Operating Analysis

The operating (income) statement

Traditional income statements seek to show operating revenues "when earned" and operating expenses "when incurred," whether or not these represent actual cash receipts and disbursements; Real estate investment analysts are concerned with actual cash flows.

Operating statements therefore usually present cash inflows and outflows from operations and extend the presentation to include non-operating cash flows such as those from debt service, income taxes and capital expenditures.

Potential gross rent is the amount of rental revenue a property would generate with no vacancies.

Effective gross income adjusts potential gross rent to reflect losses from vacancies and uncollectible accounts, and to include income from sources other than rents.

Operating expenses include all cash expenditures required to maintain and operate the property so as to generate the gross rent; For analytical purposes, it is useful to separate property taxes and reserves.

Net operating income (NOI) is the difference between effective gross income and operating expenses.

Debt service is the sum of the loan payments on the property for the period.

Income tax is determined by the investor’s individual income tax position rather than specifically by operating results of property on which the report is based; Income tax analysis takes into consideration the deductibility of interest expense and depreciation.

The bottom line, after-tax cash flow, is the amount of cash remaining at the end of the reporting period, after all operating expenses have been paid, all obligations to borrowers satisfied, and all income tax obligations met.

Estimating ability to command rent

The usual starting point for estimating the results of current operations is the history of recent operations as reflected on the property’s records.

Analysts seek to verify all records by referring to original source documents and by comparing reported operating results with known or determinable outcomes from comparable properties.

To estimate recent gross income, inspect the property's rent roll and leases to determine contract rental rates, vacancies, and concessions.

Verify indicated rental rates, if possible, by conversation with the building manager and tenants.

Reference to the experience of comparable properties is frequently the most valuable source of data for estimating a property's recent operating history; The challenge is to find properties that are truly comparable.

Comparable properties should be chosen from within the competitive market area.

Identifying comparable properties in the market area involves finding those that prospective tenants would consider close substitutes when looking for rental space.

Estimating operating expenses

The starting point is the subject property’s operating history.

The recent expense history of comparable properties is usually a good indication of the experience of the subject if it were competently managed.

Published compendiums of average operating expenses for similar properties in the general market area often serve as valuable benchmarks for judging the reliability of data from the subject and from comparable properties.

Exercise: prepare an operating statement with the following data

10-unit apartment building
Average rent = $700 pu per month
Management fee = 5% of effective gross
Taxes—110% of CA tax rate; Value = $600,000
Reserves—$250 pupy
Other expenses = $2,000 pupy
Market vacancy rate = 5%
Forecasting Income and Value

Forecasting gross income
Both the desirability of space being offered for lease and the attractiveness and price of competing space are key elements influencing a property’s ability to command rent
Prospects for continued income-generating ability over the projected period depend upon relative changes in the same factors
Both natural and man-made features contribute to a property’s desirability, as does its location; For this reason, elements of productivity are classified as physical characteristics and location characteristics
Estimating future productivity is an exercise in forecasting changes in these characteristics, and in their desirability, over the projection period
Physical characteristics by their very nature have limited useful lives; As their usefulness wanes the property becomes less desirable relative to newer properties or those that are better maintained
Declining conformity with current standards and diminished ability to render intended services inevitably means rising vacancy rates and inability to command previous levels of rent
The decline in competitive position due to defective or dated design or engineering characteristics is called functional obsolescence
Physical durability is the measure of how long a structure will continue to be productive; Design integrity and current condition form a basis for evaluating a structure’s durability
A prime factor determining a property’s ability to command rent is its location relative to the desires of prospective tenants
Some elements of locational desirability are property-specific, a function of the relationship between the site and the locations with which it is linked
Other elements are environment-related, dependent upon the relationship between the site and surrounding geography
Unlike physical features, which can be altered more or less at will, location elements are not generally amenable to manipulation and control

