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Financial Analysis of Real Property Investments

This note examines some of the methods by which real property investments are analyzed, including those most commonly used and others that will serve for purposes of comparison or illustration. It also offers suggestions about analytical techniques and provides sources of useful information.

The reader should be aware throughout that a successful analysis of a real property investment must consider many critical characteristics that are not easily reflected in the mathematics of a financial analysis. Among these are (a) the extremely long time horizon involved, (b) the lack of liquidity, and (c) the effects an ever-changing environment. In short, the investor must temper financial analysis with an understanding of the risks involved before proceeding.

The task of analyzing a real estate investment may be divided into three components:

1. **Cash flow** The amount of cash annually received by the investor, including revenues generated and financing proceeds realized, minus all cash expenses incurred, with the exception of income taxes;
2. **Tax effect** The amount by which the investment affects the taxes payable in the current year by the investor;
3. **Future benefits** The amount by which the capital position of the investor is affected by the sale or refinancing of the property or entity owning the property on an after-tax basis. It takes into account prior mortgage amortization and the change in value of the asset.

This note examines each of these elements of return and their use in establishing an overall rate of return and valuation of the property as well as the effects the passage of time may have on all of the above.

Professor William J. Poorvu prepared this note as the basis for class discussion.

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The Setup

The term *setup* is real estate jargon for a combination of the income statement and cash flow statement. The purpose is to get a better measure of value than either of these statements alone could provide. For the purchaser of real property, the setup provides the basis for a measure of the value of the acquisition. By adjusting the setup, a purchaser can trace the effect on market value of any changes that might be made. Preparing a setup is also useful to the owner of property not currently producing income. It provides a measure of opportunity cost by showing the amount of carrying costs over time and the amount of money at risk in holding the property.

Preparing a setup for a specific piece of real property is a two-step process. The first step focuses on the pretax cash flow. The second measures the effect of taxes. By following the procedure outlined in **Table A**, the pretax cash flow may be determined.

Table A Determining Pretax Cash Flow

Gross revenues:	Base rentals
	Rent escalators
	Expense reimbursements
	Other income
– Vacancies, bad debts	
= Net revenues	
– Operating expenses:	Real estate taxes
	Administrative
	Insurance
	Utilities
	Maintenance, supplies, and trash removal
	Repairs
	Replacement and other reserves
	Other expenses
= Cash flow from operations (also known as free- and-clear cash flow or operating cash flow)	
– Financial payments:	Mortgage interest
	Mortgage amortization
	Land-lease payments
– Capital expenditures	
= Cash flow after financing or cash flow before taxes	

A setup can be prepared using either actual or estimated expense figures. It is critical that a prospective buyer know what kind of information is being shown by the seller because: (1) historical and estimated cash flow may have a direct bearing on one's financial analysis, and (2) lenders use operating cash flow to determine the value of property offered as security for a loan. Lenders examine every expense item very critically.

The portion of the gross rental that goes to each of the expense items varies significantly according to type of property, age of property, its location, and whatever agreements might exist between the lessor and lessee concerning the apportionment of expenses. These factors are subject to careful research besides simple estimation. The allowances for replacement and repair deserve careful consideration; these are especially critical in older properties that may be subject to deterioration or stylistic obsolescence. In certain types of properties such as office buildings, reserves should be taken for tenant improvements and rental expenses at such times as leases expire.

Elements of the Setup

This section looks at each of the elements of the setup, and it discusses the changes in emphasis within the elements themselves caused by dealing with different kinds of property (i.e., apartments, office buildings, industrial space, retail space, and, in some categories, raw land and mobile home parks).¹

Gross Revenues

The analysis of an income property should start with *base rentals*. As a first step in the analysis of rentals, the investor should attempt to determine *comparables*. Comparables are rents or revenues generated by properties with similar features (e.g., size, age, quality of construction) and in similar locations. The gathering of baseline data on comparables is generally the first step in the collection of local knowledge required before investing. For apartments, mobile home parks, and some smaller commercial rentals, the daily or Sunday newspaper offers a first source of comparable data. The rental prices generally are quoted in a \$-per-month rate and are apt to be at or above market. The primary function of such advertising is to generate demand; some discount may, however, be expected. Once a specific area is selected, the investor should check more localized sources to make certain of the range and distribution of the potential competition for the contemplated investment. The investor should consult the local realtor's listing book and regional weekly newspapers and should make a tour of the area, noting vacancies and other existing buildings.

Rental rates for office, commercial, and industrial space are generally quoted in dollars per square foot. The amount of the space may be the usable space or more commonly the rentable space which includes a pro rata allowance for certain common areas. Because of the difference in the way common area is allocated, comparability is difficult. The primary sources of information about current market conditions come from specialized journals and surveys by brokers and consultants. In addition, most of the major real estate brokers print listings of available office, industrial, and retail space. Industrial space may also be listed with the state government bureau responsible for commercial development. It is important to remember that the rents and terms noted in these listings are often only suggestive ones. Almost all of the terms will be negotiable, depending upon factors such as the market strength, the financial creditworthiness of the prospective tenant, the length of the lease and the tenant's requirements for improvements.

Two fundamental skills are required to develop significant comparables: (1) the ability to ferret out the greatest amount of useful data, and (2) the ability to put these data together into a meaningful picture of the whole. In dealing with all kinds of properties, the investor must understand the characteristics that make properties comparable: internal features such as layout, ease of maintenance, adequacy of utilities, decor and amenities are all critical items of comparability. Exterior considerations are also important. Properties that have very similar inside features but that have different: locations, access to transportation, parking and views, can command very different rentals. These differences can be determined by actually shopping the market.

The prospective investor or developer must determine what the competition is, what it is likely to be, and how effectively a particular property can compete. Once this task is accomplished, a realistic standard can be set for the income to be obtained from the property.

¹Fundamental data about the elements can be found in the Building Owners and Managers Association's *Experience Exchange Report*, the Institute of Real Estate Management Experience Committee's *Statistical Compilation and Analysis of Actual Income and Expenses Experienced in Apartment Building Operation*, and *The Dollars and Cents of Shopping Centers*, compiled by the Urban Land Institute.

After baseline data are developed for gross revenue potential, the next step is to project the observable trends, such as government policy and inflation. Is rent control a reality or a possibility? Are there public incentives for particular groups of people, locations, or types of property? The impact of trends varies widely according to the type of property involved. In residential and smaller commercial properties, trends are very important. Generally the leases, if any, are of short duration. This provides an opportunity to adjust rents if price levels are rising or, conversely, to decrease rents if the neighborhood is declining.

For commercial and industrial properties under long-term leases, the impact of trend analysis is less important over the short term. The gross revenue figures will be those provided in the lease during the term of the lease. The investor should, however, carefully consider the impact of the observable trends on the willingness of present tenants to renew or, with commercial properties, the impact of the changes in the local market on average rents.

Beyond trend analysis, some of the key profit opportunities occur through the projection of discontinuities in the observable trends. Similarly, major losses may arise through failure to observe unfavorable discontinuities before they occur and to adjust the investment strategy accordingly. Some discontinuities that are of greatest importance are urban renewal activities, new-highway location, entry of national firms into the market, entry or exit of a major industry, and the changing socio-economic characteristics of a neighborhood.

