INCOME APPROACH IN THE VALUATION PROCESS

The *income approach* is one of the three approaches to value in appraisal. In the income approach the value of the property is derived using one or more income capitalization procedures to convert the expected income generated from a property into a present value estimate. The term *capitalization* refers to the process of converting income into an estimate of value. The income approach is often called the income *capitalization* approach.

Application of the income approach involves analyzing the income-producing capabilities of a property, forecasting the periodic income, and transforming the income expectations into a value estimate. The income typically forecast includes both the annual income expected from the operation of the property and the net income generated from resale at the end of a selected holding period. The reliability of a value found by this approach depends on an appraiser's ability to forecast and support income forecasts and to apply the appropriate income capitalization technique to arrive at the value estimate. When estimating market value, the income forecast must be considered by the appraiser to be typical and the income capitalization techniques must reflect the way investors usually estimate value. In this approach, the perspective taken must also be that of a typical, knowledgeable investor whose primary objective is to earn a profit on the money invested. Recall from Chapter 1 that the definition of market value assumes the following:

- Buyer and seller are typically motivated.
- Both parties are well informed or well advised, and acting in what they consider their best interests.
- A reasonable time is allowed for exposure in the open market.
- Payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto.

- The price represents the normal consideration for the property sold unaffected by special or creative financing concessions granted by anyone associated with the sale.

The implication of this definition is that the typical buyer is knowledgeable about and uses current techniques to set the price to be paid for the property. In applying the income approach, therefore, it is incumbent on the appraiser to

- be aware of the modern techniques used by investors to evaluate property;
- constantly monitor the marketplace to keep current as to the actual methods being used to determine price; and
- always use the same techniques that are being used by investors when estimating the value of a property.

The techniques used to capitalize income could be applied to income from the property before consideration of financing, after consideration of financing but before considering income taxes, or after consideration of income taxes. The income capitalization methods selected by an appraiser for estimating the value of a property should mirror the techniques actually being used in the marketplace by typical investors.

The theoretical framework of the income approach is based on the economic principles of anticipation, change, substitution, supply and demand, contribution, and opportunity cost. (You may want to review the discussion of these principles in Chapter 2.) These principles should be kept in mind as the various income capitalization techniques are illustrated.

INCOME CAPITALIZATION METHODS

There are two main income capitalization methods: direct capitalization and yield capitalization. Both methods convert income into an estimate of value, but they differ as to exactly how the income is capitalized.

Direct Capitalization

Direct capitalization is a method used to convert an estimate of a single year's income into an indication of value. It involves either dividing the income estimate by an appropriate capitalization rate (sometimes called an income rate) or multiplying the income estimate by an appropriate factor (sometimes called an income multiplier). The income estimate is usually the expected income for the first year of the investment holding period. The rate is based on an analysis of comparable sales.

For example, a property may sell for $1,000,000 and the buyer expects to receive NOI of $100,000 during the first year of ownership. This implies that the investor paid a price that was ten times the NOI. Thus, we can say that the NOI multiplier is 10. This is an example of a factor. Alternatively, using the same example, we could say that first-year net operating income is expected to be 10 percent of the value of the property. Thus, the capitalization rate is 10 percent. When the capitalization rate is calculated

using NOI, it is referred to as the overall capitalization rate. Capitalization rates and income multipliers can be developed from any of the measures of income discussed previously, for example, potential gross income, effective gross income, net operating income, before-tax cash flow (equity dividend), and even after-tax cash flow. Capitalization rates also can be developed using just the land or building income. The use of these various capitalization rates in appraisal is discussed in Chapter 7.

The advantage of direct capitalization is that the capitalization rates and income multipliers come directly from market indications of the relationship between income and value. However, because they are calculated using a single year's estimate of income, the assumption is that expected changes in income will be similar for the comparable properties and the subject property. In the preceding example the investor also may have expected income to increase 4 percent per year after the first year, with a commensurate increase in the property value each year. As we will see in later chapters, this implies that the investor expects a rate of return that will be greater than the 10 percent capitalization rate; that is, around 14 percent before considering the effect of financing. Thus, the 10 percent capitalization rate should only be used as an indication of the relationship between price and value for properties with similar expectations for increases in income and value. An investor who expected to earn a 14 percent rate of return would not pay $1,000,000 for a property that had the same $100,000 first-year income if that income were not expected to increase.

Yield Capitalization

Yield capitalization is a method used to convert income into an estimate of value by projecting the income or cash flow expected for each year of a typical investment holding period, including any cash flow at reversion. Yield capitalization estimates value by discounting the estimated income or cash flow, using a discount rate that represents the rate of return a typical investor will require if he or she is to invest in the property. Another term for yield capitalization is *discounted cash-flow analysis*.

The advantage of yield capitalization is that the income or cash flow for each year is explicitly identified. The discount rate used in yield capitalization should be the rate of return that investors would expect to earn on comparable properties; that is, properties of similar risk. However, because any change in income and property value is explicit in the discounted cash-flow analysis, the change does not have to be the same for the property being appraised and comparable sales. In fact, yield rates should be similar for any investments that have comparable risk. Thus, appraisers can select an appropriate yield rate without relying directly on comparable sales, assuming they can determine how the market would perceive the risk of the property being appraised relative to other investments.

Appraisers often debate the merits of direct capitalization versus yield capitalization. When adequate data are available, however, both techniques should be used, just as all three approaches to value should be used. They are likely to result in different value estimates because of the imperfections in the market, as discussed in Chapter 1. When there is an adequate amount of information on comparable sales with similar income expectations, direct capitalization can be very reliable. When information on

comparable sales is lacking, yield capitalization may provide a more reliable estimate of value, because the appraiser may be able to select an appropriate yield rate by determining what investors are requiring as a rate of return on investment of similar risk. Ways of selecting an appropriate yield rate are discussed in Chapter 19.

APPLICATION OF THE INCOME APPROACH

Application of the income approach can vary from one property type to another. Typical techniques used vary because of differences in the methods of income collection and expense treatment.