Linkages and transfer costs are key determinants of a location’s desirability
Linkages—relationships that require movement of goods or people between linked sites—are determined by the nature of land use
Identifying key linkages is an early step in forecasting a property’s future ability to command rent
Forecasting includes the estimation of how linkages might change during the forecasting period
Transfer costs—the cost of moving people or things between linked sites are subject to change
Changes may result from infrastructure alterations or from the ongoing march of technology
Changes will alter the significance of linkages that give rise to the costs
Inharmonious or incompatible land usage can quickly destroy a neighborhood’s unique character and reduce its location value; Zoning and building codes are designed to protect against such an eventuality
A forecast of changes in the supply of comparable rental space is an essential element in the analysis of a property’s ability to command rent over the projected period
Availability and cost of substitute space are strong influences on rental value; The nature of both present and potential competition must, therefore, be thoroughly analyzed
Factors that must be studied include building sites that are properly zoned and currently available, and the likelihood of significant zoning changes during the forecast period
The analyst will also consider the probable cost and availability of construction loan funds
Beyond the questions of the availability and price of competing space, future rental revenue depends on the relative degree of prestige associated with a property
Economists refer to this as a monopoly element; Real estate specialists prefer the more neutral term, “product differentiation”
Forecasting operating expenses
Usually proceed by extending the prior years’ trend into the future
The first step is a simple straight-line extrapolation
After developing a simple trend line based solely on prior years’ data, the analyst must exercise judgment to alter the trend based on a perception of how the operating environment is likely to change during the forecast period

The net operating income forecast
The net operating income forecast is the difference between the forecast of rental revenue and the forecast of operating expenses

Estimating future market value
Cash flow from eventual disposal is often a major element in the total cash flow forecast from investment properties
The ratio between operating income and market value is called a capitalization rate

\[
\text{Cap rate} = \frac{\text{NOI}}{\text{Value}} \\
\text{Value} = \frac{\text{NOI}}{\text{Cap rate}}
\]

Note the current cap rate applicable to comparable properties and estimate how the rate might change over the forecasting period—This is the “exit” cap rate to be applied to the final year’s net operating income forecast to derive an estimate of terminal market value

Measures of Investment Worth

Ratios

Gross income multiplier (gross rent multiplier) = sales price / gross income
Does not serve as an ample tool of analysis in isolation, but can play a valuable role as a preliminary filter
Permits unacceptable opportunities to be weeded out swiftly and inexpensively
Although a net income multiplier might be more useful, substantial research may be necessary to effectively estimate net operating income
To use as a filter, first determine the relationship prevailing in the market area of interest for properties comparable to that being investigated
Then automatically reject all opportunities with multipliers which exceed this benchmark figure
Opportunities passing the preliminary screening test are subjected to further analysis

Operating ratio = Operating expenses / effective gross income
The percentage of gross income consumed by operating expenses
It will be lower for relatively more efficient properties
The operating ratio can be misleading because it reflects in part the efficiency of management as well as that of the property itself

Break-even ratio (default ratio)

\[
= \frac{\text{(Operating expenses + debt service)}}{\text{effective gross income}}
\]
Less useful than ratio used in corporate finance—B-E ratio in corporate finance is the relationship between gross revenues and variable cost
Most useful when employed on a before-tax cash flow basis
The lower the break-even cash flow ratio, the greater the decline in revenue or increase in expenses can be before negative cash flow occurs

Profitability measures
Attempt to relate cash investment to expected cash returns in some systematic fashion
Differ in the degree to which they incorporate available data into the analysis
Some ignore risk; Others make rudimentary attempts to adjust for risk differentials

**Cap rate (overall capitalization rate, free-and-clear rate of return, return on cost)**

\[ \text{Cap rate} = \frac{\text{First year NOI}}{\text{market price}} \]

Usefulness is limited by the nature of financing arrangements and by the approach most investors take to arrive at an acceptable sales price.

In a typical transaction there is an acknowledged trade-off between price and financing terms; Since this trade-off is not reflected in the cap rate, comparison of rates between properties with different financing arrangements can be misleading.

