Timberland Appraisal FAQ's: The Income Approach

by Sam Radcliffe, Vice President

Of the three common approaches to valuation of timberland (income, cost and comparable sales), the income approach can be the most complex and often raises questions from clients and appraisal auditors. The following "frequently asked questions" will hopefully solve some of the income approach mysteries.

What is the income approach and why is it relevant to timberland?

As readers of this newsletter understand, timberland is an investment asset that generates annual or periodic incomes. The income approach to valuation is based on the concept that the net present value (NPV) of an asset is the discounted value of future net cash flows to the owner. In timberland appraisal the income approach is implemented using a discounted cash flow (DCF) model, in which projected future <u>cash flows</u> resulting from property management and the <u>terminal value</u> of the property are discounted to the present at a market <u>discount rate</u>. The three underlined terms are the key elements of a DCF model.

What cash flows are projected in the DCF model?

On the revenue side, future timber harvests and future timber prices must be projected and are usually the largest items in the model. Other revenue streams could include land sales, recreational lease revenues, minerals sales, or carbon credit sales.

On the expense side, the typical items include road building and maintenance, silviculture, timber sale administration, property taxes and general management/administration. Where a property is third-party certified or under a carbon contract, there would be periodic or annual costs associated with those activities. Where land sales are projected there could be costs associated with entitlement and marketing of lots. Generally the asset management fees charged to an institutional investor by a Timberland Investment Management Organization (TIMO) are not included in the model.

In timberland appraisal, it is common to project free cash flows, which are cash flows generated by the investment available for distribution to all providers of capital. Therefore, debt service is not a specific line item in the DCF model. The use of debt is accounted for by the weighted average cost of capital, described below.

Projected cash flows should all be tied to a specific property management scenario, and should be reflective of what a new owner could prospectively achieve, which may be different than the property's historic experience. This is particularly true with regard to the timber harvest projections.

What is terminal value? How is terminal value estimated?

One of the first DCF modeling tasks is to determine how far out into the future cash flows should be projected. At the end of the projection period, the property still has value. That value is called the terminal value.

There are different views on how long the projection period should be. One view is that the period should match the holding period of the typical investor. In the case of investment grade timberlands, that means 10-15 years. Whereas a commercial building might fully depreciate in that period, it is fairly short when considering the development of a forest. My problem with such a short period is that the NPV becomes heavily dependent on the discounted terminal value. When the terminal value is estimated using a cost approach (discussed below), the values indicated by the income and cost approaches converge as the projection period is shortened.

Another view is that the period should be as long as it takes to reach stability (e.g. equal annual timber harvests). This seems reasonable but in the case of very "lumpy" forests that period could be 100 years or more. A 100-year forest projection is actually not that uncommon but it strains credibility to make economic forecasts of that length.

In practice I tend to choose a projection period that is longer than the typical holding period but short enough to be reasonable for a forest and economic projection. That period tends to be in the 20 to 30 year range.

There are essentially two methods of estimating terminal value. The implicit assumption is that the property will be liquidated at the end of the period. The price that will be obtained for the property in liquidation is based on either a cost approach or an income approach.

The cost approach is based on the value of the projected timber inventory and bare land at the end of the period. A growth and yield model is used to project the changes in inventory that have occurred through growth, harvest and mortality. The gross timber value is a multiplication of the projected inventory by timber prices that have

been projected throughout the period. The value of bare land is more difficult, but a Soil Expectation Value approach can be implemented. Using a cost approach as described in a previous newsletter[1], valuation multipliers are applied to the gross timber value and to the compositional value (land + timber) to estimate the terminal value of the property.

The income approach is based on the assumption that cash flows at the end of the period have stabilized and will continue so in perpetuity. The net cash flow for the last period is capitalized at the model discount rate to estimate the terminal value of the property. In essence, this produces the same result as a perpetual projection period with stable cash flows, so the earlier comment about strained credibility applies.

Since neither terminal value calculation is perfect, appraisers should estimate both and then reconcile the two values in the same way that indicated values from the three appraisal approaches are reconciled.

How is the discount rate estimated?

Cash flows are generally estimated on a pre-income tax basis, therefore a pre-tax discount rate must be estimated. There are several approaches to discount rate estimation:

Surveys. A number of timberland appraisers regularly conduct discount rate surveys and publish the results. These can be a useful guide, but survey respondents are usually self-selected and often have an interest in having the world think that timberland investments always churn out that "6-7% real".

Survey results also depend on how the question was asked. Did the survey ask for a target rate of return, a benchmark rate of return or a realized rate of return? Over the long term among an aggregate of investors these rates may converge, but can differ from each other quite a bit at a point in time for a particular investor.

For timberland appraisals we are interested in the current target rate of return among the type of investors who are most likely purchasers of the subject property.