The critical element in projecting discontinuities is timing. When predicting a favorable change, decisions taken too early tend to be risky. Decisions taken too late, although involving the investor in little risk, usually result in missed opportunities for profit. In predicting unfavorable changes, it is often better to be too early. The opportunities to bail out of a property get worse as the likelihood of the unfavorable event increases. "Holding out for the best price" may be simply an exercise in following the market down.

Analysis of trends and potential discontinuities is possible insofar as the general economic and political data are adequate. Such data are available through local newspapers and also through national journals such as *National Real Estate Investor* and *Real Estate Appraiser and Analyst*. These two publications provide facts useful in making specific projections relative to the properties that an investor holds or contemplates buying.

For commercial properties, the base rental in the lease is only part of the story. There may be built-in *rent escalators*. These may be fixed (such as defined step-ups in rent) or conditional (such as increases tied to changes in the cost of living). In retail leases, percentage-rent clauses tie the rent level to tenants' sales performance. The longer the lease term, the more likely there will be adjustments.

Expense reimbursements have also become common, especially in leases for nonresidential property (for such items as real estate taxes, heat, electricity, water, insurance, normal maintenance including cleaning and management). Typically, the tenant will agree to reimburse the landlord either for all such expenses or for changes from a predefined base which may be established as a specific dollar amount per square foot or as the actual expenses during the first or base year. Leases with these kinds of provisions are usually described as having an "expense stop", and lenders often insist on this provision to protect their mortgage. In a multitenant building, each tenant's share of these common charges is often expressed as a percentage based on total space occupied. In acquiring a property it is crucial to analyze the terms of each individual lease and to have a reporting system that takes such complexities into account.

Other income is an item that should be examined carefully in contemplating any form of real property investment. Sources such as laundry rental, furniture rental, parking charges, utility fees, and recreational club dues are often very important profit contributors in housing investments. The investor is cautioned to examine carefully the assumptions underlying such income projections. Similarly, agreements and leases should be examined, and the investor should be aware of local practice regarding the inclusion of certain items when making a forecast. For example, if amenities such as air conditioning are not included in the base rent where such inclusion is common practice in the locality, the occupancy of the property may suffer. Other income may, in fact, be an opportunity for the investor: to charge separately for the rental of major appliances or covered parking. It can yield a very high return on the marginal investment.

Commercial and industrial buildings also offer some opportunities for other income. Among the possibilities are special janitorial service, parking, and communication equipment on the roof. Again, the two factors to consider are the leases or agreements underlying such charges and the local practice. In commercial, industrial, and residential properties, the “other income” category, once established, should be reasonably stable—subject primarily to changes in vacancy. It is important, however, to be aware of the profit opportunities and, in initial analysis, to be certain that those opportunities that are projected, really exist. On the positive side, it is often wise to look for some of the unrealized potential that may come from the other income category when contemplating a future purchase or development.

Vacancies

The second item in the setup that the investor needs to analyze is vacancies. The prospective purchaser is often presented with a setup that makes no allowance for vacancies or collection problems. This is especially common with commercial properties. Nevertheless, some reasonable vacancy allowance is almost always necessary for all properties; the art lies in determining what is reasonable. The reader is reminded, however, that even for a property 100% rented to one tenant, a four-month vacancy period between tenants at the end of the lease term equals 30% or 3% per year for 10 years. With a special-purpose building or an office building, even this 3% vacancy may not be adequate. Failure to incorporate such an allowance into the overall scheme may materially distort the potential future return. In buildings with longer lease terms, special allowances may be taken to correspond with the expiration of the leases and the likelihood of renewal. Rent escalators, expense reimbursements for charges that will continue even if the space is vacant, and other income should not be forgotten.

Bad debts and concessions are sometimes included in the vacancy allowance. The investor or developer is also cautioned to be wary of the difference between “allowance” and vacancies. In many setups shown to the prospective purchaser, vacancies are shown as an allowance. Such allowance may or may not be related to the actual experience of the building under consideration. The investor should be certain about what is being shown as a basis for further investigation.

Comparable data for vacancies are often difficult to assess. Gross area vacancy statistics are readily available for the Standard Metropolitan Statistical Areas (SMSAs). HUD compiles statistics which are often reported in the *Real Estate Analyst*. Rental boards and surveys by brokers may also be helpful. In analyzing vacancies on apartment houses, the Census Bureau provides decennial counts. These are not particularly useful, however, in making an investment decision. For housing units, it is often necessary for the prospective investor or developer to cruise the neighborhood looking for empty nameplates on mailboxes and counting “For Sale” signs. Such counts are not statistically reliable, but they may simulate the purchasing behavior of the target consumer.

Commercial, office, and industrial vacancies are harder to pin down. The specialized regional journals cited previously and the *National Real Estate Investor* provide frequent reviews that give a view of the changing market scene. The *Real Estate Analyst* and the *Urban Land Institute* provide historical data for most markets, updated at least annually. Major local realty firms often conduct useful market studies and issue quarterly vacancy reports.

The developer or investor contemplating a project must always be aware of the trends in vacancy rates and prospective new developments, which might adversely affect the properties being studied. Although such trends are never totally reliable, some basis for judgment can be gained from building-permit data, from trade and local business publications, and from direct systematic observation of the local surrounding neighborhood. In examining the possible trends in vacancies, attention should be paid to consumer tastes in habitation, and the expansion or contraction of consumer spending patterns. National economic trends such as growth in service industries or cutbacks in defense spending are also important.

The prospective purchaser of an existing property should always examine leases and even interview tenants whenever possible to determine that the projected income is, in fact, in line with that required by the lease. The prospective purchaser should also be wary of concessions given to the tenants that might inflate the occupancy statistics or rental payments. Purchasers should also be concerned with leases in which property managers provide special services to the tenant for a higher rent. The type, size, and location of the property often indicate the likelihood of such side deals. For the new development, the prospective developer or investor should be concerned with the normal leasing terms in the area and with current practices regarding concessions and management absorption of costs.

Operating Expenses

The control of operating expenses is obviously one of the key elements in any real estate investment's profitability. This is also an area in which the buyer is subject to the highest degree of deception and an area in which good, current information is difficult to find. Reliable projections of the future are almost impossible. The best sources of data on operating expenses for all kinds of properties are the "experience exchange" type of publications such as those mentioned earlier. Using data obtained from these sources, the prospective developer or investor can begin to question intelligently the projections being made and search out sources of difference. Remember that averages for an area do not imply that most properties are at the average.

One of the key mistakes made in the analysis of operating expenses is that of leaving out a category of expense, such as the cost of exterior window washing. This section will review each category of expense and give indications of some of the factors to be considered. Consideration should be given to the underlying variables to which the expenses are related. Expenses vary in relation to: (1) the gross rent, (2) the square feet or cubic feet involved, (3) the number of units, (4) the services provided, and (5) the age, condition, and cost of the property. In preparing forecasts for future profitability it is critical to understand the different natures of the expenses.

The primary categories of expenses to be considered are the following.

- real estate taxes
- administrative
- maintenance, supplies, and trash removal
- repairs

- replacement
- utilities
- insurance

Within each of the above categories there are obviously subcategories. For further information one can consult sources such as the *Building Operators and Management Association* or *National Association of Apartment House Owners* publications, which set up accounting systems for property owners.

