

Comments on Discounted Cash Flow Analysis

Discounted cash flow analysis is the analytical technique of choice when income-producing properties are appraised. Many appraisers, however, are using a "generic" approach to the analytical process in terms of the length of study period, the reversion calculations, and the approach to discounting in general. Data collection is only part of the analytical process. The study period, the selection of an appropriate capitalization rate for the reversion, the application of appropriate methods to the rate selection, and recognition of the relationship of risk as it applies to the discount rate as opposed to the capitalization rate must be considered as well.

Just last year, IBM celebrated the 10th anniversary of its introduction of personal computers into the market. For real estate appraisers, personal computers as well as Hewlett-Packard's introduction of the HP-12C have revolutionized the analytical process.

As software has become more sophisticated, the use of discounted cash flow (DCF) analysis has accelerated. Ten years ago, it was a "maverick" analyst who sat down with green columnar pads and worked and reworked cash flows, erasing and adjusting discount factors from the Ellwood tables. Now a DCF analysis is expected and it is nearly always included in a valuation analysis. While everybody is doing it, however, they rarely actually think about why they are doing it.

DCF analysis often is being performed by rote—the same technique, the same shell format, the same thought pro-

cess (or lack thereof). Rarely does anyone give any thought to what has been produced. How does a printout relate to the real world? Does an analysis make sense? Many appraisers seem to operate under the assumption that if they just fill in the blank spots on the shell or in the canned software, they automatically become appraisers. But this is not the case.

TEN-YEAR CASH FLOW ANALYSIS

What is so special about a 10-year DCF analysis? Why is 10 a magic number? The time period in the model is supposed to reflect a typical holding period for a property given its location, market conditions, property type, and other characteristics. How many appraisers have ever *not* used a 10-year study period? While it is true that a 10-year cash flow fills up a page in a landscape configuration and looks im-

Martin A. Skolnik, MAI, is vice president of the Commercial Division of Campanella & Company, Inc., in Baltimore, Maryland. Mr. Skolnik received an MBA from the University of Baltimore, and is on the faculty of The Johns Hopkins University's Berman Institute of Real Estate where he has held seminars on discounted cash flow analysis and spreadsheet development.

pressive, 10 years is hardly a magic number.

Typically, an appraisal report contains a sentence to the effect that based on investor surveys, a 10-year holding period is deemed appropriate. According to an investor survey by Cushman & Wakefield, however, typical holding periods for their 61 respondents ranged from 5 years to 30 years.¹ It should be noted that the majority of respondents to this survey uses a 10-year cash flow model. Why? What thought process resulted in this selection? Should appraisers begin rethinking their analytical assumptions?

For instance, what is typical? In 1985, did any appraiser enter negative appreciation for 1990 and 1991 into 10-year DCF models? Did any appraiser then account for current economic conditions such as stable or decreasing rents? Probably not. In current analyses, an appraiser may feel smug that he or she is modeling flat growth for a couple of years. For later years, however, standard inflation assumptions are probably being used. Why project an analysis that far into the future if the uncertainty of DCF assumptions is so great? Why "crystal ball it" that far out?

A DCF model should only project into the future a reasonable and foreseeable period of time; three years, five years, or even seven years. If a property is operating at stabilized occupancy and unusual fluctuations in income or expenses are not projected, why is a DCF analysis necessary at all? What is the point?

The difference between a stabilized capitalization rate and a discount rate is generally regarded as the inflation factor for the study period. An appraiser may merely apply an inflation factor to stabilized income and expenses and if the inflation factor is correct, the two analyses develop the same value estimate. But what advantage or service has been provided for the client?

If a property is going through a lease-up period and it is necessary to model the effects on value resulting from absorption, the DCF model is more than appropriate. Once stabilized occupancy is reached, however, why protract the analysis through another 5 or 10 years of spreadsheet modeling? By definition and

practice, reversion value is a stabilized year's analysis. Why protract the analysis to put the reversion in year 11 when stabilized occupancy has already been reached in an earlier year? This is just a waste of paper and time.

A DCF analysis is not required for every appraisal assignment. In fact, a 10-year analysis probably is necessary and appropriate for only a few appraisals. The property, the market, and common sense, rather than the width of the paper, should dictate the length of an analysis.

Two regional, mid-Atlantic lenders recently instructed the author's appraisal firm to include a DCF analysis in every appraisal of income-producing property. When asked why, they responded that the federal examiners have insisted on it. As an example of how ludicrous this is, we recently were assigned an appraisal of an owner-occupied 8,000-square-foot office building in a stable market, and were told by several market participants that they purchase these types of buildings on a direct capitalization basis only. When we asked the client, however, we were told that we should still do a DCF analysis because they did not want to have to explain to federal examiners why it was excluded. This does not make sense.