Office Buildings

Office buildings are usually rented to tenants under medium-term and long-term lease agreements. Rents can be collected either on a gross basis with the landlord paying all the operating expenses or on a net basis with the tenant paying some or all of the expenses.[1] Alternatively, leases may include provisions that result in an *expense passthrough*; that is, any increase in certain expenses (over some specified base amount) is "passed through" to the tenant for payment. The base amount is referred to as an expense stop and is usually stated on a per-square-foot basis.

Office building leases may also have provisions for increases in the rent tied to increases in, say, the consumer price index (CPI); for example, the base rent might be adjusted upward by 50 percent of any increase in the CPI.[2]

Because office building purchases usually include existing leases, values estimated for office buildings usually represent a leased fee interest. Proper application of the income approach to office buildings requires consideration of how estimated future cash flows and the resale proceeds at the end of the investment holding period are affected by existing leases.

Retail Shopping Centers

Shopping centers are also generally subject to leases. Major tenants usually have long-term leases that have a specified *minimum rent* as well as percentage rent provisions that allow the owner to receive a percentage of the tenants' retail sales volumes, if and when they exceed a predetermined level. Any amount received above the minimum rent because of the percentage rent provisions is referred to as *overage rent*. The smaller tenants (sometimes referred to as local tenants) usually have leases for short or medium terms with sales overage clauses. Tenants generally pay their own utilities costs and interior maintenance. Frequently, common area expenses (exterior maintenance, common area utilities, and so on) are shared among tenants on a pro rata basis based on leased area. It is possible that insurance and property taxes may be collected on a pro rata basis. For larger community and regional malls, tenants may also share advertising and management costs. Larger shopping centers require a high degree of marketing and management expertise and as a rule require anchor tenants, such as large national department stores, to sign operating agreements that

require the anchor tenant to operate in the shopping center for a specified number of years. A well-managed shopping center that has operating agreements in place and a diversified tenant mix with an established customer base may also include nonrealty interests in the price paid to purchase the shopping center.

Multifamily Residential Properties

Apartments are usually rented to tenants for terms of a year or less. Tenants often pay their own utility expenses, while the project owner pays for taxes, insurance, management, unit maintenance, and common area maintenance. With short-term leases, occupancy percentages may vary over time, which may make typical occupancy levels difficult to identify. When the turnover ratio is high, unit maintenance may also be high. The difficult aspect of applying the income approach to a multifamily project is the selection of appropriate expense levels. Differences in project design, construction type and quality, and tenant mix can greatly influence expenses.

Industrial Properties

Major manufacturing and special-use industrial plants are often owner occupied and therefore are not usually rented, so the income approach may not be applicable in appraising these properties. Warehouses and business parks may be rented, however, so the income approach would be a key approach when estimating their value. Warehouses and business parks are usually rented on a medium-term or long-term basis, with the tenant paying most of the operating expenses except for management fees and, possibly, property taxes, insurance, and exterior maintenance. When a building is occupied by a single tenant, the tenant usually pays all expenses except for management fees. Because these properties are usually subject to medium-term or long-term leases, the ownership interest valued is usually the leased fee.

Hotels and Motels

As a rule, hotels are not leased; therefore, the income analyzed is the total income generated by the hotel operation. The expenses reflect those required to operate the business. Consequently, the income and expense format is somewhat different from that of offices, apartments, or retail and industrial properties. The hotel operation usually includes nonrealty property, including personal property (furniture and fixtures), and business value (that is, the franchise value due to the hotel name, national reservation system, and so forth). All of these factors must be considered when estimating the real estate value of a hotel. The difficulty in valuing a hotel is that the incomes and expenses are highly sensitive to changes in average occupancy and daily room rates, which, in most cases, are directly related to the quality of management in the hotel. Estimating demand for hotel space is also difficult because there are many sources of clientele—business meetings, tourism, conventions, transient visitors, and so forth—which makes forecasting incomes and expenses difficult. Comparable sales are also difficult to analyze because each may include varying degrees of nonrealty interests in their sales prices.

Development Projects

The income approach (sometimes referred to as the *development approach* when valuing development properties) is the primary method used to estimate the value of land development projects. This approach requires a detailed study of market conditions, because the key factors in applying the approach are the absorption rate and market sales prices for the lots. Additional considerations include the timing of the development costs over the development period. Cash-flow forecasting is the difficult aspect of applying the income approach to estimating the value of development projects.

Special-Use Properties

Special-use properties, including health care facilities, recreational facilities, and recreational vehicle parks, have unique patterns of income and expense. Frequently, valuation of these properties includes nonrealty interests, as in the case of hotel properties. Care should be taken to support each input of the income and expense forecast as well as the discount rate.

ESTIMATING VALUE USING FIRST-YEAR CASH-FLOW FACTORS AND RATES OF RETURN

Value estimates for a variety of ownership interests may be calculated by applying an appropriate multiplier or capitalization rate to the property's first-year income or cash-flow forecast. The term *direct capitalization* is sometimes used to refer to the technique of deriving income multipliers or capitalization rates from comparable sales. Capitalization rates and income multipliers derived from comparable sales do not explicitly address profitability; they are simply observed ratios of income to value. However, they can provide a reliable estimate of value if

1. the first-year cash flow is representative; and
2. the income multiplier or capitalization rate is derived from comparable sales with the same potential for future income.

The common first-year ratios used by appraisers on an unleveraged basis (without consideration for financing) to estimate the value of an ownership interest include the income multipliers (*potential gross income multiplier [PGIM], effective gross income multiplier [EGIM],* and *net income multiplier [NIM]*) and several capitalization rates (*overall capitalization rate [R_O], land capitalization rate [R_L],* and *building capitalization rate [R_B]*). Use of the income multipliers is presented first. The first step in applying any income multiplier approach is to forecast the appropriate first-year income or cash flow (discussed in Chapter 6). The cash-flow forecast in this chapter is used to demonstrate the valuation techniques. In all cases in this chapter, the fee simple (unencumbered) value is estimated. The relevant issues and techniques used to estimate the value of other ownership interests are presented in later chapters.