Real estate taxes Real estate taxes are perhaps the single greatest source of uncertainty in property investment. History shows that they are almost always increased. In recent times, voters in California, Massachusetts, and elsewhere have passed referendum limiting the increases that can be imposed without voter approval. There is danger of a major increase if property is sold because a new market price is established against which the assessor can make a valuation. In many income properties an agreement with city officials can be reached in which taxes are assessed as a percentage of gross rent. These arrangements are not always legally enforceable.

Before any investment is made, the investor should examine the tax records for the property in question and make an analysis of comparable properties. Tax records are public documents. Histories of the assessments for the town or city in question are available. Changes that may occur in a city or town in the future can have major impact on tax rates and should offer warning signs. Among these are: (1) large population expansion, (2) new-school needs, (3) major public facilities projects, and (4) expansion of municipal services. On the positive side, one would expect stable tax rates if there is: a healthy mixture in the industrial base, a community with limited space for additional population, and/or growing voter resistance to tax increases.

Always the prospective purchaser or developer should consider the strength of the tax escalation clause in the leases being used and the willingness of any rent control agency to allow such clauses to be effective. Real estate taxes are a major variable in the profitability of any real property investment. All three forms of analysis—baseline, trends, and discontinuity potential—must be employed. The investor should also be aware that it is possible to successfully contest the amount of the real estate tax and therefore should understand the basis on which the local government calculates the property tax.

Administrative expenses Rental, advertising, and management expenses are often interconnected. A residential property owner may choose to sign a rental brokerage agreement and a management agreement with a local firm that specializes in handling the particular kind of property. These property management companies will usually manage the property for a percentage of the collected rentals. Although the fee may be standard for the region or local market, it is often negotiable. If the property is sufficiently large, most investors would do well to consider having both management and rentals taken care of by direct employees of the property. The two primary trade-offs are cost and degree of owner involvement. Unfortunately, common practice in the sale of many properties excludes from the setup both management expense and rental expense. Such an omission materially distorts the return since, for small properties, these may be significant when related to the gross rentals. Even if the intention is for the owner to perform the services, some cost or value should be imputed to the owner's time. If sold, the potential buyer will make an allowance that will reduce the amount offered. Lenders will always input an allowance for management in considering the building's value.

For commercial and industrial properties, the same caveats apply. It is, however, more critical to examine exactly how the rental function is to be performed, by whom, and at what price. The more specialized the building, the more critical a good marketing-rental program is to the economic

success of the development or investment. Where overage rents or percentage leases are involved, there is a further need for management.

Professional fees cannot be ignored. Legal help may be needed in many circumstances including: leasing, refinancing, collections, partnership matters, and regulatory issues. The project entity will have to file a tax return normally prepared by an outside auditor. Since real estate ownership has special tax implications, good advice is important. There are other consultants who may be called upon for design, engineering or public relations help. The more complicated the entity and project, the higher the allowance should be. As our society has become more litigious and income tax laws have become increasingly complex, the need for outside help continues to grow.

Maintenance, supplies, and trash removal The total expenses in this category can vary greatly from year to year and from building to building. Several factors are, however, predictable. The age of a building is one of the prime determinants of the maintenance required. Even if a building's history is known, simple projection of that history into the future will understate maintenance substantially. The design of a building (including the materials used, the number and sizes of public spaces, and the quality of the original equipment installed) is another critical factor. Whether windows are accessible or must be reached from scaffolding makes a difference. The type of heating and air conditioning equipment and flooring are key determinants. Finally, the previous maintenance history is important since undermaintained assets may require exceptional future outlays.

Contracts for maintenance of major building elements, such as boilers, elevators, air conditioning units, or cleaning, are often available and provide for a program of systematic upkeep. Prices on such contracts often indicate the level of service required, although they are generally profitable for companies offering them and may not cover everything.

The amount of supplies needed are related to the services provided, such as office, rest room, or common area cleaning. The replacement of light bulbs can be a significant item. With increased environmental awareness resulting in the closing of many disposal sites, trash removal prices have risen considerably in recent years.

Repairs Repairs differ from maintenance predominantly in scope. In this category for residential units are such items as painting of apartments; replacement of broken doors and windows; repair of stoves, refrigerators, dishwashers, and disposals; and fixing leaky faucets. Obviously, the age of the building and equipment is going to be a major factor in the amount of money that must be allocated to this area. It should be possible to obtain comparables as outlined earlier, but considerable annual variations are likely. One should take into consideration the expected level of maintenance by the particular tenants occupying the space.

These items may seem minor to the investor, but are of major importance to the tenants. The ability of responsible management people to learn of and respond to these problems may be a major factor influencing the vacancy rate.

Replacement reserves and tenant improvements Replacement reserves are part of the setup closely related to the maintenance element but are rarely considered as expenses that are reimbursed by tenants under the operating cost escalator. Not all depreciation is simply a tax-oriented fiction. In any property, there are items that are subject to physical deterioration and, therefore, require periodic replacement. Carpets, roofs, paint, and mechanical equipment will not last the economic life of the building. It is critical, therefore, in calculating the cash flow to be derived from an investment, to consider the impact of such required replacement. This is especially true in the purchase of used residential property. Often such property has been purchased on the

assumption of operation for five to seven years with sale contemplated as soon as the rental income has been increased. With such an investment strategy, items of major maintenance or replacement are often deferred. Unless such investment is made quickly, the new owner may be required to spend a substantial amount on repairs and maintenance or watch the attractiveness of the property decline. Unfortunately, too often, the newer the equipment, the shorter its life cycle.

Replacement reserves are not generally tax deductible. Some items, such as mechanical items or painting, may appear as expenses, but the investor should recognize that capital expenses generally have to be capitalized and then depreciated, as mandated by the tax code.

The replacement reserve for commercial and industrial properties are of two types. First, money needs to be set aside for major exterior items like the roof and parking lot and major common area expenses like refurbishing the lobby and replacing the elevators. Second, at the time of lease turnover, substantial money may be required to renovate the space and/or pay a brokerage commission. There is no way to predict future needs or market conditions. An allowance is generally taken, based on average length of tenant leases, expected rate of tenant turnover, and the amount of work to be done. Such costs point up the desirability of retaining existing tenants when leases expire.

Definitions of how the space is measured and allocated should be clarified. For example, leases written based on a "gross rentable" basis usually consider the entire gross square footage of a building and prorate it to each tenant. "Net usable" leases measure the actual space allocated to a tenant with no allowance for a proportional share of the hallways and other common areas. "Net rentable" includes some but not all of the common area.

Utilities and insurance Both of these items are generally verifiable when purchasing existing properties and are easily estimated by competent professionals for future developments. The key considerations for investors are whether the utilities are adequate and how steep the increases are likely to be in the future. Considerable expense may be incurred if the present utilities, such as electrical service, are inadequate. It is important to know the expected hours of use and the type of equipment that will be running as each tenant's needs may be different. Electricity costs are normally metered to each tenant directly but costs of common areas and central air conditioning may be apportioned. Major risk is assumed if insurance coverage is inadequate. A high purchase price may trigger the need for additional insurance. Both insurance coverage and utility services should be reviewed carefully before purchase or additional construction. Moreover, operating cost escalators in the leases should also be investigated.

