 years, and the building-to-value ratio was 80 percent. Based on current cost estimates, the structure would cost $5 million to reproduce today. The building is expected to continue to wear out evenly over the 50-year period of its economic life. Estimates of other economic costs associated with the improvement are as follows:

Repairable physical depreciation	$300,000 to repair
Functional obsolescence (repairable)	$200,000 to repair
Functional obsolescence (nonrepairable)	$ 25,000 per year rent loss

The land value has been established at $1 million by comparable sales in the area. The investor believes that an appropriate opportunity cost for any deferred outlays or costs should be 12 percent per year. What would be the estimated value for this property?

8. ABC Residential Investors, LLP, is considering the purchase of a 120-unit apartment complex in Steel City, Pennsylvania. A market study of the area reveals that an average rental of $600 per month per unit could be realized in the appropriate market area. During the last six months, two very comparable apartment complexes have sold in the same market area. The Oaks, a 140-unit project, sold for $9 million. Its rental schedule indicates that the average rent per unit is $550 per month. Palms, a 90-unit complex, is presently renting units at $650 per month, and its selling price was $6.6 million. The mix of number of bedrooms and sizes of units for both complexes is very similar to that of the subject property, and both appear to have normal vacancy rates of about 10 percent annually. All rents are net as tenants pay all utilities and expenses.

a. Based on the data provided here, how would an appraiser establish an estimate of value?

b. What other information would be desirable in reaching a conclusion about the probable value for the property?

9. The *NOI* for a small income property is expected to be $150,000 for the first year. Financing will be based on a 1.2 *DCR* applied to the first year *NOI*, will have a 10 percent interest rate, and will be amortized over 20 years with monthly payments. The *NOI* will increase 3 percent per year after the first year. The investor expects to hold the property for five years. The resale price is estimated by applying a 9 percent terminal capitalization rate to the sixth-year *NOI*. Investors require a 12 percent rate of return on *equity* (equity yield rate) for this type of property.

a. What is the present value of the equity interest in the property?

b. What is the total present value of the property (mortgage and equity interests)?

c. Based on your answer to part (*b*), what is the implied overall capitalization rate?

10. Sammie's Club wants to buy a 320,000-square-feet distribution facility on the northern edge of a large midwestern city. The subject facility is presently renting for $4 per square foot. Based on recent market activity, two properties have sold within a two-mile distance from the subject facility and are very comparable in size, design, and age. One facility is 350,000 square feet and is presently being leased for $3.90 per square foot annually. The second facility contains 300,000 square feet and is being leased for $4.10 per square foot. Market data indicate that current vacancies and operating expenses should run approximately 50 percent of gross income for these facilities. The first facility sold for $9.4 million, and the second sold for $7.9 million.

a. Using a going-in or direct capitalization rate approach to value, how would you estimate value for the subject distribution facility?

b. What additional information would be desirable before the final direct rate (*R*) is selected?

11. Refer to the highest and best use analysis in Exhibit 10–9. Suppose that the warehouse income would grow at 3 percent per year instead of 2 percent. Does this change the highest and best use of the site? If so, what is the new implied land value?

12. You are an analyst with Perception Partners and have been asked to make pricing recommendations regarding the acquisition of Rose Garden Apartments. This project was built five years ago and contains 250 units in a suburban market area. The broker that brought the project to your attention indicates that the asking price will be $27,000,000. She has also provided the attached information based on a market survey showing data from three sales of comparable apartment properties that have occurred in a one-mile radius of Rose Garden during the past six months (see table below).

Perception believes that market returns (*IRR*) should be in a range of 8 percent (compounded annually) for this type of investment. Perception (1) plans to own the property for five years and then sell it and (2) believes that rents will grow at 3 percent per year.

a. Prepare an analysis of Rose Garden with the three comparable properties. Based on this analysis, do you think that the going-in cap rate today for Rose Garden should be *higher* or *lower* than the cap rates shown for the comparables?

