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COLLECTION OF SHORT TOPICS ON TIMBERLAND INVESTMENT

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Economic Research and Analysis

March 2007





Introduction

Timberland may appear exotic to investors new to the asset class, especially compared to traditional investment vehicles such as stocks and bonds. Many questions often surface when an investor considers allocating capital to the timberland asset class. These could include:

- What are the key risks of investing in timberland?
- What is the difference between investing in the U.S. versus overseas?
- Does the size of the timberland transaction affect return expectations?
- What are the different business models that timberland managers use?
- Will diversification across different regions improve risk adjusted returns?

This paper will broadly address these common issues to provide the potential investor added insight.

Risks of Timberland Investment

“The three primary sources of systematic risk for timberland investments are: (1) market risk, (2) biological risk, and (3) regulatory, legal and policy risk.”

The risks of investing in timberland can be classified into two broad areas: systematic risk and manager level risk. Systematic risk is the risk faced by the timber investment community as a whole. Manager level risk, or non-systematic risk, is the uncertainty associated with a particular investment manager.

Systematic risk

The three primary sources of systematic risk for timberland investments are: (1) market risk, (2) biological risk, and (3) regulatory, legal and policy risk.

Market Risk

Market risk relates to the unexpected shifts in various markets that can affect the income from or value of a timberland asset. It is primarily associated with volatility in timber and timberland prices, but other markets can play a role. For example, swings in foreign exchange rates can impact offshore timberland investments. Similarly, interest rate volatility can affect the value buyers are willing to pay for timberland during disposition.



“Non-systematic risk specific to the timberland investment manager comes primarily from three sources: (1) errors in forecasting; (2) errors in measurement; and (3) variations in plan execution or asset management.”

Biological Risk

Biological risk is a product of the natural variation in tree growth and product quality due to variations in climate and genetics. Unpredictable natural events such as disease, pests, fire and wind also play a role.

Regulatory and Policy Risk

Regulatory, legal and policy risk pertain to the potential adverse affects of regulatory or legal action taken by a government or private third party that may alter a timberland investment's returns. The adoption of more stringent environmental laws or changes in the tax code are examples. Certain regions and countries are more prone to regulatory/legal risk than others. For instance, the U.S. West Coast and the U.S. Northeast have a history of state and local governments placing environmental restrictions on forest management. This regulation contrasts with the U.S. Southeast, where a tradition of strong private landowner rights has generally kept regulation of forest practices to a lower level.

Non-Systematic Risk

Non-systematic risk specific to the timberland investment manager comes primarily from three sources: (1) errors in forecasting; (2) errors in measurement; and (3) variations in plan execution or asset management.

Forecasting

Virtually no market can be predicted with 100% accuracy. So while no investment manager can identify trends with absolute certainty, some are better than others in their ability to forecast important biological and economic variables such as timber prices, land values, interest rates, and tree growth. Managers with superior modeling and analytical skills are less likely to make poor investment decisions and will be better able to achieve their target returns.

Measurement

As it is impractical to measure and classify every tree on the property, estimates must be made using statistical sampling techniques. Managers differ in the design and choice of techniques; thus, efforts made to estimate the quantity and quality of the timberland asset differ across managers. These variances among managers not only impact current inventory and valuations of the asset, but these data are also used to project future growth and yields and develop harvest schedules. Therefore, errors



“The classic management tool for portfolio risk – diversification – applies to the timberland asset class as well.”

based on poor sampling designs can impact a range of management and disposition decisions that will ultimately have a material impact on the performance of the portfolio.

Management Variation

Poor execution of forest management and harvest plans can also impact the performance of the portfolio. A lack of adequate resources and controls, or over reliance on third-parties that have poor alignment of interests with the manager and investor can impact the quality of the work and the efficiency of the management and harvesting operations. The impact of these different processes and business models will vary between managers, which will eventually be exhibited in investment returns.

Managing Risk

The classic management tool for portfolio risk – diversification – applies to the timberland asset class as well. Diversification can be made among one or more of these four dimensions: (1) species; (2) age; (3) product; and (4) geography.