Other expenses Items such as fire protection, security expenses, and "other expenses" items must be specifically related to the property under consideration. All elements of this category are somewhat extraordinary. The requirements in these areas are becoming stiffer; consequently, they are not subject to the same rules of thumb and should be treated as individual elements for analysis when seeking good baseline and trend data. They must be examined carefully for future discontinuities.

Indirect Expenses

There are also those items which under the lease are the responsibility of the tenant such as collection or environmental cleanup costs. The careful drafting of these clauses is most important to ensure that the tenant's responsibilities are carefully spelled out. If not, the landlord may have direct responsibility. The financial capabilities of the tenant are especially important in the environmental area since the exposure can be large and long term. Without receiving a bill of environmental good health, properties will be difficult to sell or refinance.

Tax Effects

Once the setup and the before-tax cash flow have been established, the second step is to propose a set of measures to find the effect of income taxes. Of prime importance to the real estate investor is the cash flow after taxes (CFAT). (See *Note on Taxation* HBS No. 9-379-192 for a detailed discussion of tax issues and trends.) This is in contrast to net income, which is the benchmark for stock market investors. CFAT is determined by first calculating the net taxable income and then multiplying by the appropriate tax rate. The tax is then subtracted from the cash flow after financing. Two approaches to calculate the cash flow after tax are shown in **Table B**.

Table B Determining Cash Flow after Taxes: Two Approaches

I. Cash flow from operations + Replacement reserve – Mortgage interest – Depreciation = Net taxable income X Tax rate = Tax Cash flow from operations – Mortgage interest – Mortgage amortization = Cash flow after financing – Tax = Cash flow after taxes	or	II. Cash flow after financing + Replacement reserve + Mortgage amortization – Depreciation = Net taxable income x Tax rate = Tax Cash flow after financing – Tax = Cash flow after taxes
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Mortgage interest The buyer is cautioned to examine tax effects over time as well as during the initial period. In general, the net taxable income from a real property investment will increase over time even if the operating cash flow remains stable. This is because many real property loans require a constant annual or monthly payment, but the components of that payment change.

The most common mortgage payment schedule is a level payment or direct reduction mortgage that most people obtain when they buy a house. The great advantage of this type of mortgage is that the payment that the borrower makes each month remains exactly the same for the entire term of the loan. Under a variable rate mortgage it usually is adjusted annually. With a level payment or direct reduction mortgage,² the starting principal of the loan (pv) is the present value of an “ordinary annuity,” or series of level loan payments. The borrower (or mortgagor) gives to the lender (or mortgagee) a prior claim upon the value of the property as security for the borrowed funds. Equal periodic installments “amortize” the loan, providing the lender with a desired return (i) on outstanding invested funds (pv). Each payment consists of interest on the outstanding principal and

²Level payment or direct reduction mortgage:

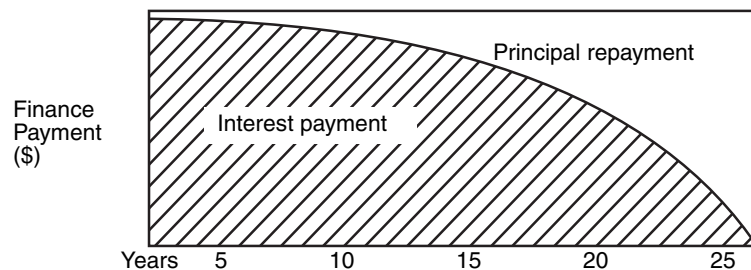
$$\underline{pmt} = \frac{pv}{\frac{1 - (1 + i)^{-n}}{i}}$$

Where: i = mortgage interest rate for period considered
 pv = starting principal balance
 pmt = annual financing payment
 n = number of periodic payments

amortization or return of principal. As principal is repaid, therefore, the interest component will decline. The remaining principal on a mortgage at any time is simply the present value of remaining payments, discounted at the face interest rate of the note. The level or constant payment varies, depending upon whether payments are made monthly, quarterly, or annually. Most mortgages are written with monthly payments. Tables are easily available and most calculators and computer spread sheet programs allow one to calculate the constant payment percentages and the breakdown of the payments between interest and principal.

Note that in the first year of a 25-year loan at a 9% interest rate, approximately 89% of the financial payment is a deductible interest charge. In the fifteenth year of the same loan only 60% is interest. Since the financial payment may represent 50% of the gross rental income, this would indicate a change in taxability of 10% of gross rental income, a significant impact that may be 30% to 50% of the cash flow after financing. **Figure A** graphically depicts this change in the percentage of each payment that goes for principal and interest over time.

Figure A Deductible Interest Expense as a Function of Time; Constant Annual Payment



Depreciation Under the 1993 tax law, residential property is depreciated over 27.5 years, and commercial property over 39 years. This depreciation is treated as a noncash deduction and expensed each year from the income statement. Depreciation is computed as a constant annual amount over the depreciable life (i.e., $\$100,000/27.5 \text{ years} = \$3,636$ annual depreciation). When the depreciation deduction exceeds amortization, tax shelter dollars are created. During the early 1980s, most real estate property could be depreciated over a 15- to 20-year life for tax purposes. In earlier years accelerated methods of depreciation were permitted greatly increasing the deduction during early years of ownership. Because some bank mortgages lasted for a longer period (usually 25 to 30 years), the tax shelters in the initial years of property ownership could be substantial. With the new tax laws this is no longer the case. (For a more complete discussion of depreciation, see the "Note on Taxation," HBS No. 379-192.)

Net taxable income Calculation of the tax effect for a real estate investment involves simply a multiplication of the stream of taxable income by the appropriate tax rates of the investor concerned. Starting in 2003, the maximum marginal tax rate is assumed to be 35% for ordinary income (the capital gains rate is 15%). On this basis, every dollar of losses will reduce taxes paid by 35%. This tax savings can then be added back to increase the total return, assuming that the investor has "passive" income to match against the "passive" loss.

Other tax considerations should include: (1) the impact of state and local income taxes, (2) the investor's probability of continuing to have high income, (3) the investor's continuing capacity to use such losses, and (4) the possibility of changes in the tax laws, which might adversely affect the tax benefits. Historically, however, the IRS policy has been to allow "grandfather clauses" on existing depreciation schedules, even though the tax rates themselves may change.

The investor should always identify the source of the tax benefits. In general there are three kinds of benefits: tax postponement, tax bracket switching, and tax avoidance. A typical real property transaction includes elements of all three. The use of depreciation tends to postpone the payment of taxes. Tax-free exchanges of real property have the same effect. Second, many types of real estate transactions are attempts to switch tax brackets, from ordinary income to capital gains. Such transactions include (1) the expensing of heavy maintenance charges to upgrade a property in hopes of a subsequently higher sales price and (2) use of depreciation to reduce income taxable at ordinary rates with subsequent sale at capital gains rates. Refinancing a property yields tax-free cash until the property is sold since the borrower is obligated to repay the principal of the loan with non-deductible dollars. This is a form of tax postponement or deferral. Tax avoidance occurs through holding of property until death, at which time the entire estate is taxed. One avoids the capital gains tax that would be imposed if the property were sold prior to death.