Cash-Flow Forecast Summary	
Building type: office	
Gross building area	24,000 square feet (sq. ft.)
Net leasable building area	20,000 sq. ft.
Market rent estimate	$15.00/sq. ft.
Vacancy and credit allowance	6%
Operating expenses estimate	$4.10/sq.ft.
Potential gross income (PGI)	
20,000 sq. ft. @ S15.00/sq. ft.	$300,000
Less vacancy and credit loss (6%)	– 18,000
Effective gross income (EGI)	$282,000
Less operating expenses	
20,000 sq, ft, @ $4.10/sq. ft.	– 82,000
Net operating income	$200,000

Direct Capitalization Using PGIM, EGIM, and NIM

Potential Gross Income Multiplier.

Using a potential gross income multiplier (PGIM) of 7.0, the value would simply be found by multiplying the potential gross income (PGI) by the PGIM.

PGI		*PGIM*		*Value*
$300,000	×	7.00	=	$2,100,000

The PGIM is found by extracting PGIMs from sales of similar properties, comparing the attributes (physical, locational, and financial) of the comparables to the subject property, and selecting a multiplier that appears to be the appropriate number to use. When either calculating value or extracting multipliers, it is assumed that the rents are calculated on the same basis with regard to treatment of operating expenses (gross, net, and so on).

Although use of the PGIM does not specifically require an appraiser to make cash-flow forecasts beyond the first year, there is an implied assumption that the expected future annual performance (no matter what the cash flows actually turn out to be) will be similar to that of the first year. For example, suppose two properties have the same PGI at the time of the appraisal but the income of property B is projected to increase faster than that of property A. Property B should command a higher price; therefore, its PGIM will be higher because it is measured against first-year income.

Effective Gross Income Multiplier.

Using an effective gross income multiplier (EGIM) of 7.5, the value would simply be found by multiplying the effective gross income (EGI) by the EGIM.

EGI		*EGIM*		*Value*
$282,000	×	7.50	=	$2,115,000

The EGIM is found by extracting EGIMs from sales of similar properties, comparing the attributes (physical, locational, financial) of the comparables to the subject property, and selecting a multiplier that appears to be the appropriate number to use.

The primary difference between the EGIM and the PGIM is that the EGIM is applied to income after subtracting an estimate of vacancy and collection loss. If a difference in the vacancy rate of the comparable property and that of the subject property exists and is expected to continue, use of the EGIM is likely to be more appropriate because investors are likely to consider the difference in vacancy rate when establishing the value of each property. On the other hand, if the difference in vacancy rate is only temporary, use of the PGIM might be warranted because investors may value the property based on the assumption that the vacancy difference will be eliminated after the property is purchased.

As was the case for the PGIM, use of the EGIM does not specifically require an appraiser to make cash-flow forecasts beyond the first year. Thus, there is an implied assumption that the expected future performance of the properties will be similar.

Net Income Multiplier.

Using a net income multiplier (NIM) of 10.5, the value would simply be found by multiplying the net operating income (NOI) by the NIM.

NOI		*NIM*		*Value*
$200,000	×	10.5	=	$2,100,000

The NIM can be found by extracting NIMs from sales of similar properties, comparing the attributes (physical, locational, financial) of the comparables to the subject property, and selecting a multiplier that appears to be appropriate. An advantage of the NIM is that it is applied to income *after* expenses (and vacancy and credit loss) are deducted from the PGI. If there is a difference in the expense ratios of the subject and the comparable properties, the NIM is likely to provide a more reliable value estimate. As for the PGIM and EGIM, extracting an NIM from a comparable property and applying that NIM to the subject property assumes that the future performance of the properties will be similar.

Rather than use an NIM, the tradition in the appraisal field has been to use the reciprocal of the NIM, which is the overall capitalization rate (R_O) introduced in previous chapters. That is, rather than multiplying NOI by the NIM, we would divide the NOI by the overall capitalization rate.

Direct Capitalization Using an Overall Rate

A value estimate may be found by dividing the first-year net operating income (NOI) by an overall capitalization rate (R_O). Using an overall rate of 9.52 percent, the value estimate would be calculated as shown below.

$$\text{NOI} \div R_O = \$200{,}000/0.0952 = \$2{,}100{,}840$$

The R_O can be found by extracting overall rates from sales of similar properties, comparing the attributes (physical, locational, financial) of the comparables to the subject property, and selecting an overall rate that appears appropriate. As discussed for PGIM, EGIM, and NIM, an implied assumption is that the future performances of the comparable sale and the subject will be similar.

Residual Techniques Using Direct Capitalization

Residual techniques are used to estimate the value of a property when one of the components of the total property value is known and the other component is estimated. For example, the known component might be the building value and the unknown component the land value. This is referred to as a *land residual technique* because the land value is the unknown. If, on the other hand, the land value is known and the building value is unknown, this is referred to as a *building residual technique*. In the following sections we give examples of the land and the building residual techniques using direct capitalization. Recall that direct capitalization uses first-year income measures. In this case separate capitalization rates are applied to the land and the building incomes. There are other ways of doing land and building residual techniques, as well as other types of residual techniques. These are discussed later in this text.

Building Residual Example.

As indicated above, with the building residual technique, the land value is known, possibly from a separate analysis of comparable land sales using a sales comparison approach (discussed in Chapter 12). The following example assumes that the appraiser has already estimated the land value at $450,000. Furthermore, the appraiser has determined that the appropriate capitalization rates for the land and building are 9.5 percent and 10 percent, respectively. (Later on we will further discuss how these rates may be obtained.)

Given:

Land value	$450,000
Land capitalization rate R_L	0.095
Building capitalization rate R_B	0.10
Solution:	
NOI	$200,000
Less return to land ($450,000 × 0.095)	− 42,750
Building cash flow	$157,250

Building Cash Flow		*Building Cap Rate*		*Building Value*
$157,250	÷	0.1000	=	$1,572,500

Building value	$1,572,500
Plus land value	450,000
Property value	$2,022,500

One possible application of the building residual technique is in estimating the value of special-purpose buildings. In this case there may be comparable land sales, but no sales of comparable buildings.

Land Residual Example.

As previously mentioned, the difference between the building residual technique and the land residual technique is that in the land residual technique, the building value is known and the land value is to be estimated. Following is an example of the land residual technique.

