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A Practical Computer Service
For the Income Approach

James A. Graaskamp

IT IS WIDELY HELD that the investment value of any income-producing capital asset is the present value of the net income to be generated. This generally has been true since the days of Alfred Marshall and Irving Fisher.[1]

Frederick Babcock went so far as to maintain there is only one method of valuing real estate: to discount building returns extended to perpetuity, determining capitalization rates in the market.[2] The basic concept of income/capitalization=value has become a truism for income property appraisal, but its appropriate application is a matter of considerable debate when forecasting sale price.[3]

The purpose of this article is to suggest how an available computer service actually can apply the income approach to modern real estate investment counseling and appraising. Because the system relies on a combination of market rents, historical costs, and a present value discounting of returns, it is possible to comment on the controversial need to use and correlate three approaches to value.

REDIRECTION OF INCOME THEORY

Over the years, the definition of income has evolved from a simple average annual net income over the investment's full useful life to a mixed return of periodic incomes and singular reversions, and, most recently, to a further

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1. For this and subsequent references, see Reference Notes, following.

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division of returns between vested mortgage interests and equity interests.[4] Concurrently, capitalization rate has evolved from a simple straight line concept to elaborate composite, Hoskold, Inwood, or Ellwood configurations. Each development attempted to provide a more realistic allocation of proceeds among cash dividends, mortgage payments, and capital recapture.[5]

In these refinements, concern with methodology gradually obscured the original present value theory. One school of thought, with roots in Babcock, sought an overall market rate by analyzing market sales of properties producing known net incomes. However, a capitalization rate determined by the ratio of income to sale price is nothing more than the reciprocal of a price/earnings ratio, as used in the stock market. A "market rate" of .085 means a price/earnings ratio of 12, a more accurate representation of market price comparisons than is possible with its cousin, the gross rent multiplier. Insurance companies and banks frequently determine loan value basis as some multiple of a normalized or average net income expectation. For smaller income properties, the market may well operate on net income multipliers.[6] However, use of a multiplier is a market comparison approach; a multiplier is not specifically a present value factor.

Another approach to capitalization rate, such as Ellwood's present value annuity, would construct an overall rate as a function of loan ratio, interest rate, mortgage term, equity yield rate, and depreciation and/or appreciation. A single composite discount rate requires a constant income at an average figure in the present value equation. Any income leveling or averaging to achieve conformity with the single variable truism $I/C = V$ does no justice to the proposition that present dollars are worth more than future dollars, and avoids the need to place returns to investor in specific time periods. All of the scholarly concern with capitalization rate misses the point that the amount of income received by the investor is uneven and erratic and has differing investment quality because of varying degrees of income taxes on these receipts. Nonetheless, the income schedule, not the capitalization rate system, is the root of all value.

Therefore, if the income approach to value is to be fully acknowledged as an appraisal tool, attention must be directed to:

1. Redefining income returns to the investor.
2. Placing returns in specific time periods.
3. Accounting for each type of return after considering income tax.
4. Reliance on simple, compound-interest, reversion discounts only, rather than all-encompassing but fictional annuity factors.
5. Redirecting appraisal methodology to reflect investor logic and motivation.

REDEFINITION OF INCOME RETURNS

It must be recognized by now that the yield of any real estate investment is not only shared between mortgage and equity interests, but also is distributed among local governments via real estate taxes and the federal

government in the form of income taxes. Therefore, if yield is adequate to equity after debt service, it should be adequate to equity after local and federal taxes. The monetary returns received by the owner of income-producing real estate must represent his after-tax spendable cash position. The investment value of the equity position is the present value of after-tax spendable cash from the original investment point to the time real estate is sold or equity is withdrawn. The after-tax cash received in each period is discounted back to the initial investment point as a simple Inwood reversion, and the series of reversions is then totaled to measure the present value of equity returns. The total investment value of the private capital share in real estate productivity is the present value of after-tax equity benefits plus the present value of mortgage payments.

After-tax spendable cash in real estate may come from four sources:

1. After-tax cash flow from operational revenues.
2. Proceeds on property sale after debts and capital gain taxes.
3. Nontaxable proceeds from refinancing an existing mortgage balance with a larger loan balance.
4. Spendable cash from other income which is taxable unless shielded by tax losses generated from real estate ownership.

To provide tax shelters, cash flow and spendable cash must be placed in appropriate time sequences, and they vary for each period of time. This is obvious because interest and depreciation vary according to time and, over a long period, revenue and expenses shift for a variety of reasons. In contrast, sales proceeds after debts and taxes, as well as nontaxable income due to refinancing, are placed at specific calendar dates.

Year-by-year estimates of after-tax cash flow are tedious and repetitious, well suited to the capabilities of a carefully programmed computer. Indeed, the extensive accounting this method requires may be a major factor in explaining appraisers' willingness to accept normalized income for appraisal purposes, while paying accountants to calculate after-tax cash flow for their own real estate investments.

