GREENWOOD RESOURCES®

RESEARCH NOTE 2009-1

Valuing Emerging Market Forestry Investments

(Clark S. Binkley - 30 January 2009)

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I. Introduction

The methodologies for valuing forestry assets have been adapted from those used for valuing more conventional real-estate assets (e.g. residences, office buildings, hotels, apartment buildings), and therefore rely on three basic approaches: comparable sales, income and replacement cost. The replacement-cost approach is rarely used in forestry due to the long time periods involved in "replacing" a forestry asset. The comparable-sales approach is difficult to apply in emerging market countries: (i) there are relatively few transactions, (ii) the details of the transactions that do take place are generally not reported, and (iii) the transactions differ so markedly from one another that it is difficult to claim that any are "comparable" to the asset of interest. The paucity of data forces valuations of emerging market forestry investments to rely on the income or discounted cash-flow ("DCF") approach. Applying the DCF approach requires estimates of cash flows, estimates of the appropriate discount rate, and the conversion of non-USD cash flows and values back to USD. This note describes our approach to each of these issues. We note in passing that our methodology is consistent with the International Financial Reporting Standard IAS 41 (Agriculture).[1]

[1] International Accounting Standard 41 (Agriculture). Available at http://www.iasb.org/NR/rdonlyres/86E09784-F30D-4DBC-B7BC-64C8B94C5B8D/0/IAS41.pdf

II. Cash Flows

We adopt the practice that is standard in forestry valuations of estimating all cash flows in *real* (i.e. net of inflation) terms. This convention has long been practiced because of empirical evidence that forestry returns are highly correlated with unexpected inflation.[2] Using real cash flows makes it difficult to properly calculate income taxes, but at the moment this is not a major source of error in our valuations.

We forecast cash flows in their natural currencies. Costs are typically forecast in local currency (despite the fact that the cost of diesel fuel—an important component of logging costs—is typically denominated in USD). Revenues are forecast either in local currency or USD depending on the denomination of receipts. In keeping with the long production periods for forestry assets, cash flows are forecast for long periods—several decades based on sustainable harvest schedules. Costs are generally held constant in real terms at current levels. For the 2008 valuations, we held prices constant for two years at the relatively low 2008:4 levels, with a return to trend after that time.

III. Discount Rate

Throughout we assume all-equity discount rates (as at 31/12/2008 none of our investments include a material amount of debt) for cashflows denominated in USD. To the extent appropriate we incorporate project-specific risk (e.g. forest fires) explicitly in our cash-flow models and do not adjust the discount rate to account for these. It can be easily shown that the simple approach of adding a "risk factor" factor to the discount rate is equivalent to assuming that same annual probability of total loss—even in devastating forest fires this is too extreme an assumption.

To estimate the appropriate discount rate, we adapt the methodology developed by Aswath Damodaran.[3] We start with a benchmark of US returns and then add the relevant sovereign spread to reflect the risk of investing in a specific country. We adjust this spread to reflect the project's exposure to the domestic economy.

The benchmark US returns are for forestry assets is set based on an analysis of the timberland valuation information data collected by the National Council of Real Estate Fiduciaries ("NCREIF")[4]. A "real estate" model of returns is used to infer the discount rate implied by the current valuations.[5] As at 31/12/2008, this calculation provided a real discount rate for US timberland of about 5.0% on a real, unlevered, pre-fee basis.

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[2] Washburn, C.L. and C.S. Binkley. 1993. Do forest assets hedge inflation? **Land Econ.** 69: 215-224.

[3] A. Damodaran. 2003. Country Risk and Company Exposure: Theory and Practice. **J. Appl. Finance.** Fall/Winter 2003. Website data available at http://pages.stern.nyu.edu/~adamodar/

[4] http://www.ncreif.com/indices/timberland.phtml

[5] see, e.g., M. E. Aronow, T. Starr, M. Mattox, C. Washburn and C. Binkley. 2005. Are timberland returns falling? Here's what the data say. Hancock Timber Resource Group **Research Paper**, 7 March 2005.; Binkley, C.S., M. E. Aronow, C. L. Washburn. 2006. Timberland: the natural alternative. Ch. 10, pp. 231-246 in, B. J. Greer, ed**. Handbook of Inflation-Hedging Investments.** (McGraw Hill: New York).