- **Species:** Different species may serve different markets, and thus have different price movements.
- **Age:** Forests of different maturity will have expected cash flows at different points in time. They will therefore be exposed to different points in the market cycle for timber.
- **Products:** Logs of different quality and size are made into different products, and could therefore serve very different end-use markets. In the United States, there are typically three or four major product classifications: pulpwood, small sawlog (or chip n’ saw), large sawlog, and poles. Overseas markets may have more product categories.
- **Geography:** Due to high transportation costs, timber faces localized markets of mills which purchase the timber, often within a 50 to 100 mile radius. As a result, market dynamics could differ significantly across regions due to the make-up of mills in the “wood basket”. In addition, different regions also have different climate and soils, which will affect the productivity of the timber grown there.



Furthermore, land use patterns are unique between local markets, which will affect disposition values.

The management of non-systemic risk can be aided by the careful research and selection of the timberland investment manager.

Domestic versus International

For a United States based investor, overseas timberland investments may offer opportunities for higher return in exchange for higher levels of risk. The higher potential for return comes from (1) higher productivity and (2) a growing market for wood products. **Table 1** below lists the major regions where commercial timber is being produced; note, however, that not all regions on the list currently have foreign institutional investment.

Table 1. The major established producers of timber from managed timberland (plantation) and natural forests.

Country	Leading Commerical Species
Africa	
Countries in tropic rainforest belt	Native tropical mix
South Africa	Patula and slash pine, eucalyptus, wattle
Asia	
India	Eucalyptus, acacia, native tropical mix
Indonesia	Acacia, native tropical mix
Malaysia	Native tropical mix
Thailand	Native tropical mix
Europe	
Scandinavia	Scots pine, Norway spruce, aspen, birch, sallow
Russia	Norway spruce, scots pine and larches
North America	
Canada	Spruce, pine, fir, hardwood mix
United States	Douglas fir, southern yellow pine, hardwood mix
Oceania	
Australia	Radiata, slash and caribbean pine, eucalyptus
New Zealand	Radiata pine
South America	
Brazil	Loblolly, slash and caribbean pine, eucalyptus
Chile	Radiata pine, eucalyptus



Potential for Competitive Returns

Faster Growth Rates

There are timber producing regions outside the U.S. that achieve growth rates double or triple the rates observed in domestic timber plantations (see **Table 2**). Given that the costs of land and labor can be lower than the U.S., the greater productivity and lower production costs of international investments offer the opportunity for higher returns than domestic investments.

Table 2. Common range of yields of selected commercial timber species in the major wood producing regions.

Species	Yield (m ³ /ha/year)	Countries
Eucalyptus	22 - 40	Argentina, Brazil, Chile, Uruguay
	12 - 19	Australia, South Africa
Pine	18 - 30	New Zealand
	4 - 24	United States
	2 - 10	Sweden
	1 - 5	Russia
Oak	2 - 8	United States, Europe
Beech	2 - 12	United States, Europe

m³/ha/year: cubic meters per hectare per year (where a hectare is 2.47 acres)

Source: United Nations Food & Agriculture Organization: "The Global Outlook for Future Wood Supply from Forest Plantations," Christopher Brown. 2000. Adjusted by TIR Research.

Growing Markets

The forest products sector in North America is considered a mature market, where investments and capital additions are incremental. In comparison, some international markets are experiencing strong growth, with mills being built or expanded at a strong pace. Examples include parts of Latin America such as Brazil, Chile and Uruguay. Asia, South Korea and China are also seeing strong investment in capacity to process logs into all wood products, from paper to panels to lumber. Timber plantations located in developing markets where mill investment is strong will likely face support for higher future timber prices.



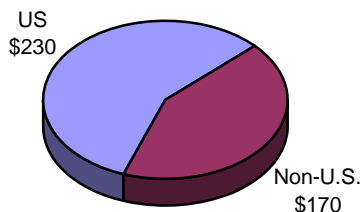
“While some international timberland investments offer the opportunity for greater returns than their domestic counterparts, they are accompanied by higher levels of risk.”

Accompanied by Higher Risk

While some international timberland investments offer the opportunity for greater returns than their domestic counterparts, they are accompanied by higher levels of risk. These risks are composed of: (1) currency exchange risk; (2) cash repatriation issues; (3) country risk and (4) timber market volatility.

