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RESEARCH NOTE 2008-2

A Note on the Value of Mature Timberland Assets

(Clark S. Binkley - 22 June 2008)

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Abstract. The ratio of selling price to Gross Timber Value (GTV) is commonly used as a rule of thumb to value mature timberland. This metric, frequently applied to slowly growing forests of the US North, can be extended to plantation projects. Even at comparatively high discount rates, forest growth subsequent to the liquidation of mature timberland contributes a material component of overall asset value, a sales prices approaching or even exceeding 100% of GTV may be justified.

I. Introduction

In valuing timberland assets, there is no substitute for careful, professional discounted cash flow analysis. For any specific asset, such an analysis includes assessment of current and future timber market prospects, harvesting and growing costs and the possible harvest schedule within biophysical, regulatory and social constraints. Such analyses are expensive and time consuming to conduct, so many investors use various rules of thumb to test the reasonableness of prospective purchase prices and to quickly screen investment opportunities.

One such rule of thumb is the ratio of sales price to Gross Timber Value (GTV) where GTV is defined as the market value of the entire standing inventory assuming it could be liquidated immediately. Indeed, in the northern forests of the US, appraisers commonly use this metric to assess comparable sales. In these forests, most of the value lies in the mature inventory and not in the future growth so the measure has some intuitive appeal. The objective of this paper is to provide a quantitative economic rationale for this measure and to extend the analysis to other kinds of forests where future forest growth is a larger fraction of value.

II. Valuation Methodology

Imagine a mature forest of A hectares with standing inventory of I m^3/ha valued at a net stumpage price of \$p/m^3 with a growth rate subsequent to harvest of G m^3/ha/yr. What would you pay for this asset?

Let's presume that

- the land has no other use that growing trees;
- it is environmentally/physically/economically/politically feasible to liquidate the standing inventory over a period of T years;
- the real stumpage price of timber is p/ m^3; and
- the real discount rate is i.

Assume further that all of these factors will remain constant throughout history. Such a world is sublimely innocent and attractive, bearing little resemblance to the real one. But, it does offer insights into valuation.

In such a world, annual income and therefore asset value arises from two components, the harvest of mature timber and the income from timber growth.

Annual Income from mature timber over the liquidation period = p*I*A/T Annual

Income from timber growth is a bit more complicated. Ideally we would model the accretion to value associated with replanting and harvesting timber. However, a simple way to model this is to assume that timber income each year equals the growth rate G[1] applied over the average area available over the conversion period 0.5*A*T multiplied by the net timber price p. Or,

Annual Income from second growth during the conversion period= p*G*AT/2 As

long as T is sufficiently long this is probably not a bad approximation. Finally, we

have value from forest growth after the conversion period, or p*A*G.

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[1] Note that the growth rate G refers to the growth of the forest that is replacing the forest that is being liquidated. In a plantation project, this is likely to be higher, perhaps much higher, than the growth of the mature forest.

The first two income streams persist for T years. The third income stream is perpetual, but does not commence until T years out. As a result, the net present value of these three income streams is:

$$(P*I*A/T + p*G*AT/2)* (1-(1 + i)^{-T})/i) + (p*G*A)* ((1 + i)^{-T}/i) \quad (1)$$

Timberland values are sometimes expressed as a ratio of "value" to gross timber value (GTV) of the standing inventory.

In our simple world, GTV = p*A*I.

The ratio R of NPV to GTV is then, with algebraic simplification,

$$R = (1/T +G/2*I)*(1-(1 + i)^{-T})/i + (G/i*I)*((1 + i)^{-T}/i) \quad (2)$$

III. Results

Accepting this valuation approach provides some interesting results.

First, let us imagine an extreme case where G = 0 so we are simply harvesting mature inventory. This case represents exactly the situation where the investor owns a timber deed and the timberland is being converted to some other use. It approximates the situation where growth rates are small in relation to the value of current inventory, a situation that obtains in much of the world's natural forest. Under these circumstances the ratio R of timberland NPV to inventory GTV is

$$R = (1/Ti)*(1-(1 + i)^{-T}) \quad (3)$$

And, if the discount rate is high enough and the liquidation period long enough this further simplifies to 1/Ti. Taking T = 20 and i = 10%, then the ratio of selling price to GTV is 0.5. This is interestingly consistent with the observation that in northern forests where growth is slow, timberland sells for a substantial discount to the value of the timber. This situation does not necessarily represent the opportunity for a highly profitable investment, but instead reflects the fact that on many large properties, the mature timber can be liquidated only over a rather long period as a result of market, regulatory or social constraints.

The table below provides the results for the case where I = 400 m^3/ha and T = 20 yrs. A couple of points are relevant to mention. First, even at relatively

Table 1. Ratio of Selling Price to GTV
(I = 400 m^3/ha and T = 20 yrs)

Discount Rate	Growth Rate (m^3/ha/yr) 0	5	10	15	20
2%	0.82	1.34	1.86	2.39	2.91
4%	0.68	0.91	1.13	1.36	1.59
6%	0.57	0.71	0.85	0.98	1.12
8%	0.49	0.59	0.68	0.78	0.87
10%	0.43	0.50	0.57	0.64	0.71
12%	0.37	0.43	0.49	0.55	0.60

high discount rates with relatively modest growth rates, the timber growth provides a material source of value in a mature forest. For example, in the case of a 10% discount rate and a growth rate of10 m^3/ha/yr and a 20 year liquidation period, timber growth provides nearly 25% of the total value. Second, with relatively high growth rates the ratio of NPV to GTV can approach 1.0, even at rather high discount rates. In an example not shown in the table, the selling price can equal the value of the timber if the liquidation period is shortened to 10 years, and the growth rate is 22 m^3/ha/yr.

IV. Conclusions

The ratio of selling price to GTV is a handy rule of thumb for valuing timberland properties with large amounts of mature inventory. While the methodology is commonly used for natural forests in the US North, it can be readily adapted for plantation projects where subsequent growth is a material component of the value proposition. At commercially reasonable discount rates the ratio can approach 1.0 if growth rates are high enough.

Moreover, there are some cases where the ration of price to GTV may even exceed 1.0. This may occur with a fast-growing stand of high-yield timber, and simply reflects a situation where the rate of value growth exceeds the discount rate. It can also occur where, in the near future, the investor expects product class shifts to produce value growth rates that exceed the discount rate. But for mature timber the potential for future value growth will, only in very rare situations, exceed the discount rate.