Cash flow after taxes The calculation of CFAT is completed by deducting the taxes paid or adding the tax benefit received to the before-tax cash flow. This is equivalent to applying the tax effect to the operating cash flow reduced by financial payments. For many investors, CFAT is the appropriate *annual* cash flow for the evaluation of an equity investment. For analysis purposes, remember that CFAT is composed of two of the three components of a potential return on a real estate investment: cash flow before taxes and the tax effect. The third component, futures, must be estimated to calculate an overall return. This procedure is discussed later in this note.

Impact of Financial Structuring

With an understanding of the elements that make up a cash flow and the effects of these elements on taxes, the investor is able to begin an analysis of the impact of leverage on real property investments.

Leverage Concept

A fundamental characteristic of financial leverage (and often not recognized) is that there are two kinds: positive and negative. Positive leverage increases the return on the equity invested; negative leverage decreases the return on such investment. Positive leverage occurs when the cost of the debt payment, expressed as a percentage, is lower than the annual return on total assets. For negative leverage the reverse is true. The cost of debt is the total of interest and principal payments as a percentage of the initial principal balance. Negative leverage is not necessarily bad since it may reflect a more rapid pay-off of a mortgage. The percent return on total assets (ROA) is calculated by dividing the operating or free-and-clear cash flow by the total cost of the asset. Comparing the cost of debt with the return on assets is a good first-step calculation in determining the most appropriate financial structure for a property.

The size of the mortgage, the time period over which it will be paid off, and the interest rate, all affect the cost of debt and subsequently the return on equity. These items, to the extent allowed by the marketplace, can be controlled by the investors and adjusted to their needs. **Tables C, D, and E** indicate the effects of each on the cost of debt and the impact on the returns.

Table C Relationship of Free-and-Clear Cash Flow to Cost of Asset Assuming no Debt

Total cost of asset:	\$1,250,000	
Setup:	Gross revenues	\$270,000
	Vacancies	27,000
	Net revenues	\$243,000
	Operating expenses	118,000
	Free-and-clear cash flow	\$125,000
	Return on cost of asset	10%

As the table above shows, the return on the cost of the asset in the absence of debt is 10%.

Table D demonstrates the benefits of arranging a mortgage that is a large percentage of the total asset cost when the financial leverage is positive.

Table D Effect of Mortgage Size on Pretax Return (Variable: Mortgage size; 25 years, 7.5% interest, monthly payments)

Mortgage as % of Total Asset Cost of \$1,250,000	Equity	Debt Service	Before-Tax Cash Flow	Mortgage Constant	Pretax Return on Equity Investment
90%	\$125,000	\$99,787	\$25,213	8.87%	20.17%
80	250,000	88,700	36,300	8.87	14.52
70	375,000	77,613	47,387	8.87	12.64
60	500,000	66,525	58,475	8.87	11.70

Since leverage is positive because the ROA is 10% and the cost of debt is only 8.7%, the more leverage the higher the return. As can be seen, an increase from 80% to 90% leverage increases the return on equity by 38.9%.

In **Table E** we see once again that leverage or using other people's money greatly impacts the return on one's equity investment. Obviously, there are benefits in having a long-term mortgage. In this case, a 15-year mortgage illustrates negative leverage. The same analysis as used in **Table D** indicates what happens:

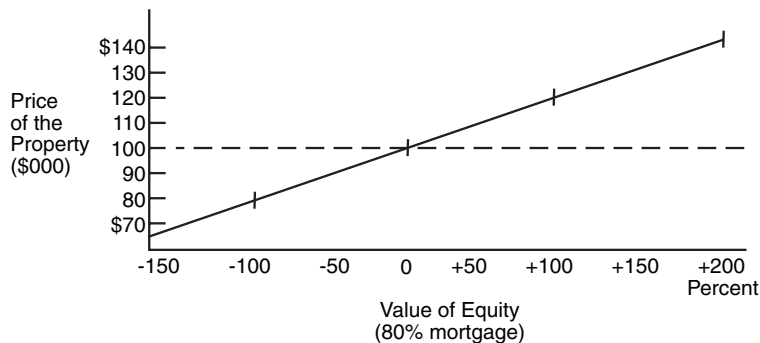
Table E Effect of Negative Leverage on Annual Returns

Mortgage as % of Total Asset Cost of \$1,250,000	Equity	Debt Service	Before-Tax Cash Flow	Mortgage Constant	Pretax Return on Equity Investment
90%	\$125,000	\$125,213	(\$213)	11.13%	(0.2%)
80	250,000	111,300	13,700	11.13	5.48
70	375,000	97,388	27,612	11.13	7.36

As one would expect, in a negative leverage situation where the property generates a 10% return on assets and the cost of debt is 11.13%, the lower the leverage the higher the annual return on equity. It is important to realize, however, that in this situation, the debt is amortizing quickly and the overall return on the equity investment, including the sale and repayment of the mortgage might be higher with more leverage, even though the annual cash return will be lower.

Financial leverage offers benefits to the investor who is seeking to maximize return on investment as long as the property's income and appreciation results in positive leverage. The heavy use of leverage is normal in real estate. For the investor, leverage allows control of a greater asset base than would be possible simply through the use of equity. Through the use of nonrecourse clauses in the mortgage, the risk to the equity holder can be limited to the equity invested in the particular property with the creditor having no claim to other assets that the investor owns. A deed of trust can be structured with the same effect. Since the repayment of the debt is a fixed sum, the rate of return on the equity is increased disproportionately in the event of appreciation and similarly decreased or eliminated if the price of the asset should fall (see **Figure B**).

Figure B Effects of Leverage on Value of Equity



It is important to note that the above numbers are all calculated on a pre-tax basis. Since interest is a deductible expense, its effect is mitigated by the tax rate of the borrower, another factor which encourages the use of leverage and the use of long repayment terms.

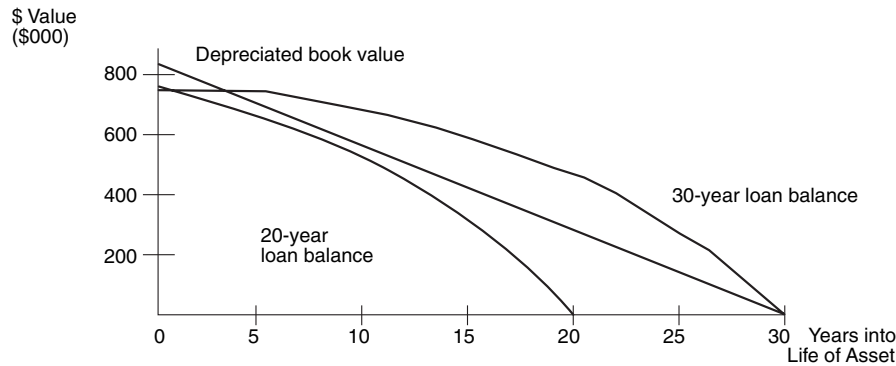
Among the problems that need to be considered in choosing how much leverage is appropriate are some operational and tax considerations. The use of heavy leverage increases the risk to the equity owner which may force him or her to sell at an inopportune time. The heavy cash drain upon operations that results from the use of a relatively large amount of first-mortgage debt can force a property into a negative cash flow position precisely when sale prices for such properties are low.