The NCREIF data reflect annual appraisals of US timberland properties. As a result of the well-known backward-looking bias of appraisal-based valuations, inferences drawn from these data do not necessarily reflect discount rates at year end, but rather an average for the prior year. To account for this bias, we considered the timberland enterprise value ("TEV") of publicly traded, timberland-intensive US firms (e.g. PCL, PCH,RYN) on that basis that public-equity and private-equity values are subject to arbitrage, and the public-equity values are a better measure of contemporaneous market perceptions of timberland returns. The extreme financial dislocations at in 2008:4 resulted in significant downward movements of TEV from 30% to 50%. A simple calculation shows that this reduction in TEV implies a comparable increase in the discount rate. For that reason, we assume that the real discount rate for US timberland as at 31/12/2008 is 8%.

Several of our investments involve manufacturing as well as forestry assets. Our valuations consider the combined forestry and manufacturing cash flows, so the discount rate needs to reflect a weighted-average cost of capital ("WACC") to account for the relative portions of the asset value in each of forestry and manufacturing. We set the manufacturing discount rate at 16% based on unlevered trend ROE comparables from North American forestry products manufacturing as compiled by various securities analysts. This is a *nominal* discount rate, so we need to adjust for inflation. To do so, we consider the spreads between nominal and real yields on 10-year constant maturity US Treasuries, and assume the best estimate of US inflation is nil at the moment, subject to revisions in the future.[6] This provides a higher discount rate than might be justified, and a conservative estimate of value.

To this base weighted-average cost of capital for each asset, we add a sovereign spread adjusted by the export exposure of the particular asset. The sovereign spread reflects the investment risk of a particular country.[7] We use the spread on $US-denominated debt to extract the currency risk which we treat separately. Damodaran's principal

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Aronow, M.E., C. Washburn and C.S. Binkley. 2004. Explaining timberland values in the United States. **J. Forestry** (January, pp 14-18).

[6] See http://research.stlouisfed.org/fred2/categories/115. We use the monthly 10-year constant maturity series GS10 and FII10. As a result of the financial crisis, the two series have been quite erratic in the last several months. The difference stood at 0.6% as at November, 2008 0.2% in December and was plummeting. This measure of expected inflation may *understate* actual expected inflation (see, e.g. CT. Carlstrom and T.S. Fuerst. 2004. Expected inflation and TIPS. **Economic Commentary** (November). Federal Reserve Bank of Cleveland Research Department.). The University of Michigan Inflation expectations survey averaged about 3.5% for calendar 2008, with an abrupt decline in December to 1.7%. (http://research.stlouisfed.org/fred2/series/MICH/). We expect that the massive amounts of fiscal and monetary stimulus will tend to increase inflation over the long term. Faced with this considerable uncertainty, we have accepted contemporaneous US inflation at 0% for 31/12/2008, with the understanding that is it likely to increase in future valuations.

[7] The six-month average of spreads of USD-denominated long bonds in each country; Bloomberg: JPMorgan EMBI

contribution was to recognize that an investment in a country might not be fully exposed to that country's sovereign risk. As an extreme case, one can imagine a entrepôt activity in a port-side free-trade zone with revenues in USD and costs paid in USD—except for nationalization or civil war, such an activity would have *no* sovereign risk. Damodaran uses the ratio of the project export exposure to the country's export exposure to reflect the degree to which the specific investment shares the country's sovereign spread. We adopt this practice.

IV. Treatment of Foreign Currency Movements

We seek USD valuations of each of our assets. The cash flows take place in a mix of local and international currencies. Even when formally denominated in local currency, the functional currency may be USD. This problem is well recognized in forestry valuations. For example, international trade in logs, particularly in the Pacific Rim, is denominated in USD. As a result, the export component of revenues is denominated in USD, even if the receipts are in local currency. To the extent that the country's log exports are large enough, domestic log prices may actually be denominated in USD as a result of arbitrage between domestic and export markets and export-price parity.[8]

Ideally we would forecast all local cash flows in nominal local currency, and convert back to USD using a market-based forward curve which incorporates expectations of both relative inflation and relative interest rates. Our DCF models track cash flows for at least a decade in the future, and few if any of the currencies are traded so long into the future. As a result, we adopt a simplified approach. We convert all local currency to USD using recent spot rates. Because we are dealing with real cash flows, this is equivalent to assuming that differential inflation expectations between the country in question and the US are wholly incorporated in the sovereign spread.[9]

[8] C.S. Binkley, C.L. Washburn and M.E. Aronow. 2003. Exchange-rate risk for timberland investments in New Zealand. Hancock Timber **Research Note** N-03-08. http://www.hancocktimber.com/pdf/newzealand.pdf

[9] An alternative approach would be to include inflation forecasts for local currency, and then to construct a long-term forward curve based on relative interest rates and inflation rates, perhaps with a 'return to trend" after five years or so. This is consistent with the economic theory of covered interest rate parity.