Given:

Building value	$1,400,000
Land capitalization rate R_L	0.095
Building capitalization rate R_B	0.10
Solution:	
NOI	$200,000
Less return to building ($1,400,000 × 0.10)	–140,000
Land cash flow	$ 60,000

Land Cash Flow		*Land Capitalization Rate*		*Land Value*
$60,000	÷	0.095	=	$631,579

Building value	$1,400,000
Plus land value	631,579
Total property value	$2,031,579

This particular approach was originally developed to help estimate the highest and best use of the land. The assumption is that if the contemplated use of the land is the highest and best use, the value of the building should equal the cost of constructing it. Thus, the value of the building is assumed to be based on the construction cost. The land residual technique, as outlined above, would be repeated for alternative assumptions about the type of building constructed on the site to determine which use results in the greatest residual value to the land.

This approach to highest and best use analysis requires separate estimates of the land and the building capitalization rates. This can be difficult in practice. An alternative way of doing a highest and best use analysis to estimate residual land value is to first estimate the total property value (land and building), and then deduct the building costs to arrive at land value. Using the previous example, suppose the R_O is assumed to be 10 percent and the building value (based on construction cost) is $1.4 million. NOI is still $200,000. The land value could be estimated as follows.

NOI		R_O		Property value
$200,000	÷	0.10	=	$2,000,000

Property value	$2,000,000
Less building value	1,400,000
Land value	$600,000

The reader should note that residual techniques also can use the discounted cash-flow approach. Discounted cash flow is the subject of the next section.[3]

YIELD CAPITALIZATION (DISCOUNTED CASH-FLOW ANALYSIS)

Value estimates for a variety of ownership interests may be calculated by forecasting cash flows over a typical holding period and discounting those cash flows to a present value estimate using a typical discount rate. This valuation approach is called *yield capitalization* or *discounted cash-flow analysis*. The discount rates used in this approach directly address the expected profitability of the investment. This chapter demonstrates discounted cash-flow analysis on an unleveraged basis (without consideration of financing). Discounted cash-flow techniques that consider financing are presented in Chapter 15. The cash flows to be forecast with an unleveraged discounted cash-flow approach include NOI and net proceeds from resale. The discount rate is the property discount rate, which is sometimes called the "property yield rate" or *overall yield rate (Y_0)*. The first step in applying the discounted cash-flow approach is to forecast the cash flows over a typical holding period, as was discussed in Chapter 6.

The following cash-flow forecasts will be used to demonstrate the valuation techniques. In the first example, it is assumed that NOI is level. The resale is estimated to be $2.3 million at the end of a five-year holding period.

CHAPTER 8 EXAMPLE 1

Year	1	2	3	4	5
PGI	$300,000	$300,000	$300,000	$300,000	$300,000
Less vacancy and credit loss	– 18,000	– 18,000	– 18,000	– 18,000	– 18,000
EGI	$282,000	$282,000	$282,000	$282,000	$282,000
Less operating expenses	– 82,000	– 82,000	– 82,000	– 82,000	– 82,000
NOI	$200,000	$200,000	$200,000	$200,000	$200,000
Net resale proceeds (5 years)					$2,300,000

The standard discounted cash-flow formula for solving for value on an unleveraged (without financing) basis is

Value = Present value of NOIs + Present value of the net resale proceeds

Using a Y_0 of 12 percent to discount the cash flows results in the following present value estimate.

Year	Cash Flow		Present Value Factor @ 12%		Present Value
1	$200,000	×	0.892857	=	$178,571
2	200,000	×	0.797194	=	159,439

(continued on next page)

Year	Cash Flow		Present Value Factor @ 12%		Present Value
3	200,000	×	0.711780	=	142,356
4	200,000	×	0.635518	=	127,104
5	200,000	×	0.567427	=	113,485
5 (resale)	2,300,000	×	0.567427	=	1,305,082
Total present value					$2,026,037
			Shortcut Method		
Present Value Annuity @ 12%			*Present Value Factor*		
$200,000		×	3.604776	=	$720,955
$2,300,000		×	0.567427	=	1,305,082
Total present value					$2,026,037

In the analyses, the present value estimate is $2,026,037, which implies an R_o for the property of 9.87 percent ($200,000/$2,026,037). In this instance, the shortcut method could have been used to estimate the present value of the annual incomes because the NOIs were a level ordinary income. The shortcut cannot be used if the NOIs vary over time, as demonstrated below.

Variable Income and a Fixed Resale Price.

In the following example, the incomes and expenses are assumed to be increasing over time.

CHAPTER 8
EXAMPLE 2

Year	1	2	3	4	5	6
PGI	$300,000	$312,000	$324,480	$337,459	$350,958	$364,996
Less vacancy and credit	−18,000	−18,720	−19,469	−20,248	−21,057	−21,900
EGI	$282,000	$293,280	$305,011	$317,211	$329,901	$343,096
Less operating expenses	−82,000	−85,024	−88,183	−94,580	−98,021	−101,616
NOI	$200,000	$208,256	$216,828	$222,631	$231,880	$241,480
Resale proceeds (5 years)						$2,300,000

Using a property discount rate (Y_o) of 12 percent results in the following present value estimate.

Year	Cash Flow		Present Value Factor @ 12%		Present Value
1	$200,000	×	0.892857	=	$178,571
2	208,256	×	0.797194	=	166,020
3	216,828	×	0.711780	=	154,334
4	222,631	×	0.635518	=	141,486
5	231,880	×	0.567427	=	131,575
5 (resale)	2,300,000	×	0.567427	=	1,305,082
Total present value					$2,077,068

In this analysis, the present value estimate is $2,077,068, which implies an R_O for the property of 9.63 percent ($200,000/$2,077,068). The value is slightly higher than the value found assuming level income, obviously because of the additional income to be received.

■ **Note:** This also results in a lower implied R_O, even though the discount rate is the same, because the value is based on future income, whereas the capitalization rate uses the first-year income in the numerator. Thus, the more a property is expected to increase in value, the higher its present value and the lower its first-year capitalization rate.