Estimates of spendable after-tax cash involve assumptions that can be unique to a single investor, or characteristic for a class of investors. Because these assumptions are always unique to one taxpayer, valuation of after-tax income is appropriate for investment counsel, but not for appraisal. However, if certain assumptions can be modified to reflect probable group behavior, then after-tax benefits are not unique to the user but also are appropriate to general appraisal.

GENERAL STRUCTURE OF AN INVESTMENT MODEL

Investment models for the computer can be designed to produce: alternative results of given actions, while measuring the chances of success or failure; a single result with a statement of probable standard error; a single

Figure 1: Simplified Flow Chart of Investment Compraisal Simulation Model

Initial Data Entry Inputs

1. Gross annual rent roll
2. Operating expenses and real estate taxes
3. Income tax assumptions
4. Capital investment allocation and depreciation terms
5. Type and terms of financing, including lender participation
6. Time index adjustments for market, cost, and money factors
7. Appraisal and yield assumptions

Capital and Financial Summary Printouts

1. Capital investment cost allocations and depreciation schedule
2. Finance schedule summary
3. Annual net worth and capital gain statement

Cash Flow Data Printouts

1. Annual income, expense, and after-tax cash flow statements
2. Annual analysis of tax savings or tax losses carried forward
3. Annual analysis of important rates, returns and ratios
4. Annual investment valuation by the Inwood technique at five selected yields
5. Annual investment valuation by the mortgage-equity before-tax technique at five selected yields
6. Annual investment valuation by the mortgage-equity after-tax technique at five selected yields
7. Graphic analysis of key investment objectives

result which is simply the mathematical result of one set of numerical assumptions.

The commercial model described here is one of the latter types. Decision theory people call it a heuristic model, for it runs through a single set of inputs and stops without searching for an optimal solution. Because the combination of alternative inputs is infinite, it is presumed that the user has narrowed his choices to a limited set of practical alternatives on the basis of his own judgment and experience. The model's product is an extension of the decisions already made by the user. It is not a decision-making model, but the art, science and practice of real estate investment cannot be made conclusively mechanistic, nor would it be accepted by practitioners if it were. The Investment Compraisal model carefully avoids infringing on matters of judgment.[7]

The simplified chart of inputs and outputs in Figure 1 shows input information which presumes an extensive market and cost study by the investor or appraiser before considering all these factors in the valuation process. Gross annual rent roll, current operating expenses, real estate taxes, and the terms of financing all require full knowledge of the market, if the data are to be realistic and are to justify sophisticated analysis.

Depreciation assumptions, income tax decisions, and choice of equity rates require professional judgment. Time index adjustments of each input factor to anticipate a changing market, cost, and money factors in future years, require an understanding of real estate dynamics appropriate to the professional ideals of Realtor and appraiser. The specific commercial model now available provides alternative programs which follow the general format of cash flow analysis, but directs application to the objectives of appraisers, architects, land planners, tax assessors, lenders, accountants.

It is important to distinguish between a model which provides financial profiles with investment valuations, and an appraisal model intended to forecast market purchase price. At the start, an investment model must presume a purchase price which is then allocated to different capital classes for depreciation calculations in order to measure taxable income. Cash returns could be valued by an array of capitalization rates to permit equivalent comparisons of mortgage-equity, after-tax and traditional appraisal results. However, the appraiser attempts to forecast a price, rather than assume one beforehand. Furthermore, he must thoroughly know the market.

If there is group behavior, there should be only one discount rate or, more realistically, a narrow range of capitalization bracketed by two related discount rates. For an appraisal model, therefore, original acquisition cost allocations must be processed further to bring after-tax cash flows (as discounted by the market expectation of return) into balance with the forecasted purchase price. An investment model is not an appraisal technique for estimating probable selling price until it can be proven that a certain group of buyers has a certain pattern of cash flow analysis, or that these buyers rely on the results of the specific investment models in question. Thus, the computer system discussed here must be considered an investment model until the modifications necessary to reflect market behavior have been introduced, or until buyers generally follow the output of an investment model.

A CASH FLOW COMPUTER SERVICE FOR REAL ESTATE INVESTORS

Early in 1968, the Compraisal Corporation[8] licensed a set of cash flow models from the University of Wisconsin Alumni Foundation, which had received commercial rights to these programs from the School of Business staff members who had participated in their development.[9] The Compraisal Corporation is uniquely composed of professional appraisers and nationally known leaders in finance and communications technology.[10] They are concerned specifically with computer applications to real estate appraisal and investment. Basic to their approach is the assumption that the computer can

produce any form of analysis for which the appraiser can communicate the facts and then understand the implications of the outputs. Thus, the University programs were recast to fit the user, to simplify the information gathering process, and to maintain roots in traditional and applied investment logic. Organizations with computer capabilities will be licensed to run Investment Compraisal on their own equipment. Individual users without access to their own computer can avail themselves of this analytical tool on a service basis.