REVERSION ANALYSIS

For a property operating at stabilized occupancy, a current sale price would be based on the following year's expected cash flow capitalized at a rate appropriate for the investment risk and property type. This is standard appraisal and investment practice. In current DCF practice, the reversion interest is the same as a stabilized net income analysis projected into the future, but is usually modified in two ways: using costs of sale, and applying a risk factor to the capitalization rate.

For example, in a 10-year cash flow analysis (i.e., for a property that reaches stabilized occupancy by the end of year 10) the reversion would be based on year 11's net operating income (*NOI*), because a potential purchaser at the end of year 10 would base the sale price on projected year 11. This makes logical sense, and is

1. Cushman & Wakefield, Inc., *Real Estate Outlook* (June 1991).

According to standard financial theory, long-term investments require a higher rate of return than short-term financial instruments to attract investment dollars.

the same as assuming that for a property operating at stabilized occupancy today, a current sale price would be based on the following year's expected cash flow capitalized at an appropriate rate.

In typical appraisal practice, however, an appraiser modifies the stabilized analysis in two ways, neither of which appears appropriate. First, to derive a reversion value, an appraiser capitalizes stabilized *NOI* at a rate appropriate for the subject property given such characteristics as its location and its investor requirements. Many appraisers base this future rate on some kind of current capitalization rate analysis modified for future uncertainty and investment risk. There is no basis for this kind of modification to the capitalization rate. Future uncertainty and investment risk are accounted for in the selection of the discount rate. In fact, the discount rate selected is an average rate based on future uncertainty and investment criteria.

According to standard financial theory, long-term investments require a higher rate of return than short-term financial instruments to attract investment dollars. This phenomenon can readily be observed in the financial markets by comparing short-term Treasury bills with longer term Treasury notes. They both have the same investment risk because they are guaranteed by the federal government, but the longer term notes tie up investor funds for a longer period of time. An investor thus is exposed to longer term fluctuations in the interest rate and greater risk. A greater rate of return would be required to compensate for this risk.

How does this affect a DCF analysis? By applying a single discount rate for the entire study period, an appraiser chooses to represent an average risk return for the subject's analysis. Nothing prevents an appraiser, however, from applying a different discount rate for each year to more accurately reflect the increasing investment risk associated with passing time. The early years of the analysis thus would have a lower rate than the years at the end of the study period.

One can see that in this manner the risk associated with the final years of the analysis is accounted for in the discount rate. The projected stabilized year's capitalization rate should only be adjusted if

an appraiser/analyst believes that the structure of mortgage and equity markets (i.e., a change in market conditions) would somehow be different than in year one of the analysis. For example, using the band of investment as a starting point for capitalization rate derivation, an appraiser's terminal capitalization rate would only be different from a current rate if the analyst believed that in the future loan-to-value ratios, equity dividend rates, or mortgage lending requirements would be different than they are now.

The rationale for increasing a terminal year's capitalization rate may be to reflect the increased risk to the investment, because the property would be 10 years older and thus subject to additional depreciation. Again, it is inappropriate to increase the capitalization rate for this important factor. The risk associated with an aging property should be accounted for by including a reserve for replacement or modifying the repairs and maintenance line items through the term of the holding period. Just because an analyst believes that repairs and maintenance are equivalent to \$1.00 per square foot now does not mean that the only increase in repairs over the analytical period is caused by an inflation factor. As a property ages, more attention to repairs and maintenance items will be required. The expenses in the stabilized year, if it is 11 years away, should reflect the appraiser's opinion of what costs the potential purchaser will incur 11 or more years away. The discount rate accounts for future uncertainty. An adjustment to the current capitalization rate of 50 to 100 basis points is an incorrect method and is not supportable by appraisal or financial theory.

The second area of apparent "knee-jerk" reactions on the part of the appraisal community in developing the reversion value is a cost-of-sale subtraction. Why is this so? As mentioned previously, the reversion value is a representation of a future sale-pricing scenario. Its method is comparative with a stabilized current-year analysis. Does anybody subtract closing costs, transfer taxes, or broker commissions from a current, stabilized scenario to arrive at market value? Of course not. Why then do appraisers automatically subtract closing costs from the future indicated sale price when attempt-

ing to mimic the same type of stabilized analysis? A subtraction of costs of sale from a future indicated sale price is an incorrect appraisal method. A cost-of-sale subtraction does not appear supportable by appraisal theory.