It is important to understand how expected future income affects observed capitalization rates. That is why we stress that comparable sales should have the same expected future income when capitalization rates are derived from comparable sales. It would be incorrect to use a capitalization rate obtained from a comparable sale with little expectation of increase in future income to appraise a property with a much greater expectation of increase in income. Although the appraiser may feel that both properties have about the same risk, and thus would require the same Y_O, the R_O would have to be quite different. The relationship of these two rates (yield rate and capitalization rate) is stressed frequently in this text because although they are very different, they are often confused.

In the previous examples, the mathematics of applying the discounted cash-flow technique is relatively simple because all future cash flows are known before solving for present value. This situation can occur when the reversion is forecast by capitalizing the last-year or last-year-plus-one-year NOI by a terminal capitalization rate (see Chapter 7).

Variable Income and Resales Based on a Terminal Capitalization Rate.

Recall that in Chapter 6 we discussed the concept of a terminal capitalization rate. The terminal capitalization rate can be applied to an estimate of income for the next owner to estimate the resale price. This income depends on how market rates are expected to change over the first owner's holding period and whether any of the original leases are still in effect. (Ideally, all the leases will have been renewed at an

estimated market rental rate before the end of the holding period, so the estimated resale price is not affected by any below-market or above-market rent.)

Following is a discounted cash-flow analysis that assumes the resale price is estimated using a 10 percent terminal capitalization rate (based on year 6 NOI) and a 12 percent property discount rate.

CHAPTER 8 EXAMPLE 3

Estimated year 6 NOI = $241,480
Resale = NOI (6th year) ÷ Terminal R_O
Resale = $241,480 ÷ 0.10
Resale = $2,414,800

Year	Cash Flow		Present Value Factor @ 12%		Present Value
1	$200,000	×	0.892857	=	$178,571
2	208,256	×	0.797194	=	166,020
3	216,828	×	0.711780	=	154,334
4	222,631	×	0.635518	=	141,486
5	231,880	×	0.567427	=	113,575
5 (resale)	2,414,800	×	0.567427	=	1,370,223
Total present value					$2,142,209

In the analysis, the present value of the total property value is $2,142,209, which implies an R_O of 9.34 percent ($200,000/$2,142,209). When using a terminal capitalization rate to estimate the reversion, an appraiser should compare the implied overall capitalization rate (in this case, 9.34 percent) with the terminal capitalization rate (10 percent) to see whether the proper relationship is implied. In this instance, would it be logical that today's overall capitalization rate would be 0.66 percent lower than the terminal capitalization rate (perhaps due to the higher risk associated with estimating the resale price)? We are much less sure of the NOI in year 6 than we are of the NOI today. Therefore, because we are estimating the resale price based on the uncertain NOI in year 6, it may be appropriate to add a risk premium to the terminal capitalization rate. This strategy is conceptually the same as using a higher discount rate to discount cash flows beyond year 5 to estimate the resale price in year 5. Another possible reason for using a higher terminal capitalization rate is that the NOI growth will be less after year 5 than it was during the first five years. (Recall how the expected growth in NOI affects capitalization rates: the less the expected growth, the higher the capitalization rate.)

On the contrary, there may be a circumstance where it would be logical for the terminal rate to be lower than the going-in capitalization rate. For example, the potential for income growth might be expected to be greater after the property is sold because of changing economic conditions or, perhaps, a planned renovation of the property during the holding period.

The appraiser also should calculate the implied change in value over the holding period and compare it with the change implied in the NOI. In this instance, the NOI increased from $200,000 to $241,480, a total of about 21 percent over the five years from year 1 to year 6. Over the same five years value would increase from $2,142,209 to $2,414,800, a total of about 13 percent. Would a 21 percent increase in income and a 13 percent increase in property value reflect the expectations of a typical investor? If not, the appraiser may need to alter the input assumptions.

- **Note:** In this case the increase in income is greater than the increase in property value. This could reflect a situation in which there are below-market leases that will expire during the holding period. Income will rise more than the property value in this situation because the fact that income is expected to increase is already reflected in the initial present value estimate when it is found by discounting estimated future cash flows (including the reversion).

Percentage Change in Value.

Frequently, an appraiser may wish to solve for value, assuming the resale will change by a certain percentage (annual or total) over the holding period. In this instance, the resale price will not be known until the value is found because the resale price depends on the present value being calculated. At the same time, the present value depends on the resale price. Although this may be a valid appraisal assumption, it presents a mathematical problem when we attempt to solve for present value. There are many ways of solving this type of problem:

- Using algebra
- Using a *yield capitalization formula*
- Using a computer

We will demonstrate the use of algebra and the yield capitalization formula to show that yield capitalization formulas were developed, in effect, to presolve the algebra by solving for an R_O that gives the same answer as the algebra. The same answer also can be found using a computer. In this case, the computer can be programmed to solve for the present value while allowing the resale price to depend on the present value. A discussion of the procedure that computers use to solve the problem is beyond the scope of this book. However, the reader should be aware that there are a number of commercially available software programs as well as electronic spreadsheets that can solve this type of problem.[4]

Variable Income and an Unknown Resale Price.

Following is an example of using algebra to solve for present value, assuming level income over five years, a resale value that increases by 15 percent over the five years, and a 12 percent property discount rate, which results in the present value estimate. (V represents property value.)

CHAPTER 8
EXAMPLE 4

Year	Cash Flow		Present Value Factor @ 12%		Present Value
1	$200,000	×	0.892857	=	$178,571
2	208,256	×	0.797194	=	166,020
3	216,828	×	0.711780	=	154,334
4	222,631	×	0.635518	=	141,486
5	231,880	×	0.567427	=	131,575
5 (resale)	(V + 0.15V)	×	0.567427	=	0.652541 V
Total present value					$771,987 + 0.652541 V

$$V = \$771,987 + 0.652541\ V$$
$$0.347459\ V = \$771,987$$
$$V = \$2,221,806$$

The resale value is

$$\text{Resale price} = \$2,221,806 \times 1.15 = \$2,555,077$$

** Proof **

Year	Cash Flow
0	($2,221,806)
1	200,000
2	208,256
3	216,828
4	222,631
5	2,786,951

IRR = 12.0%

In the analysis, the present value is $2,221,806, which implies an R_o for the property of 9.00 percent ($200,000/$2,221,806). Proof that the answer is correct is that the internal rate of return for the implied cash flows is equal to the property discount rate (Y_o) used in the analysis.