Actual return data. The National Council of Real Estate Investment Fiduciaries (NCREIF) publishes a Timberland Index that measures the performance of properties owned by institutional investors (https://www.ncreif.org/timberland-returns.aspx). Clearly data such as these would inform an investor's choice of a target rate of return. However, care must be taken to refer to the correct geography and the appropriate time period. The index is developed for four US regions: South, Pacific Northwest, Northeast and Lake States. For the 12 months ending 3/30/15, the total returns in those regions range from about 10% to over 14%. The index dates back to 1987, but long historic averages are probably misleading given

the development of timberland as an institutional asset class. In the early years the market was not transparent and buyers were able to consistently enjoy 20%+ annual returns. As more money was allocated to timberland and sellers became more sophisticated marketers, timberland prices rose and returns have declined. For purposes of informing a current target rate of return, it is my opinion that only about the last five years are relevant.

Build-up method. This approach starts with a risk-free rate of return and adds risk elements to reflect the riskiness of the particular subject property. In the general financial investment world, the Capital Asset Pricing Model (CAPM) is a well-accepted build-up approach that has been applied to timberland as well. In my own research, I have estimated and used a "timberland risk premium" which is the amount by which timberland returns exceed the risk-free rate as represent by long-term US treasury bonds[2].

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Application of general build-up methods should include consideration of any extra risk presented by the particular subject property. For example, when real estate sales comprise a significant portion of the projected cash flows, extra risk might be added due to the inherent riskiness of real estate markets. Where the property is under a contract that limits management options, such as a conservation easement or a carbon contract, consideration should be given to adding extra risk.

Extraction. Extraction of discount rates from recent comparable sales is typically a rare opportunity, as a good bit of knowledge of the sale property is required to develop a cash flow stream and then "back out" the discount rate that equates net present value to the actual transaction price.

I have heard this approach criticized because the appraiser does not know the assumptions the buyer was making to develop his projected cash flow stream, and therefore can't know what the buyer's discount rate was. For example, the buyer may have used a higher timber price growth rate than the appraiser, which would indicate a higher discount rate. I don't think this criticism is valid. The appraiser uses his best judgement of the cash flows the property will produce. The purchase price is a known fact, so the extracted discount rate is the appraiser's best estimate of the discount rate that would

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apply if a typical well-informed buyer bought the property at the actual transaction price.

In practice, the appraiser should use as much information and as many approaches as are available to arrive at a reasoned opinion on the discount rate. The sources and methods described above are useful for estimating the return on equity. The total rate of return is indicated by the weighted average cost of capital (WACC), which takes into consideration costs of both equity and debt. The cost of debt is indicated by typical timberland lending rates, which tend to be approximated by the return on medium grade corporate bonds. Here is an example WACC calculation where the estimated cost of equity is 5%, the estimated cost of debt is 3.5%, and the assumed equity:debt ratio is 80:20 is: (0.8 x 5%) + (0.2 x 3.5%) = 4.7% = WACC

The weights in the WACC calculation should represent the typical capital structure among timberland investors. In actuality, capital structures vary widely among entities, and more research needs to be done on this aspect of the industry.

What is the role of inflation in the model?
DCF models may be based on either nominal or inflation-adjusted cash flows. The important point is that the discount rate must match the type of cash flows, i.e. if the cash flows are inflation-adjusted then a real discount rate must be used, and vice-versa.

The various sources of discount rates cited above provide both real and nominal discount rates. Surveys generally provide real discount rates while the other three approaches indicate nominal rates. Adjusting the nominal rates to real is a simple arithmetic exercise but one that many analysts get wrong[3].

The inflation rate used either to adjust nominal discount rates or to project current cash flows in nominal dollars should be an expected rate, not a current or historical inflation rate.

There are a number of ways to estimate inflation expectations, including analysis of inflation protected US treasury bonds. Fortunately for the appraiser, much of this work is regularly done by researchers at the Federal Reserve Bank, investment banks and pension consultants. Consulting numerous sources will usually lead to a reasonable consensus.

When is the income approach most relevant and when is it not relevant?
For large investment grade properties, the income approach is always relevant because it is the approach most favored by institutional investors. It is particularly relevant when the property is encumbered by conservation easement or has some unique revenue streams such as carbon offset sales or leases for such things as sugarbush, wind towers and recreational lots. In such cases, the detailed accounting of the income approach systematically accounts for property-specific cash flows.

For smaller properties where income generation is not the principal objective, it may still be instructive to carry out an income approach, but the value indicated would likely not be given much weight when reconciled with the value indicated by the comparable sales approach.

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[1]. Samuel J. Radcliffe. 2010. Cost Approach and the Timber Value Multiplier. Prentiss & Carlisle Quarterly Update, 2nd Quarter.

[2]. Samuel J. Radcliffe. 2013. Timberland Return on Investment and the Discount Rate. Prentiss & Carlisle Quarterly Update, 2nd Quarter

[3]. The expected inflation rate cannot be simply subtracted from the nominal discount rate to get the real discount rate.

The proper formula is: $(1 + n) / (1 + i) - 1 = r$

where: n = nominal discount rate
i = expected inflation rate
r = real discount rate

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