DISCOUNT RATE VERSUS DISCOUNTING

Some sophisticated appraisers overvalue property every time they develop a DCF analysis. Some do this unknowingly; some, however, may be keenly aware of what they are doing. They do this by midperiod discounting and monthly discounting. Some software packages and some spreadsheet models allow an analyst to discount cash flows on a monthly basis, on a quarterly basis, or on a mid-period basis. The justification for this is that these techniques allow for a more accurate representation of cash flow than the standard, end-of-period discounting usually found in practice. It is true that cash flow modeling on a monthly or more regular basis than end of period is a more accurate representation of reality. The attempt to reflect a more realistic cash flow should be commended. Cash flow representation, however, is only part of the process. These appraisers err in their approach to discounting.

For example, assume that appraiser A has modeled a monthly cash flow analysis. He or she then derives a discount rate from investor surveys that reflects that a 12% annual rate of return is appropriate. Appraiser A then divides the 12% rate into 12 months and applies it to the monthly *NOI* to derive a value estimate. Appraiser B, working on the same project, decides to model his or her cash flows on an annual basis using the same assumptions as appraiser A. Appraiser B uses the same investor survey and applies the same annual rate to the annual *NOI* but arrives at a different value estimate.

Appraiser A has applied an annual discount rate against monthly cash flows. Dividing the annual rate by 12 does not yield an appropriate monthly rate. All other things being equal, appraiser A's value will be greater than appraiser B's but not necessarily more accurate because the A model accumulates cash flow more rapidly and uses a more aggressive rate.

The following example should make this easier to understand:

A \$150,000 annual *NOI* is discounted for five years at a 12% annual end-of-period factor to yield \$540,720 (no reversion is assumed).

To get the same final value (\$540,720) on a monthly basis, the appraiser must use monthly income of \$12,500 (\$150,000 divided by 12 months) discounting for 60 months at a discount rate of 13.7%.

If the appraiser had used the annual rate of 12% (1% per month) applied against monthly income, the resulting value would be \$561,940, almost a 4% error.

For appraiser A to accurately discount net income of \$12,500 per month for five years, an annual discount rate of 13.7% (translated to a monthly rate of 1.14%) would have been more appropriate. Clearly, an annual rate divided by 12 does not yield the appropriate monthly discount rate for monthly cash flows. When an appraiser does investor surveys, he or she must make sure that the quoted rates of return are in the same format as the analysis. If survey participants quote annual rates of return but the analysis is monthly, the results of the DCF analysis will be misleading.

It should be remembered that if investors are quoting annual rates of return, the cash flows against which these rates are applied must also be annually presented. Investor surveys are typically based on annual rates that allow for discounting at the end of the period. Monthly or midperiod discounting artificially, erroneously, and incorrectly inflates the resultant value if the discount rate is based on annual cash flow expectations and end-of-period discounting.

CONCLUSION

The following incorrect techniques are being used in DCF analysis and reduce the accuracy of this analytical method.

- Arbitrary choice of a 10-year study period without considering the property type, the phase of its economic life, or market factors.
- Unjustified continuation of cash flow projections past stabilization.
- Arbitrary increase of capitalization rates for reversion calculations for

risk when the investment risk and future unknowns are already considered in the discount rate. The capitalization rate for the reversion is an inappropriate place to adjust for future uncertainty.

- Unwarranted costs-of-sale deductions in the reversion valuation that are unsupported in appraisal theory.
- Division of an annual discount rate by 12 and calling it a monthly factor, which is erroneous and misleading to a client because it results in an artificially higher value. The discount rate chosen from the market must be applied to cash flows in the same manner as expected by the market. A discount rate reported by investors as annual must be applied against annual cash flows.

The intent of this article is to provoke thought and discussion within the appraisal community. Knee-jerk reactions and automatic responses do not help promote the industry or advance appraisal theory. It is important to think about the underlying concepts, especially in a rel-

atively new field such as DCF analysis. Refinement of analytical techniques only makes appraisers better.

One caveat should be added, however. Regardless of how much sense these refinements to DCF analysis make, clients (e.g., banks, savings and loan associations, developers, government regulatory bodies) must be made aware of changes to standard methods—even if previous methods are proven to be incorrect.

The reason for eliminating costs of sale from a reversion value should be explained in the body of a report. Further, an appraiser should explain why he or she has chosen a terminal capitalization rate equal to the current stabilized rate and why the analysis extends over a 4-year period instead of the typical 10 years.

Most reviewers will send back a report in which an appraiser develops DCF analysis with these refinements without properly explaining deviations from the currently accepted standards, because such a report does not conform to appraisal practice. However, bankers, mortgage lenders, government reviewers, federal examiners, and real estate developers need to rethink their analytical practices as well.