Finding the answer to a problem that requires algebra is not only tedious, it is usually time-consuming. Fortunately, it is relatively easy to solve this type of problem using a spreadsheet or a computer program.

Estimating Value Using Yield Capitalization Formulas

In the 1960s and 1970s, before the introduction of personal computers, a series of formulas were developed to shortcut the calculation of discounted cash-flow

problems. The use of a formula approach to solving discounted cash-flow problems is sometimes referred to as *yield capitalization* because it involves developing a capitalization rate based on an assumed yield rate. That is, rather than obtaining the capitalization rate from comparable sales, it is mathematically derived from an assumption about the yield rate that the typical investor would require to invest in the property. As we shall see, this capitalization rate gives an estimate of value consistent with discounting the implied cash flows.

Although this approach produces a capitalization rate, the logic used to arrive at that rate is quite different from that used in direct capitalization. The formula is used instead of discounting the cash flows because the resale price is assumed to depend on the unknown property value. This results in an algebraic problem with an unknown value on both sides of the equation. The yield capitalization formulas presented in the remainder of this chapter were developed as an alternative to solving the problem algebraically. In effect, these formulas result from solving the problem in terms of an overall rate that can be used in more general cases.

The basic unleveraged yield capitalization formula was derived by beginning with the basic discounted cash-flow relationship and algebraically solving for the capitalization rate R_O that can be used to calculate the value.

Yield capitalization formulas are derived by making an assumption about the pattern of future income and the projected change in value. The first case we consider is level income with a change (Δ) in value.

In this case the basic yield capitalization formula is $R_O = Y_O - \Delta 1/S_{\overline{n}|}$, where Y_O is the required yield (discount) rate and $1/S_{\overline{n}|}$ is the sinking fund factor. Recall that the sinking fund factor is the amount that must be invested each year to have a future value of $1 based on earning interest at a specified rate for a specified number of years. In this case the yield rate (Y_O) is the interest rate and the holding period is the number of years used to calculate the sinking fund factor $1/S_{\overline{n}|}$.

Value Estimate Assuming Level Income and a Changing Resale Price.

Following is a value solution assuming level NOI at $200,000, a 15 percent increase in value over a five-year period, and a 12 percent property discount rate (Y_O). The sinking fund factor for five years at 12 percent is 0.157410. This can be calculated using a financial calculator as follows.

CALCULATOR APPLICATION
FV = 1
PV = 0
n = 5
i = 0.12
Solve for PMT
PMT = 0.157410

$$R_o = Y_o - \Delta/1/S_{\overline{n}|}$$
$$R_o = 0.12 - (0.15)(0.157410)$$
$$R_o = 0.096388$$
$$\text{Value} = \text{NOI}/R_o = \$200{,}000/0.096388 = \$2{,}074{,}947$$

** Proof **

Year	Cash Flow
0	($2,074,947)
1	200,000
2	200,000
3	200,000
4	200,000
5	$2,586,189

IRR = 12.0%

The value found using the formula is the same as that using the algebraic approach in the discounted cash-flow discussion. In this instance, the R_o is less than the Y_o because additional profit (return *on*) will come from the increase in property value at resale.

Level Income with No Reversion.

In some valuation situations the income may be level for a specified holding period but there may be no reversion at the end of the holding period. For example, suppose a special-purpose building is leased to the user with a level lease that has a term equal to the economic life of the building. In this situation the income is simply a level annuity. One way to value this annuity is simply to use the present value of an annuity factor (column 5) from the compound interest tables in the appendix in the back of the book.

For example, suppose you are valuing the personal property in a hotel. The personal property (that is, furniture and fixtures) is estimated to have a five-year economic life. The appraiser estimates that $10,000 of the NOI from the hotel can be attributed to the personal property and the NOI is assumed to be level for the five-year economic life. What is the value of this property, using a 10 percent discount rate?

One approach is to use the present value of $1 per period from the compound interest tables in Appendix A, which is 3.790787. Thus, we have:

$$\$10{,}000 \times 3.790787 = \$37{,}908$$

Or using a financial calculator:

CALCULATOR APPLICATION
FV= 0
$n = 5$
$i = 0.10$
PMT = 10,000
Solve for PV
PV = 37,908

Alternatively, we can use the yield capitalization formula introduced above to solve for an overall capitalization rate as follows:

$$R_O = Y_O - \Delta_O 1/S_{\overline{n}|}$$

Because there is no reversion, we can say that the property will lose 100 percent of its value, which means that Δ_O is −1.0. Thus, the yield capitalization formula becomes:

$$R_O = Y_O + 1/S_{\overline{n}|}$$

Using this overall rate, the value is estimated as follows:

$$\$10{,}000/0.263797 = \$37{,}908$$

Note that the sinking fund factor $1/S_{\overline{n}|}$ is based on a 10 percent discount rate. This implies that a portion of the NOI could be reinvested at 10 percent to replace the investment. We could say that Y_O represents return on capital and $1/S_{\overline{n}|}$ represents return of capital.

Value Solution Assuming Income and Value Are Changing at the Same Rate.

A yield capitalization formula can be used in another special situation, when NOI and property value are expected to change by the same annual compounded rate. In this case the formula is $R_O = Y_O - \text{CR}$ where CR is the annual rate of change.

The interesting fact about using this formula is that the overall rate is the same for all holding periods. Following is the solution for value assuming a property discount rate of 12 percent (Y_O) and a 3 percent annual change in NOI and resale:

$$R_O = Y_O - \text{CR}$$
$$R_O = 0.12 - 0.03$$
$$R_O = 0.09$$
$$\text{Value} = \text{NOI}/R_O = \$200{,}000/0.09 = \$2{,}222{,}222$$

** Proof **

Year	Cash Flow
0	($2,222,222)
1	200,000
2	206,000
3	212,180
4	218,545
5*	$2,801,266

IRR = 12.0%

* [$225,102 + ($2,222,222)(1.03)5]
= $2,801,266

■ **Note:** If the NOI continues to increase 3 percent per year, it will be $231,855 in year 6. Using this sixth-year NOI, we can calculate the terminal capitalization rate as follows:

$$R_T = \$231,855/52,576,164$$
$$= 9\%$$

where R_T equals the terminal capitalization rate.