- **Currency exchange risk:** Volatility in exchange rates will add a layer of risk to the realized return of international investments.
- **Cash repatriation issues:** Many of the prime areas for overseas timberland investment are in developing markets, which often have Byzantine regulation and heavy taxation on foreign investors who wish to repatriate cash back to their home countries. These taxes and regulations can also shift rapidly and unpredictably.
- **Country risk:** The protection of property rights and legal system support for foreign investors may be both challenging and unpredictable in certain countries. Other risk factors include shifts in the political environment and the overall economy.
- **Timber market volatility:** Some overseas markets for timber and timberland lack the depth of U.S. markets. There are fewer buyers and sellers of land and timber. Compared to the U.S. where it is common to have a dozen different buyers of timber competing in a given wood basket, other countries often have only one or two major buyers. Market domination by few players can lead to greater market volatility and buyer control of the market (i.e., monopsony).

**Global Timberland Market:
USD 400 Billion**



Source: Mike Clutter, Warner School of Forestry, University of Georgia. “Advanced Forest Finance” course, 2004.

Figure 1. Estimated size of the investable timberland asset class, separated between domestic and international markets.

Portfolio Strategy of Domestic vs. International

The United States remains, by far, the largest market in the asset class, capturing close to 60% of the total value of commercial timberland (**Figure 1**). Nevertheless, international investments can provide a source of diversification. Combining both domestic and international timberland investments can therefore expand the efficient frontier of risk-return to a timberland portfolio. However, conservative investors who value preservation of capital should weight heavily their allocation to U.S. investments. More aggressive

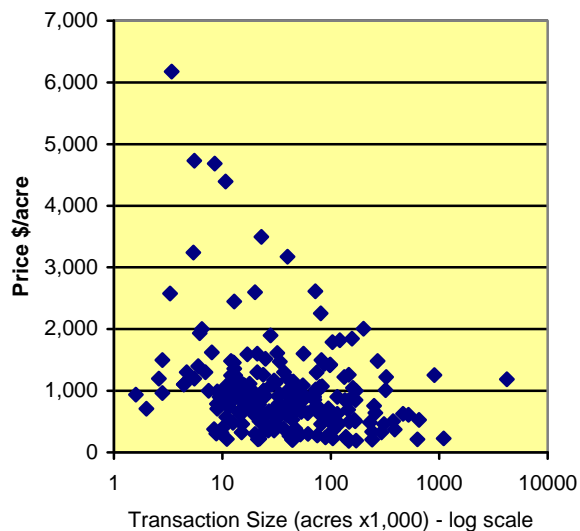


investors, who are comfortable with the greater level of risk entailed with international investments, should spread their capital across different countries and species as much as possible to minimize excessive exposure to any single foreign market.

Does Transaction Size Affect Return Expectations?

There is theory, and there is reality. While we have theory to suggest that the relationship between return and transaction size exists, there is, unfortunately, very little hard data to verify or refute the theory. Comprehensive return data on individual timberland investments across a range of sizes is not available to perform a statistically verifiable test.

To understand the theory, one must understand that each timber property, no matter how it is divided, is unique. Each property has unique road access. Each has different levels of biological productivity and amount of trees growing on the land. Each has a distinct pattern of access to mills that buy timber, and an individual potential for higher and better use land values.



Source: *Timberland Markets Report and TIR Research*

Figure 2. Reported timberland transactions in the U.S. from 2001 to 2006 Q2 by size and price (222 transactions in total)

Due to this unique nature of each property, larger timberland transactions, in theory, should have lower return expectations than smaller transactions. The basis for the relationship is that, all things being equal, a smaller timberland transaction is more unique (or risky). A larger sized timberland purchase is more diverse and balanced, due to the fact that it (1) is in more micro-markets, (2) offers more different products, and (3) produces more stable timber harvests. The relationship can be seen in **Figure 2**, where property size is plotted against the purchase price. Note in the chart that there is a greater range of prices for smaller properties, reflecting the unique nature of each timberland transaction as the size drops. The standard deviation of sales below 20,000 acres in size is \$775 per acre, while sales above 20,000 acres have a standard deviation of \$556 per acre, a 28% decrease.

