Pitfalls of Discounted Cash Flow Analysis in the Valuation of Certain Income Producing Special Purpose Properties

A discounted cash flow analysis is often the analytical methodology of choice when an income producing special purpose property, such as solid waste management facilities, certain mineral and quarry properties, and certain agricultural and agribusiness propitious, among others, is appraised. Caution should be taken when confronted with a discounted cash flow analysis within a valuation report. Slight distortions or errors can result in significant over or understatements of value. The analytical risk in a discounted cash flow analysis is that miscalculations may be cumulative resulting in significant error in the final value conclusion. Problematic areas within discounted cash flow studies are summarized below.

Over or Understatement of Growth Rate:

Valuation reports often attempt to analyze projected growth in the demand for special purpose property products, such as landfill space or mineral products. Small discrepancies in annual growth rates can lead to large differences in aggregate rates over time. For example, an overly optimistic annual growth rate of 4% versus a more realistic market supported rate of 2% over an investment period of five years will result in an aggregate growth rate of over 21% in comparison to the market supported aggregate rate of approximately 10.4%.

Misinterpreting the Penetration of the Market Area:

By misjudging the basic level of need or demand for special purpose property products, the future demand requirements may be seriously miscalculated. Careful consideration must be given to the availability of substitute facilities as well as probable expansions of competing operations. By increasing the size of the market area, the valuation analyst could often include properties that probably are not competitive. Conversely, underestimating the competitive market area could result in serious misjudgment of actual market conditions.

Income and Expense Forecasting Errors:

Unrealistic inflation rates -

Generally, assumptions have to be made in forecasting income and expense items as to the impact of inflation over the investment period. An aggressive inflation rate can produce a significantly overstated value through the effect of compounding.

Exclusion of certain expense items -

Often valid expense items are omitted in the discounted cash flow analysis. As an example, if reserves for replacements are not included, the resulting net operating income will be overestimated. Reserves for anticipated property upgrades should be carefully noted in the analysis. For example, for solid waste management facilities and some quarry and mineral properties, monitoring costs as well as pre-closure and closure costs should be realistically accounted for within the investment period.

Failure to identify "other" income -

"Other" income may include cash flows generated by, for example, recycling centers, the sale of "borrow" material, as well as other sources of income. Neglecting the contribution of "other" income potential can result in the undervaluation of a special purpose. Conversely, an overoptimistic estimation of "other" income can result in an erroneous valuation.

Inclusion of non-real estate expenses -

If the valuation problem includes only the real estate assets, the inclusion of non-real estate revenues and expenses should be carefully avoided. Likewise, if the value sought is for the business value or the going concern value, the appropriate income and expenses attributable to the total operation should be carefully researched and supported.

Unsupported operating expense ratios -

Some discounted cash flow studies produce unattainable operating ratios which result in valuation errors. So-called "rules of thumb" as to operating expense ratios are inappropriate in well supported discounted cash flow studies. Operating ratios produced within a discounted cash flow analysis should be checked for reasonableness in the marketplace.

Failure to recognize "typical" market conditions -

Occasionally, income and operating statements for a particular project do not reflect normal or "typical" operating patterns. In these cases, it is necessary to reconstruct the actual operating statements to reflect market conditions. To properly measure market value, the projected operating statements utilized within the discounted cash flow (DCF) analysis must attempt to reflect actual market conditions.

Failure to consider changing technologies -

Many special purpose property types are experiencing technological impacts that may influence future income streams. The ability to optimize and more accurately predict operational patterns could reduce future operating costs. Not recognizing current and future technology within the selected investment period could result in unreliable operating cost estimates.

Capitalization Errors:

Misrepresenting the investment period -

Investment periods for special purpose properties can vary widely. For example, the investment period for a typical solid waste management project is the period from the date of valuation to the expiration of the license. This may not be appropriate, particularly when a very long operational period is expected. Conversely, the arbitrary use of a five or ten year investment period in a discounted cash flow analysis should be avoided. Surveys and experience have shown that investment holding periods vary widely.

The discounted cash flow model should project into the future only for that period of time that is reasonable and realistic. When the investment period is extended too far into the future, the assumptions necessary in a discounted cash flow analysis become more uncertain and the chances for error increase. The length of the investment period should reflect the realities of the marketplace.

Mid year or beginning of the year discounting -

Investors typically assume that net income is received at the end of the year. The proper discount factor should be an end of year factor. Some analysts, either purposely or mistakenly use a mid-year or beginning of the year factor. The latter will result in an overstated value for the property under appraisement. Because of the mystique of discounted cash flow analyses, the misuse of discount factor timing is often unnoticed by the user of the appraisal.