This is exactly the same as the going-in capitalization rate that was calculated above. This is not a coincidence. This yield capitalization formula implicitly assumes that the capitalization rate will be constant through time and, therefore, the terminal capitalization rate will always equal the going-in capitalization rate.

We can certainly envision situations where it is reasonable to assume that income and value will increase at the same compound rate. In fact, for fee simple estates or leased fee estates, where leases have clauses that keep rent at the market rate, this is probably a reasonable approximation. However, recall our earlier discussion of the relationship between the going-in capitalization rate and the terminal capitalization rate. An assumption that they are going to be the same implies that expectations for increases in income will be the same at resale as they are at the time the property is being appraised. This assumption does not allow for economic deterioration in the value of the property. Thus, it should be made only when it is warranted based on a careful analysis of the property's potential. Furthermore, recall that the terminal capitalization rate often includes a risk premium, even if the anticipated future growth in NOI is expected to be the same at resale as it is at the time of the appraisal.

Residual Techniques Using Yield Capitalization Formula.

Before the 1970s, when annual inflation became an accepted fact in the marketplace and mortgage loans became important in the financing of real estate transactions,

a segment of investors separated real estate into its physical components (land and building) and analyzed each separately when arriving at a purchase price.

The basic assumption then was that the land value would basically remain stable over time and that the building would lose value over its economic life because of depreciation. Ultimately, at the end of the life of the building, the property value would equal the original land value. Appraisal techniques developed to mirror this purchasing strategy were called residual techniques (land residual and building residual). When solving for value in the building residual technique, the value of the land was calculated first, by sales comparison, and the building value became the unknown (the residual). In the land residual technique, the value of the building was assumed and the land value became the unknown to be found (the residual). Once the unknown component was estimated, it was then added to the known component to arrive at a value estimate for the total property.

As mentioned earlier in this text, the two basic motives of an investor are

1. to recover the initial investment; and
2. to earn a profit.

In appraisal terminology the act of recovering an investment is referred to as *return OF capital* and any additional profit earned is referred to as *return ON capital.* Because land value was assumed to be level over the life of the building, total return of the land investment was expected at resale. All annual income, therefore, attributable to the land represented return *on*, or profit, owing to the land. On the other hand, the building was expected to lose its total value over its life. Therefore, the income attributable to the building must provide for both total return *of* the original investment as well as a reasonable return *on* capital.

The problems that arose when applying the residual techniques in estimating value were, first, in estimating the NOI over the entire life of the building and, second, in dividing the income into the portion attributable to the land and the portion attributable to the building. In addition, the land and building capitalization rates, unlike overall capitalization rates, were not readily extractable from comparable sales. If they were known, solving for value would have been a simple matter, as shown in the example demonstrating the building residual technique.

Because building and land capitalization rates were not readily observable in the market, yield capitalization techniques were used to estimate the building and land capitalization rates. In essence, the land capitalization rate was assumed to be equal to the return *on* profit rate (often referred to as the land yield rate or the discount rate) and the building capitalization rate was a combination of the return *on* or profit rate (yield or discount rate) plus an adjustment added to ensure full return *of* the building investment over its life. The return of rate was referred to as the recapture rate.

The following example shows how we can use the yield capitalization formula for level income and a change in property value discussed earlier to develop a land and building capitalization rate.

Building Residual

Given:

NOI	$200,000 (level for 25 years)
Land value	$450,000
Discount rate estimate (Y_O)	0.095
Land capitalization rate R_L	0.095*
Building life	25 years
Sinking fund factor	0.01096†

*Same as discount rate because the change in land value Δ_L is assumed to be zero.

†Sinking fund factor for 25 years at a 9.5% internal rate. Referred to as the recapture rate (return of capital) for the building.

Because the holding period is the entire economic life of the property and value is zero at the end of the holding period, the change in building value, Δ_B, would be -1. Therefore, $R_B = Y_O + 1/S_{\overline{n}|}$

Building capitalization rate (R_B)	=	Discount rate	+	Recapture rate
		0.095	+	0.01096
	=	0.10596		

Solution:

Net operating income	$200,000
Less return to the land ($450,000 × 0.095)	−42,750
Building cash flow	$157,250

Building Cash Flow		*Building Cap Rate*		*Building Value*
$157,250	÷	0.10596	=	$1,484,051

Building value	$1,484,051
Plus land value	450,000
Total property value	$1,934,051

STABILIZING INCOME

We have discussed several yield capitalization formulas that can be used to estimate value. These formulas required very specific assumptions about the expected change in income and property value. A more general way of dealing with a variable income pattern is to stabilize the income pattern (i.e., convert the variable income pattern into an equivalent level income pattern). We can then estimate the value of the stabilized income pattern using the level income yield capitalization formula discussed earlier in this chapter.

To stabilize a variable income pattern, we need to calculate an equivalent level income with the same present value. This can be done with the following two steps:

1. Find present value of nonlevel income stream using appropriate yield rate (Y_O or Y_E).
2. Multiply the present value from step 1 by the installment-to-amortize-$1 factor (using the same yield rate and holding period) to obtain an equivalent level income stream.*

*Alternatively, we could divide the result from step 1 by the present value of $1 factor. This step can be thought of as finding payments for a loan.

Assume the following:

NOI in year 1	$100,000
Increase in NOI after year 1	4%
Increase in value over 5 years	15%
Y_o	12%
Holding period	5 years

Stabilize the income and estimate the property value using a yield capitalization formula.