	Rose Garden	Comparable 1	Comparable 2	Comparable 3
Age	5	6	7	10
Acres	14	10	8.75	12.5
# Units	250	200	175	250
Units per acre	17.9	20.0	20.0	20.0
Price		$20,000,000	$16,625,000	$21,000,000
Bedroom / Bathroom:	$ Rent / # Units / SF:	$ Rent / # Units / SF:	$ Rent / # Units / SF:	$ Rent / # Units / SF:
1 / 1	830 / 75 / 780	820 / 60 / 770	791 / 53 / 740	775 / 75 / 750
1 / 1.5	850 / 50 / 810	835 / 40 / 800	810 / 35 / 780	795 / 50 / 775
2 / 2	1,040 / 100 / 960	1,030 / 80 / 950	1,000 / 70 / 920	970 / 110 / 900
3 / 2	1,270 / 25 / 1,180	1,250 / 20 / 1,170	1,200 / 18 / 1,130	1,170 / 15 / 1,100
Weighted average	962 / × / 898	950 / × / 888	925 / × / 864	888.5 / × / 842
Rentable area (SF)	224,500	177,600	150,130	210,500
Vacancy	5%	5%	5%	5%
Operating expense	40%	40%	40%	45%
Gross rent	$2,886,000	$2,280,000	$1,928,076	$2,665,500
GIM		8.77	8.62	7.88
Net income	$1,645,000	$1,300,000	$1,099,000	$1,393,000
Cap rate		0.0650	0.0661	0.0663
Wt. Avg monthly rent/unit	$962	$950	$918	$889
Rent per sq. ft.	$12.855	$12.838	$12.843	$12.663
Price per unit		$100,000	$95,000	$84,000
Price per sq. ft.		$112.61	$110.74	$99.76
Quality	Excellent	Very good	Average	Average
Location	Excellent	Desirable	Desirable	Slightly less desirable
Parking spaces per unit	2.00	1.75	1.60	1.50
Security gate	Yes	Yes	Yes	No
Washer/dryer	Yes	Yes	Yes	Not in 1 / 1
A/C	Yes	Yes	Yes	Yes
Built-ins	Yes	Yes	Yes	Yes
Covered parking	Yes	Yes	No	No
Free cable TV	No	No	Yes	Yes
Fireplaces	No	No	Yes	No
Exercise room	No	No	No	Yes
Swimming pool/BBQ	Yes	Yes	Yes	Yes

b. If Rose Garden is acquired for $27,000,000, what would be the going-in cap rate at that price? How does this compare to cap rates for the comparables? What do you think may account for any differences?

c. Perception believes that the sale price that it hopes to achieve at the end of year 5 should be based on a *going-out*, or terminal, cap rate that will be .005 greater than the *going-in* cap rate. If Rose Garden is acquired for $27,000,000, would the 8 percent required return be achieved over the five-year period of ownership? What would cause the terminal cap rate to be greater than the going-in cap rate?

13. An investor is considering the purchase of a small office building. The *NOI* is expected to be the following: year 1, $200,000; year 2, $210,000; year 3, $220,000; year 4, $230,000; year 5, $240,000. The property will be sold at the end of year 5 and the investor believes that the *property value* should have appreciated at a rate of 3 percent *per year* during the five-year period. The investor plans to pay all cash for the property and wants to earn a 10 percent return on investment (*IRR*) compounded annually.

a. What should be the property value (*REV*) at the end of year 5 in order for the investor to earn the 10% IRR?

b. What should be the present value of the property today?

c. How can the value at the end of year 5 be estimated today if the present value today is unknown?

d. Based on your answer in (*b*), if the *building* could be reproduced for $2,300,000 today, what would be the underlying value of the *land*?

14. **Spreadsheet Problem.** Refer to the Ch10_Mort Eq Cap tab in the Excel Workbook provided on the website. This replicates the example discussed earlier.

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a. Suppose that there is an aggressive lender that is willing to allow the debt coverage ratio (*DCR*) to be as low as 1.0. Keep all other assumptions, including the loan interest rate and equity discount rate (before-tax equity yield), the same. How does this affect the amount that can be borrowed and the property value?

b. Refer to part (*a*). Is it reasonable to assume that the loan interest rate and equity discount rate would be the same? If not, would you expect each to be higher or lower? Why?

15. **Spreadsheet Problem.** Refer to the Ch10_H&BU tab in the Excel Workbook provided on the website, which replicates the highest and best use analysis example in the chapter.

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a. Suppose that the construction cost is $3.5 million for office, $6.5 million for retail, $2.5 million for apartment, and $3.5 million for warehouse. How does this change the highest and best use of the site and the land value?

b. Use the same construction costs as part (*a*) but assume that office income would increase by 4 percent per year instead of 3 percent per year. Does this change the highest and best use of the site and the land value?

16. **Spreadsheet and RealNex Market Edge Problem.** Use the Oakwood Apartments. SF file provided on the book website to use with RealNex Market Edge. This replicates the Oakwood Apartments example in the book. This same example is also solved with Excel in the Ch10_Apartment tab in the Excel Workbook provided on the website. Suppose that investors required only a 9 percent rate of return (discount rate) instead of 11 percent and the terminal cap rate used to estimate the resale price was 8 percent instead of 9 percent.

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a. Use the Excel template to see how your answer would change.

b. Use RealNex Market Edge to see how your answer would change.