The extensive use of second mortgages or mortgages with large balloon payments can frequently produce similar results. Many buyers of syndications have discovered that the financing that includes second-mortgage debt to the seller absorbs all of the cash flow. Secondary financing increases leverage, but often comes at high interest rates and short maturities, which make for a high total annual payment.

Should problems of cash flow arise, the investor may face another problem created by his or her tax position. As shown in **Figure C** below, there may be a substantial period of time during which the book value of a property for tax purposes is less than the unamortized mortgage amount. This is particularly true in situations where a property has been refinanced to a level higher than the depreciated book value. In the event of foreclosure, the sale price would be deemed to be the

unamortized amount of the mortgage; a capital gain would be reported even though the investor has lost his or her equity. Thus, the investor could face a tax liability without cash proceeds from the property to meet such liability.

Figure C Book Value of Property vs. Mortgage Balance



Assumptions: Straight Line Depreciation taken on 27.5-year life. Loans are for 20-30 years.

Operating Leverage

In **Figure C** above, the analysis of leverage is based on the economic factors existing at one point in time. But with an ever-changing environment, the key factor in investment success is to anticipate correctly changes over time. Fundamental analysis of changes in a real property investment can be divided into three basic steps: (1) development of comparable data, (2) projection of trends, and (3) prediction of discontinuity. Each of these steps is critical to the informed investment decision.

Once the property has been developed and financed, operations become the area most affected by changing economic forces. The investor must be aware that there is such a thing as operating leverage which occurs when the income from operations changes while the financing payments remain fixed and that such changes can drastically affect: the yearly return, the ability to refinance at an appropriate time, and the future value of the investment.

Real estate investments are often made utilizing the maximum amount of financial leverage. Experienced investors, however, are often more concerned in a mortgaged property about the operating leverage available to them. Real property assets are unique in allowing the investor to obtain a high degree of financial leverage while benefiting from major operating leverage as well. Operating leverage arises because a major component of expense (normally the financing payment) in a real property investment is fixed, regardless of the revenue. A small change in revenue which might simply reflect inflation produces a large effect upon the rate of return to the equity investor. The example outlined in **Table F** for a garden apartment shows the impact of favorable operating leverage.

Table F Example of Favorable Operating Leverage (\$ in thousands)

(Cost of building: \$1,100,000; mortgage \$900,000; 25 years at 9% interest; constant payment 10.08%)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Revenues	\$200.0	\$206.0	\$212.2	\$218.5	\$225.1	\$231.9
Operating expenses	90.0	94.5	99.2	104.2	109.4	114.9
Financial payment	90.7	90.7	90.7	90.7	90.7	90.7
Before-tax cash flow	19.3	20.8	22.3	23.6	25.0	26.3
Return on investment	9.65%	10.4%	11.15%	11.8%	12.5%	13.15%

The table above was prepared on the assumption that operating revenues inflated by 3% annually and that expenses inflated by 5%. Even in this example, where the operating expenses increase at a higher rate than revenues, the return on equity still rises each year. Operating leverage can be negative as well. Since a major portion of costs associated with owning a property is fixed, only a slight decrease in revenues can have a drastic impact on the return to the equity holder.

This negative outcome from operating leverage can be seen by using the example from the section on financial leverage and changing the amount of vacancy (**Tables G and H**):

Table G Basic Setup

Cost of asset	\$1,250,000	
Gross revenues	270,000	
Vacancies (10%)	(27,000)	
Net revenue		\$243,000
Expenses		
Building operations	\$69,400	
Property taxes	48,600	118,000
Free-and-clear cash flow		\$125,000
Debt service (7.5% interest, 25 years on \$1 million)		88,700
Net cash flow		\$ 36,300

If we hold all other costs (except vacancies) constant, we observe the operating leverage shown in **Table H**. A change of 5% in occupancy levels makes a corresponding change in the return on equity, sometimes to levels that may not be tolerable to the investor. Also note that at 85% occupancy, the cost of debt is more than the return on asset, thus putting the investment into a negative leverage position. It is important in financial analysis to separate the impact of the additional return that arises from financial leverage from the impact of projected operating leverage. Such separation helps in making critical assumptions clear and open for specific attention.

Table H Operating Leverage with Varying Occupancy Levels

Occupancy	Free-and-Clear Cash	% Return on Asset	Net Cash Flow	Return on Equity Investment
100%	\$152,000	12.16%	\$63,300	25.32%
95	138,500	11.08	49,800	19.92
90	125,000	10.00	36,300	14.52
85	111,500	8.92	22,800	9.12
80	98,000	7.84	9,300	3.72

A major lesson that can be learned from this section on leverage is the importance of projections. One usually projects the future on the basis of the recent past. Yet in a cyclical industry like real estate, change is the norm, and when it occurs, highly leveraged properties can run into trouble. Over time, rents tend to rise but the ability to ride through down cycles can be crucial.

If the U.S. economy continues to be inflationary, the possibilities to increase returns through financial and operating leverage seem great. To this point, we have assumed that the original financing of an investment is fixed. In fact one of the great opportunities that is available in real estate is to refinance a mortgage when interest rates drop, unless the lender's agreement prohibits repayment or imposes a penalty that may equal the interest rate savings. This penalty is more common in commercial than residential mortgages.

Measurement of Return

Valuation

The primary method of valuing income-producing properties is known as the *capitalization of income* or *capitalization rate* technique. For appraisal purposes, this technique is supplemented by an analysis of comparable sales and by an analysis of replacement cost. Even in the area of raw land, appraisals often rely on the value of the prospective income stream to be generated in the future through development.

Capitalization techniques are based upon the following formula:

$$\frac{\text{Annual cash stream}}{\text{Capitalization rate}} = \text{Value}$$

Determining the appropriate cash stream and the appropriate capitalization rate is never easy or precise. The uniqueness of each property and lack of clear, consistent information makes this calculation an art as much as a science. Still, it does give a rough approximation of how investors currently are valuing properties.

The two primary cash flows considered to be relevant are the *free-and-clear cash flow* and the *cash flow after financing*. (Cash flow after taxes will be discussed later in this note.) The former is used in determining the value of a property for lending purposes. The latter is most often used in considering the equity value of the property. In most instances, the cash flow is determined by the

setup and is a static measure of the value at the particular moment in time with no adjustment for inflation, physical depreciation, operating leverage, tax benefits, or mortgage amortization.

For the purposes of a lender, the free-and-clear cash flow is the most relevant number since it represents the total funds that would be available to service the debt on the property in the event of foreclosure. The normal practice is to apply a capitalization rate somewhat in excess of the lending rate and then to loan a percentage of the value derived. The following example illustrates the principle:

Cash Flow	=	\$1,000,000
Capitalization rate	=	11%
Loan to value ratio	=	.75

$$\frac{\$1,000,000}{.11} = 9,090,909 \text{ value} \times .75 = \$6,818,181$$

Note the sensitivity of the loan amount to the capitalization rate. For example, in the preceding example a change in the capitalization rate from 11% to 10% would yield an increase in valuation from \$9.09 million to \$10 million. Much has been written on capitalization rates. In general, however, these rates are chosen as measures of perceived risk at a point in time for the particular type of property, its rental and operating projections, its physical condition, current and projected interest rates and investors' expectations of returns in the light of alternative investment opportunities.