Calculation of equivalent-level income:

			Present Value of NOI		
Year	*NOI*		*PV Factor*	=	*Present Value*
1	$100,000	×	0.892857	=	$89,286
2	104,000	×	0.797194	=	82,908
3	108,160	×	0.711780	=	76,986
4	$112,486	×	0.635518	=	$71,487
5	116,986	×	0.567427	=	66,381
					$387,048

Total present value of NOI × Installment-to-amortize-$1 factor = Equivalent level income

$$\$387,048 \times 0.277410 = \$107,371$$

Calculation of capitalization rate:

Application of level income yield capitalization formula:

$$\begin{aligned} R_O &= Y_O - \Delta_O \, 1/S_{\overline{n}} \\ &= 0.12 - 0.15(0.157410) \\ &= 0.096389 \end{aligned}$$

Calculation of value:

$$\begin{aligned} \text{Value} &= \$107,371/0.096389 \\ &= \$1,113,934 \end{aligned}$$

** Proof **

Year	Income
0	($1,113,934)
1	100,000
2	104,000
3	108,160

(continued on next page)

Year	Income
4	112,486
5*	$1,398,010

IRR = 12.0%
* $116,986 + (1.15 x $1,113,934)

Income Stabilization Factor

An alternative way of stabilizing income is to calculate a factor that, when multiplied by the first year's income, results in the equivalent level income. This is illustrated below using the information from the previous example.

Refer to the previous example. Calculate the equivalent level income based on a factor.

Calculation of factor

Year	Δ in NOI*		PV Factor @ 12%		Present Value
1	1.000000	x	0.892857	=	0.892857
2	1.040000	x	0.797194	=	0.829081
3	1.081600	x	0.711780	=	0.769861
4	1.124864	x	0.635518	=	0.714871
5	1.169859	x	0.567427	=	0.663809
Total					3.870480

*The change in NOI from year 1. In this case the change is $(1.04)^{(n-1)}$ where *n* is the year.

Calculation of Income Stabilization Factor.

The *income stabilization factor* (X) is found by multiplying the present value calculated above by the installment-to-amortize-$1 factor.

Income stabilization factor = 3.870480 x 0.277410 = 1.073709

Calculation of Level Income.

1.073709 x $100,000 = $107,371. The answer is the same as calculated previously.

Adjusting the Capitalization Rate

The previous example estimated the value of the property with the following two steps:

1. Stabilize the income by multiplying the first-year income by an income stabilization factor.
2. Divide the income from step 1 by a capitalization rate that assumes the income is level.

A slight variation of this approach is as follows:

1. Divide the capitalization rate (for level income) by the same income stabilization factor as calculated above.
2. Divide the first-year income (unadjusted) by the adjusted capitalization rate calculated in step 1.

The difference in the latter approach is that the capitalization rate is adjusted rather than the income. The result of each approach is mathematically the same. An advantage of adjusting the overall capitalization rate rather than income is that capitalization rates can be compared with capitalization rates from other properties.

Using the same information as the previous example, estimate the value of the property by adjusting the capitalization rate.

Using the symbol X for the income stabilization factor, we have

$$\begin{aligned} R_O &= (Y_O - \Delta_O\, 1/S_{\overline{n}}) \div \mathrm{X} \\ &= [0.12 - 0.15(0.157410] \div 1.073709 \\ &= 0.089772 \end{aligned}$$

$$\begin{aligned} V_O &= \$100{,}000 \div 0.089772 \\ &= \$1{,}113{,}934 \end{aligned}$$

This is the same answer as found previously ($1 difference due to rounding).

SUMMARY

This chapter presented a variety of techniques used to value real estate income property. In general, these techniques could be categorized as either direct capitalization or yield capitalization. Direct capitalization uses first-year measures of income or cash flow to estimate value. This includes the use of income multipliers such as the potential gross income multiplier, effective gross income multiplier, and net income multiplier, as well as the use of capitalization rates such as the overall capitalization rate, land capitalization rate, and building capitalization rate.

Yield capitalization requires an assumption about the estimated future income of the property. Value is estimated by discounting this income, including any proceeds from reversion, at an appropriate yield rate. Another term for yield capitalization is discounted cash-flow analysis. When estimating value using yield capitalization, the first-year NOI must always be explicitly estimated. Income after the first year must be either explicitly estimated for each year of the investment holding period or assumed to change according to a particular mathematical process. Several common alternative income patterns were discussed, such as level income and compound change.

Similarly, either the proceeds from reversion must be estimated as a dollar amount or the property value must be assumed to change by some specified percentage amount over the holding period. A common way of estimating the reversion proceeds as a dollar amount is to apply a terminal capitalization rate to the NOI during the first year following the end of the assumed investment holding period. When value is assumed to change by a specified percentage amount per year or a total percentage change over the holding period, the value must be estimated either by solving an algebraic equation or by using an appropriate yield capitalization formula. Yield capitalization formulas have traditionally been used for specific assumptions about the manner in which income and value will change over the investment holding period. These formulas require simplifying assumptions about the pattern of income, but were useful to appraisers before the advent of personal computers allowed appraisers to solve more complex discounted cash-flow problems. Whether the value is estimated by hand using a formula or with the aid of a computer, it is important to recognize that the value simply represents the present value of the future cash flows that the investor expects to receive over the investment holding period. The appraiser can always "prove" this by discounting the implied cash flows.

The yield capitalization process automatically ensures that the investor will receive a return *on* capital in addition to return *of* capital invested. Normally the appraiser does not have to be concerned with what the property owner does with the return of capital each year. However, in the case of short-lived assets such as personal property, appraisers sometimes feel that it is appropriate to make an explicit assumption that a portion of the return of capital will be used to establish a sinking fund to periodically replace the asset. The Hoskold premise assumes that this sinking fund earns interest at a rate lower than the yield rate assumed to represent the rate of return on capital that must be earned on the investment.

Residual techniques allow the appraiser to apply an income approach to estimate the value when one of the components of value is assumed to be known. In this chapter the land and building residual techniques were introduced. In the case of the land residual technique, the building value must already be specified. This technique is sometimes used in a highest and best use analysis because the building value is assumed to equal the cost of constructing the building when the building represents the highest and best use of the site. Similarly, in the case of the building residual technique, the land value must already be specified. This approach is sometimes used to estimate the value of special-purpose buildings where land value is assumed to be known, for example, from a separate analysis of comparable land sales.

In this chapter, value was estimated without explicitly considering the effect of debt financing. Chapter 13 discusses how financing affects yield rates and other investment measures. This sets the stage for Chapter 14, which illustrates how financing can be incorporated into the valuation process, using either direct capitalization or yield capitalization.