**Equity dividend rate (cash-on-cash return)**

\[ \text{Equity dividend rate} = \frac{\text{First year BT cash flow}}{\text{initial equity}} \]

Fails to incorporate income tax considerations.

Considers only the first year’s consequence of ownership.

Is made more useful by using AT cash flow.

**Payback period**

\[ \text{Payback period} = \frac{\text{initial equity}}{\text{AT annual cash flow}} \]

Expected cash flows are rarely the same from year to year (especially when considering tax effects) and therefore payback period must be determined by summing expected proceeds from year to year until the total equals the initial equity.

Does not consider cash flows beyond the payback period.

Does not consider timing.

**Disadvantages of traditional measures**

- They ignore cash-flow expectations during the later years of the holding period, concentrating instead on the first year or first few years of operation.
- They ignore cash-flow expectations from disposal, even though this latter component may in some instances be the greater portion of the expected return from an investment.

**Five major factors govern the relative attractiveness of a real estate investment that should be incorporated into analysis:**

- Anticipated stream of net cash flow to the investor.
- Anticipated timing of cash receipts.
- Degree of certainty with which expectations are held.
- Yields available from alternative investment opportunities.
- Investor’s attitude toward risk.

**Compounding and Discounting**

Good investment analysis requires an assessment of the timing of cash flows.

The trade-off between receiving cash today and some time in the future is referred to as the time value of money.

Time value of money is based on two propositions:

- More is better than less;
  - actual possession or consumption is not necessary
  - certain knowledge is equivalent

Sooner is better than later;

- there is therefore a preference for present over future receipt
- choosing the promise of future receipt eliminates the possibility of present use

Thus, people will insist on being compensated for waiting and there will be a trade-off between the amount received and timeliness of receipt.

The more intense the desire for immediate gratification, the greater will be the rate of trade off.

Money in hand today is worth more than money to be received in the future because it can be invested to earn interest.
Quantifying the time value of money is a function of the interest rate or discount rate
Compounding—growth in the amount available as a consequence of waiting—adding interest
Discounting—reduction in the amount available as a consequence of opting for more immediate receipt—foregone interest or required interest

**Future value of a lump sum—the future value of a lump sum based on interest compounding periodically at a constant interest rate**

Example: A property worth 2.5M today is expected to appreciate at a rate of 5% per year for the next 5 years. What is the expected value at the end of 5 years?

**Present value of a lump sum—the present value of an amount to be received/paid in the future**

Example: A property whose current NOI is $100,000, increasing at 3% per year, is expected to sell at a 9% cap rate at the end of 5 years. What is the present value of the property discounted at 12%?

**Present value of an annuity—the present value of a series of equal, periodic cash flows to be received/paid in the future**

Example: A buyer proposes to purchase your property by paying you $10,000 per month for 5 years. You also receive an all cash offer of $450,000. Which is the better deal?

**Future value of an annuity—the future value of a series of equal, periodic cash flows at a constant interest rate**

Example: An owner of a 100-unit apartment building is depositing $20 per unit per month into an account earning 3% per annum as replacement reserves. What amount will be accumulated after 7 years?

**Present value of a perpetual annuity**

\[
PV = \frac{\text{cash flow}}{\text{rate}}
\]

**Sinking fund factor (deposit require) — Sinking fund payment—the amount required to be deposited at the end of every period to achieve a future value after a certain number of periods earning a constant instant rate**

Example: The reserves account currently has a balance of $10,000 and the roof will need to be replaced at the end of 5 years from now. If the roof is expected to cost $25,000, what amount will need to be invested monthly at 3% to accumulate enough money to replace the roof?