With this service, the investor or real estate analyst can utilize the computer without special training in data processing. Specially prepared data entry forms have been constructed with a view to simplicity. There are five basic forms, grouped as follows:

Data Entry Form A — Income, expenses, real estate tax, and income tax data
Data Entry Form B — Equity yields, investment tax credit and working capital loan
Data Entry Form C — Capital investment allocation and depreciation terms
Data Entry Form D — Loan schedule, one form for each mortgage or term loan of any amortization or bonus interest plan
Data Entry Form E — Indexes to modify each factor affecting cash flow to reflect changing conditions over time

These five forms complete the user's minimum information requirements and can be submitted to the local Compraisal representative, mailed to Compraisal, or, in some cases, telephoned for 24-hour, turn-around service. Of course, alternative data combinations can be submitted and the user would then receive packaged sets of outputs, including a graphic analysis of the key financial relationships and value determinations for each set of input data. After studying these results, the user might wish to submit his final financial plan and assumptions in order to establish more firmly the character of his expectations. If he has made an omission or inconsistent statement on his input form, a diagnostic sheet explains in plain English the nature of the problem and what the computer has done about it. Of course, the market judgments and the numbers submitted in the blanks are the user's responsibility.

THE NATURE OF THE COMPUTER OUTPUT

For each run of the Investment Compraisal model there are 17 pages of printed material plus 10 graphs drawn by a computerized plotting device. The computer reprints major input assumptions, such as capital cost components and loan schedules. Various income and expense assumptions reappear on the outputs, which provide *pro forma* income and cash flow statements. Here are the four basic analytical materials which are printed out:

1. An income and cash flow analysis for each of ten years, presented in a year-by-year format for comparisons.
2. A ten-year, year-by-year analysis of investment yields and important ratios of expense, default, debt cover, cash return on cash equity, tax shelter ratio to principal payments, capital gain and net worth.
3. An investment analysis which discounts all returns at the end of each year by the Inwood technique, the mortgage-equity before-tax technique, and the mortgage-equity after-tax technique at five selected yields.
4. Graphic analysis of significant relationships which measure the investment's effectiveness.

AN INVESTMENT MODEL AS AN APPRAISAL TECHNIQUE

According to Ratcliff, the appraiser must forecast the probable sale price of a specific property in most of his assignments.[11] This objective is a premise for converting investment models to an appraisal method which can be used to forecast the central tendency of price negotiations for a specific property. The concept of market action implies group behavior, knowledgeable buyers and sellers, with alternative courses of action open to each, striking a bargain only when their respective self-interests converge. To predict the price at which these interests will agree to buy and sell, Professor Ratcliff has stated: "There are only two devices open to the appraiser for predictive purposes—statistical inference and simulation."[12] As an approach to value, market comparison is a rough form of statistical regression analysis of residential property sale prices. Simulation is a 25-cent word describing what an appraiser does to predict value, most specifically when using the income approach. However, present income approach methods are challenged because they do not accurately simulate the income stream valuations of sophisticated investors. Spendable after-tax cash flow analysis is far more representative of investment counseling techniques in real estate and, therefore, is a more precise simulation approach to value.

The Investment Compraisal is only an investment valuation model when the inputs for time index dynamics and tax computations characterize a specific investor. However, Professor William Kinnard has underscored the fact that when the appraiser has determined highest and best use, he has also implied the probable group of buyers who would make such use of the property.[13] In this case, an appraiser can use the Investment Compraisal if he is familiar with such a group's decision-making logic and probable financial and tax pattern. The Investment Compraisal will produce an investment value that is the most probable sale price for the investment opportunity in question. The model only relieves the appraiser of clerical and computational responsibility, while permitting him to stress his professional understanding of economic and investment research and analysis.

SYNTHESIS OF THE THREE APPROACHES TO VALUE

As a final thought on using the Investment Compraisal simulation model, one could argue that it may lead to resolving the basic dilemma in appraisal theory for income properties. If rental income power is a measure of market demand, if historical costs are necessary to compute depreciation allowances for determining taxable income and, further, if returns to lender and investor are discounted to present values at yields representing investor requirements, might it be that an after-tax spendable cash income approach represents a synthesis of the three approaches to value? Such a synthesis would eliminate the necessity of correlation, a more awkward process. In any event, the Investment Compraisal input and output material permits the appraiser to demonstrate a professional understanding of real estate investment dynamics.

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8. Compraisal Corporation, Port Columbus International Airport, Columbus, Ohio 43219. Investment Compraisal® is a registered name for the model described in this article.
9. Professor James A. Graaskamp, Robert Knitter, Robert Markwardt, Mrs. Sara Pinkert, Thomas Turk.
10. The programs developed by Compraisal Corporation reflect the ideas and appraisal experience of J. F. Poisson, Gary J. Seckel, and Donald Casey Hambleton, all of whom are M.A.I.s.
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