Lenders normally expect cash flow from operations to cover debt service by 110% to 130% or even more depending upon risk. Lenders also restrict loans to a specific percentage of value, often 75%.

Determining the value of the equity follows the same general approach. The cash flow after financing is capitalized at some rate to reflect equity value. The technique of capitalizing cash flow is the basis upon which value is usually initially estimated.

Future Values

Future benefits arising from sale or refinancing are the final component of return available to the real estate investor. Because of assumed appreciation, almost all real property transactions anticipate benefits from holding a property. The value calculated depends upon estimates of many future conditions. These include, but are not limited to: (1) the physical condition of the asset, (2) existing lease structure, (3) economic and interest rate environment, (4) change in the physical neighborhood, (5) consumer and investor preference for the kind of property involved, (6) expected inflation rates, (7) rate of return on alternative investments, (8) tax position of the seller, and (9) contemplated holding period.

The longer the time horizon, the more difficult it is to calculate future benefits. Probabilities increase for major changes, which may be either for the better or for the worse. In a financial analysis it becomes necessary to make judgments about such changes. These can be categorized as follows:

1. Operating changes
2. Physical changes
3. Financial changes
4. Market changes

Operating changes can be brought about in two ways. First, in the analysis of the setup, projections can be made by assuming changes in operating income over time while financial payments stay constant. These projections should be factored into the final calculation of value as discussed earlier. Second, change can come from operating policy decisions, such as those calling for more efficient operation or for a policy of limited maintenance or those that seek a different market through upgrading the clientele. All of these changes should be reflected in the projected final setup that the buyer and seller use to determine value.

Physical changes are of two primary sorts: those affecting the property itself and those affecting its environment. In both instances, however, the primary impact is made upon the expected revenues to be realized. If the property is physically upgraded, it should be in anticipation of higher revenues. If the property is allowed to run down, lower future revenues would naturally be expected. If that occurs, it can affect the value of surrounding properties, spiralling the downturn for all. A major question needing analysis is that of options for future use. Physical change of both the property and of surrounding properties have an impact on "highest and best use" of the property. Such change is the greatest source of discontinuity in real property analysis.

The prospective developer or investor should be aware of opportunities to use the purchase as a holding action anticipating future uses. Often duplexes or small commercial buildings are purchased in anticipation of the opportunity to develop them later either for higher-density dwellings or for more intense commercial uses. The purchase of a mobile home park is often a high-yield way of holding land for future high-density commercial or residential development. In these situations, however, it is probably wise to make alternative analyses showing the impact on return of both the change and no-change options. What is permissible zoning now may change with the political environment.

Financial changes affecting future value are projections relating to the future financial market conditions and the simple calculation of the changed financial structure of the deal as loans are repaid or refinanced. A projected financial change that assumes more favorable financial market conditions at the time of sale than are currently prevalent is generally a trap set for the unwary. If the major source of return comes from refinancing a property with a long-term mortgage at below present market rates, the investor might have a long wait.

Market changes derive from the assumption that at the time of sale someone will be willing to pay more using a lower cap rate for the same cash flow and associated benefits of ownership than the present owner is. Unless there is a compelling reason like an upgrading of the tenants in the building, it is risky to base one's investment on this kind of assumption. On the other hand, cap rates investors pay do change based on factors such as: the effect of physical or functional obsolescence, changes in tenant mix or use, changes in government tax policy, and/or the owner simply doing a better selling job. Probably though, the major factor that affects cap rates is investors' general perception of the real estate market at the time of sale. There is a herd instinct to valuation in real estate as well as in other forms of investments.

In conclusion, the reader should be aware throughout that a successful analysis of a real property investment must consider many critical characteristics of the investment. Among these are (a) the extremely long time horizon of most investments, (b) poor liquidity, and (c) uncertainty concerning the valuation of the property. Valuation of property is subject to vagaries caused by competition, changes in financial market conditions, physical depreciation, government action, and changes in the microenvironment. Any of these may seriously revalue the property. In addition, historical information on a particular property may be unavailable or, if available, either irrelevant or intentionally misleading.

Despite the uncertainties, future benefits should be estimated when evaluating a real estate investment. Sources of future benefits are mortgage amortization, return of initial equity, and sales price appreciation. As always, benefits should be evaluated net of taxes.

Table I below illustrates the benefits available to the investor who can refinance opportunistically.

Table I Setup Showing Benefits from Refinancing (Cost of asset: \$1,250,000; mortgage: \$1,000,000)

	Present	Rate of Inflation per Year	Year 10
Gross revenues	\$270,000	4.14%	\$405,000
Vacancies	27,000		40,500
Net revenues	\$243,000		\$364,500
Operating expenses	118,000	4.14%	177,000
Free-and-clear cash	\$125,000		\$187,500
Debt service (7.5% interest, 25 years)	88,700		88,700
Cash flow after financing	\$ 36,300		\$ 98,800
At the end of 10 years, if the free-and-clear cash flow of \$187,500 were capitalized at 9%, the property might be worth \$2,085,000. An 80% mortgage on this value is \$1,668,000.			
New mortgage	\$1,668,000		
Less: Balance of old mortgage	792,000		
Cash proceeds	\$ 876,000		
Less: Prior mortgage amortization	208,000		
Original equity	250,000		
Net new cash	<u>\$ 418,000</u>		

In the example shown in **Table I**, the investor will have (without immediate tax consequences) all his or her original equity returned, plus prior mortgage amortization payments, plus an additional \$418,000 from refinancing. The investor will have obtained some of the potential future benefits without sale of the property, will have no cash invested, but will retain ownership. Because the new cash flow after financing will be \$37,862, the investor will be receiving more income in year 11 than in year 1, and will be building equity once again. But as said before, although no income tax is due on refinancing, the tax is only deferred and becomes due after a sale or foreclosure.

To calculate the future benefits of sale, one again must face the added complication of computing the net cash to seller *after* taxes. To predict the future sales price of an income-producing property, the capitalization-of-income method previously discussed is generally used. Note that assumptions of future operating results are required and provide an area of much discretion. Alternatively, a simple growth assumption may be applied to the original purchase price though this can be very misleading. Once sales price and holding period assumptions have been made, the net cash to seller can be calculated:

Table J Calculation of Net Cash from Sale

1.	Calculation of book value	
		Purchase price
	+	Capital improvements
	-	Accumulated depreciation
	=	Book value
2.	Calculation of gain on sale	
		Net selling price
	-	Net book value
	=	Gain on sale
3.	Calculation of tax	
		Gain on sale
	x	Tax rate
	=	Tax liability
4.	Calculation of net cash to seller	
		Net selling price
	-	Mortgage balance
	-	Income tax
	=	Net cash from sale

The net cash from sale is the appropriate cash flow in the year of sale to use when evaluating an equity investment. Note that the net cash from sale is composed of the three potential elements of future benefits, adjusted by taxes:

		Return of initial cash equity
+		Return of mortgage amortization
+		Increase in sales price
-		Income taxes
=		Net cash from sale

Methods of Calculating Return

The preceding sections have focused upon development of basic data for analyzing the profitability of a real property investment and upon elements that lead to change in such investments. This section shows how these data may be used to measure return on investment in such a property. There is extensive literature on valuation and return, but space does not permit an in-depth review of it here. This section simply reviews the various methods of valuation as they apply to real property assets. A cardinal rule of financial analysis--that the investment decision be made apart from the financing decision--does not hold for many real estate decisions especially for high income taxpayers. Although the operating cash flow may be used to determine the project value for mortgage purposes, the after-tax cash flows will determine the return on equity to the investor. Since the cash-flow-after-tax calculation requires financing assumptions, and since mortgages by definition are property specific, it is necessary to consider financing effects when comparing alternative investments in real estate.