**Discounted Cash Flow Analysis**

**Net present value—the value today of benefits that are expected to accrue in the future**

\[
PV = \frac{c_1}{(1+\text{rate})} + \frac{c_2}{(1+\text{rate})^2} + \frac{c_3}{(1+\text{rate})^3} + \ldots + \frac{c_n}{(1+\text{rate})^n}
\]

When the discount rate used is the minimum acceptable rate of return on equity:

Present value in excess of the required initial equity cash outlay implies that a project is worthy of further consideration
A present value totaling less than the required initial equity expenditure results in automatic rejection
- Subtracting the required initial equity expenditure from the present value of cash flow yields net present value
- A positive net present value means a project is expected to yield a rate of return in excess of the discount rate and therefore merits further consideration
- A net present value of less than zero means the project is expected to yield a rate of return less than the minimum acceptable rate and therefore should be rejected

**Net present value (NPV)—difference between how much an investment costs and how much it is worth to an investor in present value dollars**

\[
\text{NPV} = \text{present value of cash inflows minus present value of cash outflows}
\]
If the NPV is equal to or greater than zero—the investment meets criteria; i.e., the discount rate has been met or exceeded.

**Internal rate of return**—the rate at which the present value of cash flows equals the initial investment

\[ 0 = \text{SUM}(t=1\ldots n) \text{ of } [CF_t/(1+k)^t] \]

\[ CF_t = \text{cash flow projected for year } t, \]
\[ k = \text{the discount rate that makes the present value of the expected future cash flows exactly equal to the initial cash outlay} \]

If the IRR is equal to or greater than an investor's required rate of return, a project is considered further.
If the IRR is less than the minimum acceptable rate of return, the project is rejected.
The major distinction between the IRR approach and the NPV approach is that NPV requires a predetermined discount rate to be introduced early in the analysis; However, the IRR requires a minimum threshold rate to be set to determine its acceptability.

**Problems associated with the IRR can result in conflicting decision signals from this and other discounted cash flow approaches**

**Reinvestment-rate problem**
Comparisons using internal rate of return analysis involves an implicit assumption that funds are reinvested at the internal rate of return; The IRR reliably discriminates between alternatives only if there are available other acceptable opportunities expected to yield an equally high rate.
The reinvestment rate problem also limits the usefulness of the IRR when choosing between investments having different useful lives or different holding periods; If the indicated IRR is unrealistically high, so that reinvestment at that rate is not a reasonable assumption, the IRR will give an ambiguous decision signal.

**Multiple-solutions problem**
Generally, a project's net present value is a decreasing function of the discount rate employed. Thus, with successively higher discount rates, a point is reached where the net present value is zero; This is the IRR, and any greater discount rate will result in a negative NPV.
When the discounting equation is well-behaved in this fashion, there is but one internal rate of return equating all cash inflows with all cash outflows.
Unfortunately, not all cash-flow forecasts are this accommodating; Investment proposals may have any number of IRRs depending on the cash-flow pattern.

**NPV vs IRR**
Under most circumstances, IRR and NPV approaches will give the same decision signals; When this occurs there is little significance in the choice of one over the other.
When using internal rate of return, reject all projects whose internal rate of return is less than the minimum required rate of return; Projects with an internal rate of return equal to or greater than the minimum acceptable rate (the hurdle rate) are considered further.
When using net present value, discount at the minimum acceptable rate of return and reject all projects with a net present value of less than zero; Projects with a net present value of zero or greater are considered further.
The essential similarity of these decision criteria is reflected in their mathematical formulation; The only structural difference is the discount rate.
There are some conditions under which contradictory signals emerge; The two techniques may, for example, rank alternatives in different order.
Where IRR and NPV give different decision signals, results of NPV analysis are usually preferred.

**Addressing the problems of IRR**
Attempts have been made to modify the IRR to address its problems but none eliminates the problems of lack of consistency.
The modified internal rate of return approach solves the multiple root problem by discounting all negative cash flows back to the time at which the investment is acquired, and compounding all positive cash flows forward to the end of the final year of the holding period; This process eliminates all sign changes and generally allows a unique solution

Proponents of the modified internal rate of return would eliminate the double solution problem by discounting negative cash flows back to year zero and compounding positive cash flows forward to the end of the investment holding period

Discounting future cash flows at either 25 or 400 percent yields a net present value of exactly zero; Both are indicated internal rates of return; Since there is no unique solution there is no "correct" internal rate of return