There is lower risk with a larger property if one considers that a large property is really an aggregation of several smaller properties. With lower risk comes lower required risk premium, and therefore a lower expected return. Also, due to the diversified characteristics of larger properties, exceptionally good (or poor) performance is more difficult to achieve than with a smaller holding.



However, in the end, to an institutional timberland investor, the relationship between transaction size and return may be a moot point because there are transaction costs involved. To aggregate several small properties together takes more time and resources than to buy a single big property. In the end, smaller properties in theory will have a slightly higher expected return, but that premium may be largely eroded by higher search and transaction costs to assemble a portfolio from many small properties rather than a few large properties. The practical guidance for an investor is thus to focus on diversification and strategy in building a timberland portfolio and not concentrate on transaction size.

Business Models of Timberland Investment Managers

There is a spectrum of business models used by timberland investment managers (TIMOs), but they can be categorized into four basic types. No one model, *a priori*, is superior to another in all cases. The choice depends upon the strategy as well as the operating philosophy of the investment manager. It should be noted that a TIMO might utilize more than one business model, with one model better suited for one client or property, and another model more appropriate for a different client or property.

“No one model, a priori, is superior to another in all cases. The choice depends upon the strategy as well as the operating philosophy of the investment manager.”

Hands-Off Ownership

At one end of the spectrum, the investment manager may leave all property management and ground-level decision making to contracted parties. Only strategic level decisions are made by the investment manager. The business model is applicable when the manager has no in-house expertise in the timber asset class – at least in that specific market where the clients’ investments are held.

One example would be a general private equity firm that has acquired timberland as part of a larger acquisition of a forest products business or division. Lacking expertise in timberland, the private equity firm would contract out property management until the disposition of the timber assets.

Another example of the hands-off business model occurs in international investments. In a foreign market, a TIMO may purchase timberland from a forest products company or form a joint venture with that company. The TIMO then contracts with the forest products company to



continue to manage the property on behalf of the TIMO – for a fee, of course. Unsurprisingly, this often comes with a long-term contract attached to supply timber to the forest products company that sold the timberland.

Contractor-Based

A step up from the hands-off model is the contractor-based model, where most of the key services in forest management are contracted out, and whose costs are directly billed to the client. TIMOs adopting this business model will still typically retain in-house analysis of acquisitions and dispositions. The setting of budgets and the coordination of contractors are also performed by the TIMO's own staff. In some cases, there may be a lead contractor that supervises sub-contractors. The lead contractor will coordinate all the key services to manage the properties, such as timber inventory, the maintenance of geographic information systems (GIS), harvest scheduling, tree planting, and the sale of timber.

Semi-Integrated (Hybrid Model)

TIMOs that prefer a higher degree of in-house control may choose the semi-integrated business model. In contrast to a contractor-based structure, there is a regional managing forester employed by the TIMO who directs all activities on the client's property. Other operations such as (a) maintaining the timber inventory database, (b) harvest scheduling and (c) real estate sales may also be internalized with the investment manager. Effectively, contractors are hired for defined tasks specific to each property, but most coordination, planning and analysis, as well as on-the-ground verification, is performed in-house by the TIMO's own personnel.

Vertically Integrated

The other end of the spectrum from the hands-off model is full vertical integration. Akin to a traditional forest products company, most aspects of managing timberland properties are performed by the TIMO's own employed staff. While a semi-integrated model would only have a managing regional-level forester, the vertically integrated model will have all field foresters on the properties under the TIMO's payroll. The only tasks that may be contracted out are third party appraisals, remote sensing, harvesting, and possibly planting and fertilization. TIMOs that employ this business model in the U.S. are rare, but it is sometimes used in overseas



developing markets, where there is a lack of a developed infrastructure of forest industry contractors. With limited options to contract out many services, TIMOs, by necessity, need to internalize most field operations and be vertically integrated.