Mistakes in selection of capitalization and discount rates -

Capitalization rates and discount rates are highly sensitive. Understating both capitalization rates and discount rates may seriously overvalue the property. The converse is also true. To illustrate: the use of an 11% capitalization rate rather than a 12% rate will generate a value over 9% higher. The estimation of both capitalization and discount rates tend to be judgmental. Evidence of sales activity should be included in the valuation analysis to support the judgmental estimates found in a discounted cash flow study.

Failure to Recognize the Contribution of the Project at the Reversion:

The chance for error in estimating the value of the reversion or project value at the end of investment period arises from the often long investment periods that are characteristic of some solid waste management, mineral, and agribusiness investments. The failure to properly recognize the influence of technological and economic influences on value over time as well as neglecting to adequately indicate the highest and best use of the property after the investment period may also misstate the reversionary value.

Use of a Discounted Cash Flow Analysis When Not Indicated by Market Evidence:

It is not necessary to include a discounted cash flow analysis in every valuation report of a special purpose properties. The valuation methodologies used by typical market participants may not include discounted cash flow analyses within their decision making processes. This often is the case for smaller projects. The use of a discounted cash flow analysis within an appraisal report is dictated by the characteristics of the property, the reactions of market participants and quite frankly, common sense.

The foregoing is not meant to discredit discounted cash flow (DCF) analysis. The utilization of a discounted cash flow analysis has a definite place in the valuation of many special purpose properties. However, caution should be utilized in relying on valuation analyses that contain numerous assumptions without strong market research. The fundamental weakness found in discounted cash flow (DCF) analysis is that it is difficult to obtain reliable data for the estimation of multiple year income and expenses. Further, the calculation of a reversionary value sometime in the distant future is a problem unto itself.

The sole or heavy reliance of a discounted cash flow (DCF) study within a valuation report can lead to an unwise investment decision. Without a presentation of recent market activity, the real estate analyst can easily over or understate market value. |

VALUATION GLOSSARY

Special Purpose Property:

A limited market property with a unique physical design, special construction materials, or a layout that restricts its utility to the use for which it was built.

Discounted Cash Flow (DCF) Analysis:

A procedure in which a discount rate is applied to a set of projected income streams and a reversion.

Discount Rate:

A yield rate used to convert future payments into present value.

Capitalization Rate:

Any rate used to convert income into value

Direct Capitalization:

A capitalization methodology that utilizes capitalization rates and multipliers extracted from sales data. Only the first year's income is considered. Yield and value change are implied, but not identified.

Reversion:

A lump sum benefit that an investor receives or expects to receive at the termination of the investment.

Depreciation (Valuation):

In valuation, a loss in property value from any cause; the difference between the reproduction cost or replacement cost of an improvement on the effective date of the valuation and the market value of the improvement on the same date.

Depreciation (Accounting):

In accounting, an allowance made against the loss in value of an asset for a defined purpose and computed using a specified method.

Source:
The Dictionary of Real Estate Appraisal, Third Edition
Appraisal Institute
Chicago, IL (1993)

QUESTION AND ANSWER CORNER:

Q. Is it difficult to find sale data for special purpose property such as solid waste management facilities?

A. Certainly, but finding sales is not insurmountable. Granted, the research period has to be extended and some data will be included in a special purpose property valuation that may be less than ideal. However, special purpose property does transfer and a carefully researched analysis will provide reliable indicators of value.

Q. If market evidence is limited, what does sales data of limited market property, such as mineral or stone quarry, indicate?

A. Sales data will indicate central tendencies within the market for unusual property types. Most importantly, sales evidence is a strong identifier of trends.

Q. What specific information can special purpose property sales data provide decision makers?

A. Sales data will establish a range of comparative unit values (e.g. sale price per cubic yard or per acre). In addition, multipliers and rates may be abstracted from sales data providing support to the analyst's estimations. The selection of multipliers, capitalization rates and yield rates, without sales data, is highly conjectural and is always subject to error.

Q. How do the courts react to sales evidence in valuation cases?

A. The courts have reacted most favorably to sales evidence as compared to cost and income support. Sales evidence reflects most accurately the actual conditions of the market. The courts have indicated that the sales comparison approach should be developed and relied upon whenever there is adequate market data.

Q. Isn't the cost approach the most reliable indicator of value for special purpose properties.

A. In some cases the cost approach will provide a reasonable indication of value. The difficulty of the cost approach in the valuation of special purpose property is the problem of estimating accrued depreciation. The best method of estimating accrued depreciation is through abstraction from sales evidence. Without sales evidence, the estimation of depreciation is highly conjectural.