Financial management rate of return—incorporates two intermediate rates: one a cost of capital rate employed to discount negative cash flows back to year zero and the other a specified reinvestment rate for compounding positive cash flows to the end of the projection period

**Goals and Decision Criteria**

**Choosing a discount rate**

Choice of discount rate is critical in selecting between alternative opportunities, as well as in deciding what opportunities merit additional consideration

Minor adjustments in the discount rate can result in rather dramatic changes in net present value

The further into the future projections are made, the greater the influence of discount rate variations

Relative ranking of opportunities can be changed by altering the discount rate, when opportunities differ in the timing of anticipated cash flows

**Summation technique**

Based upon the proposition that investors seek compensation for deferring consumption, for bearing risk, for sacrificing liquidity and for portfolio management

Practical problems associated with estimating appropriate compensation for various components make it impractical

**Risk-adjusted discount rate approach**

Lumps compensation for everything except waiting (compensation for which is the safe, or risk-free rate) into one "reduced form" rate, called a risk premium; The sum of the risk-free rate and the risk premium is held to be the appropriate discount rate

The risk-free rate is assumed to be the reward solely for waiting, with no premium for associated risk

The risk premium differs according to the perception of investment risk; The riskier the project, the higher the discount rate employed

Thus the discount rate is composed of two elements: a time adjustment and risk adjustment

**Marginal cost of capital**

applies a weighted average rate incorporating the marginal cost from each capital source employed, with the cost from each source weighted in accordance with the percent of total new capital to be generated from that source

The investor's opportunity cost of capital is the rate of return that can be earned on the best available alternative use of funds that does not appreciably increase an investor's exposure to risk; Serves as the minimum acceptable rate of return, or hurdle rate, since investors are unlikely to accept any project promising a rate of return below that available elsewhere with the same degree of risk

**Investment decisions and decision rules**

NPV, a generally applicable technique, does not give an unambiguous decision signal when projects require different levels of initial cash outlay

Larger projects result in larger NPVs; Project size can be equalized using cost/benefit ratio

Profitability index (PI) is calculated by dividing the present value of expected future cash flows by the amount of the initial cash outlay—the present value per dollar of initial cash expenditure

Accept the project with the greatest profitability index (if risk profile is the same)
Mutually exclusive decisions
Limited capital resources—accepting one proposition exhausts available capital and renders acceptance of other ventures impossible
Owner-user—acquisition of a property eliminates the need for another
Alternative allowable capital recovery methods (depreciation), financing alternatives, lease or buy choices, decisions to accept or reject offers to buy or sell, selection from among alternate lease terms or tenants and alternate forms of ownership
The most appropriate technique for deciding between mutually exclusive (and otherwise equally desirable) alternatives when using NPV is to accept the alternative producing greater (positive) net present value
When using the IRR, the most appropriate approach is to accept the proposal having the higher internal rate of return, providing it is greater than the predetermined rate
Mutually dependent decisions—investment proposals are mutually dependent if acceptance of one forces the investor to accept the other
Acquisition of more than one property at a time, or a portfolio of properties, requires consideration of results from alternative combinations
If investment decisions are related in this fashion, group the mutually dependent ventures into consolidated units, and treat each unit as a single investment venture
Accept the mutually dependent combination having the highest net present value, provided it is greater than zero
If the "packages" differ in the amount of initial equity cash expenditure, compare the profitability indexes of the combinations
If the internal rate of return method is being used, accept the combination having the highest calculated return if it is greater than the predetermined cut-off rate

Investment value and investment strategy
Investment value—the value of an income producing property to a particular investor
Prospective investors will be motivated to buy if they believe their subjective investment value is greater than the amount they will have to pay for a property
Owners will be motivated to sell if they believe they will receive more than their properties are worth to them as elements in their personal investment portfolios
The greater the spread between investment value and transaction price for both buyer and seller, the greater the possible increase in both investors' wealth