Effect of Regional Allocation on Investment Returns

Regional allocation is an important diversification tool for a timberland portfolio. A prudent investor can improve his risk-adjusted return through an allocation of capital across different major regions. This is due to the fact that different timber growing regions are not perfectly correlated with each other (see **Table 3**).

Table 3. Correlation of total annual returns by U.S. region as reported by the NCREIF Timberland Index, 1994-2006.

NCREIF Region	South	Pacific Northwest	Northeast
South	100.0%	53.7%	30.4%
Pacific Northwest	53.7%	100.0%	8.8%
Northeast	30.4%	8.8%	100.0%

Source: National Council for Real Estate Investment Fiduciaries (NCREIF)

“The implication of imperfect correlation across timber investment regions provides an opportunity to expand the efficient frontier of a timberland investment portfolio through regional allocation.”

The time period in **Table 3** begins at 1994, the point when the NCREIF Index began to report returns from the Northeast region. Notice that there is very low correlation between the Pacific Northwest and the Northeast. This is to be expected given that the Northeast is dominated by hardwoods while the Pacific Northwest is dominated by softwoods – each of which serves different end-use markets. The South provides a balance of softwood woods and hardwoods, but with a greater emphasis on softwoods. As a result, the South has moderate correlation with the Pacific Northwest and the Northeast, but of the two, it more closely tracks the Pacific Northwest.

The implication of imperfect correlation across timber investment regions provides an opportunity to expand the efficient frontier of a timberland investment portfolio through regional allocation. To illustrate, the Sharpe ratio is calculated for each region as well as two hypothetical portfolios: (1) an even weighted portfolio



(33:33:33) of each major region; and (2) a South emphasized weighting of 60:20:20. The Sharpe ratio is a measure of the reward that an investor must accept for the risk facing the investment.¹ The higher the Sharpe ratio, the greater the return in exchange for the risk.

As observed in **Table 4** below, the risk-adjusted return has historically been highest for a regionally diversified portfolio.

Table 4. Average annual time-weighted return, standard deviation and Sharpe ratio of the NCREIF Timberland Index (1994-2006) by region and by two synthetic portfolios: (a) an evenly distributed allocation of 33:33:33; and (b) a South weighted distribution of 60:20:20.

	South	Pacific Northwest	Northeast	Portfolio of 33:33:33	Portfolio of 60:20:20
Avg. Return	10.34%	9.78%	12.90%	11.01%	10.74%
Std. Dev.	7.60%	10.62%	12.07%	7.31%	7.01%
Sharpe Ratio	0.741	0.478	0.679	0.862	0.861

Risk free rate is assumed to be 4.708%, which is the market yield of 10-year Treasury notes as of 2/21/2007. Sources: Wall Street Journal, National Council for Real Estate Investment Fiduciaries (NCREIF)

To get a general perspective of the increase in risk-adjusted return that diversification can bring, we tested what would happen if each region had Sharpe ratios as high as the diversified portfolio. **Table 5** shows the difference in return between a single region and a diversified allocation, on an equal risk-to-return basis.

¹ Sharpe ratio formula: The average return, less the risk-free return, divided by the standard deviation of the return.



Table 5. The boost in returns a regionally diversified portfolio will provide over a 1-region specific allocation, if the Sharpe ratios are equal, based on historical NCREIF Timberland Index returns from 1995-2006.

	Return if the region had a Sharpe Ratio equal to a diversified portfolio		The risk-adjusted return premium the portfolio provides over a 1 region allocation	
	Portfolio of 33:33:33	Portfolio of 60:20:20	Portfolio of 33:33:33	Portfolio of 60:20:20
South	11.26%	11.25%	92 bp	91 bp
Pacific NW	13.86%	13.85%	407 bp	406 bp
Northeast	15.11%	15.09%	220 bp	219 bp

Source: National Council for Real Estate Investment Fiduciaries (NCREIF)

The historic results shown in **Table 5** above should not be interpreted as expectations for future investments of one's own timberland portfolio. Different timber periods and different types of actual timberland investments in each region will provide unique performance that may be divergent to those shown by the NCREIF Timberland Index. With that in mind, the results should best be interpreted as an indicator of the general value of regional diversification. Risk-adjusted return could improve significantly through the prudent allocation across different regions.