The measurement of return on investment in real estate is a subject of great dispute and sales expertise. The careful builder or investor must be aware of the measures being used since one

person's 28% return is another's 6%. The major differences occur in the elements of return that are included in the measurement and in the time horizon over which the measurement is made. The measures will be examined on the basis of the time horizon and with the inclusion of the three elements of return.

Return on assets Basically, this measure of return may be defined as follows:

$$\frac{\text{Free-and-clear return}}{\text{Property cost}}$$

This measure of return is static in that it assumes the same cash flow throughout time. It ignores the risk or tax consequences of the investment and ignores the capital change brought about by disposing of the investment. However, it is most important for a lender who wants to insure that from the first year there is adequate income to cover mortgage payments.

Cash flow after financing return on equity or cash on cash return This measure of return may be stated thus:

$$\frac{\text{Cash flow after financing}}{\text{Equity}}$$

In this case, the equity is defined as the initial cash investment. This measure is also known as "cash on cash" return and is frequently applied by seasoned investors in the real estate field. The measure looks at return statically and omits both tax effect and capital change from sale or refinancing. The argument made by investors using this measure is "if a deal will stand up under this, everything else is a plus." It is perhaps the most rigid measure applied because it ignores all elements of return that are not reflected in the end-of-the-month checking account balance. The preceding two measures are commonly used by professionals, as a first cut or in a "back of the envelope" form of analysis.

The following measures are often shown to induce purchase. In general, they have major flaws that limit their usefulness. Either the simple measures or a full internal-rate-of-return calculation should be used.

Before-tax cash flow + first year's amortization return on equity This measure is defined in the following way:

$$\frac{\text{Before-tax cash flow} + \text{Mortgage principal payment (year 1)}}{\text{Equity}}$$

This measure is the same as the previous one except for the addition of the amount repaid on the mortgage as an element of return. This return measure and the one that follows are often used by aggressive real estate salespeople. For example, if you assume the property has an 80% mortgage at 8-3/4% interest and a 20-year amortization schedule, the first-year reduction in loan balance amounts to 1.9% of the original balance. Thus this amortization by itself represents a 7.6% return on the equity investment. That 7.6% return is not available without either refinancing or selling the property. These events are considered only as future possibilities rather than as certainties, so some portion of that return should be discounted. This measure of return considers neither the tax effect nor the bulk of the change in capital position, positive or negative, that will arise through change in value of the property.

Cash flow after financing + tax effect as return on equity This measure is defined as follows:

$$\frac{\text{Cash flow after financing + Tax effect (year 1)}}{\text{Equity}}$$

This measure gives the cash value of the investment to the investor in the first year of ownership. It ignores the change of after-tax cash flow over time and the impact of sale on the capital position of the investor.

Average returns All of the last three measures are sometimes shown as averages based upon an estimated holding period. It is wise to look carefully at the components of these averages rather than to accept the average figure. It is also often the case that the largest portion of the return comes in the final year when the property is sold. Then, for example, in the tenth year alone of an 8-3/4% 20-year loan, approximately 4.2% of the original loan balance is paid off. For a property purchased with 80% debt, the loan amortization alone accounts for a 16.8% annual return on the original equity. Unless there are plans for the realization of the equity built up through loan amortization, the inclusion of such a large annual figure may materially distort the average and mislead the potential investor. This is especially critical given the long time before that portion of the return is to be realized. It also ignores the time value of money.

Payback period This simple benchmark return measures the number of years required for the investor to recoup the cash equity invested. Discounted payback applies the investor hurdle rate to the future stream of after-tax cash flows. These measures are of limited value because they ignore benefits or the tax consequences beyond the payback period. This measure is useful, however, in a high risk investment environment where return of capital may be more important than a huge projected future payoff.

Net present value (NPV) The net present value for a real estate investment may be found by applying the following formula:

N = holding period

$$\text{NPV} = \sum_{n=1}^N \frac{1}{(1 + i)^n} [\text{CFAT year } n] - \text{Equity}$$

Where: i = investor hurdle rate.

CFAT = cash flow after taxes in year N
(= the sum of: before-tax cash flow in year n + tax effect in year n + futures in year n).

In other words, a stream of cash flows is discounted back at a predetermined discount rate, totaled, and then subtracted from the initial investment.

The NPV calculation considers all of the components of return available to the real estate investor. The relative sizes of initial investment are not explicitly accounted for by the NPV method; therefore, projects cannot be directly compared unless they are of the same size. This failing may be accounted

for by the use of a profitability index, which is simply the ratio of the NPV to the amount of equity invested.³

Internal rate of return (IRR) The internal rate of return for a real estate investment may be found by solving the following equation for i :

N = holding period

$$\sum_{n=1}^N \frac{1}{(1+i)^n} - \text{Equity}$$

[Before-tax cash flow (year n) + Tax effect (year n) + Future benefits (year n)] - Equity = 0

Thus i is the rate of return that will set the discounted present value of all cash flows less equity equal to zero. All of the standard caveats regarding discounted values apply. Arduous trial-and-error algorithms solve for the IRR and are best left to calculators or computers. Care must be taken in remembering the critical assumptions underlying the calculation of the IRR. The primary critical assumption is that the cash thrown off by the investment can and will be reinvested at the calculated internal rate of return. This assumption is often not true in practice. For a project with a pattern of large initial tax losses and then considerable taxable income, the tax savings must be reinvested or the investor may end up with a very poor investment. For example, the following cash flow stream has approximately a 12% internal rate of return, but the cash outlay is actually greater than the cash inflows.

-	\$1,000	Year 1
+	500	Year 2
+	500	Year 3
+	500	Year 4
+	500	Year 5
	0	Years 6 through 11
-	\$2,000	Year 12

The unwary investor who dealt with the \$500 as though it were real return and did not reinvest it in some asset earning 12% (as is often done in tax-shelter investments) is in for a shock in Year 12.

Summary

Analysis of real property investments is complicated. It is not, however, impossible. Since it most often involves projection of future events, it is well to err on the conservative side. Projections of compound growth over the periods involved in real estate must always be considered to contain a risk. The key tasks that need to be performed for all investments are the following:

³The NPV calculation is useful when the investor's cost of capital is known. When projections are made that involve many changes from positive to negative cash flows and might therefore produce multiple IRR solutions, and when investments with widely varying lives are compared.

1. develop baseline data
2. project trends, and
3. search out sources of discontinuity

These tasks, adequately performed, will yield opportunities. One must understand what assumptions have been made. The number calculations themselves are not very complicated. Net present value and internal rate of return analyses can be done quite easily on calculators and computers. Basing the future on projections of the past may be the most logical way to start, but as any investor knows, events rarely work out that way. Fortunately, over time real estate has been one of the most profitable forms of investment. However, it is crucial to realize that the ability to sustain and take advantage of short-term downturns and to hold property for the long term has generally been the key to success.