
Timberland

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Overview

A timberland investment involves the purchase of forestland for the purpose of growing and harvesting timber. Timberland offers several attractive benefits to institutional investors, including the potential for attractive returns and diversification benefits, and as an inflation hedge. Investment in timberland has gained prominence in recent years in institutional portfolios, as investors have looked to diversify away from equities without sacrificing returns. Traditionally, a large percentage of non-government owned timberlands have been owned by large, publicly owned, integrated forest products companies. Over the last few decades, institutional investors have purchased large tracts of timberlands from these forest products companies, and in turn, sold logs harvested from these lands back to the producers of forest-related products. Today institutional investments in timberland have grown to over \$10 billion from approximately \$2 billion a decade ago. Presently, it is estimated that the investable universe for commercial timberland in the US exceeds \$200 billion, with another \$100 billion of desirable timberland elsewhere in the world in countries such as Canada, New Zealand, Australia, Chile and Brazil.

In this Research Note, we outline the fundamentals of timberland investing. We begin by describing what timberland is, followed by a discussion on the primary sources of its returns. We then describe the historical performance of this asset class relative to other traditional asset classes.

Introduction to Timberland

Timberland is a real asset that consists of both productive land and growing trees. Timberland is not, however, purely a commodity investment. While the end products (e.g., lumber, pulp, etc.) are commodities, the forest itself has attributes similar to a factory and can produce several intermediate products suitable for conversion into commercial products. As such, timber is a growing and renewable resource that, when properly managed, an increase in volume and value as it grows over time. Logs are harvested and sold either as sawlogs to lumber and other wood products manufacturers or as pulplogs to pulp and paper manufacturers. Timber is grown either on plantations or in natural forests.¹

Worldwide, there are over eight billion acres of timberland, more than half of which is found in two regions, the former Soviet Union and South America. The US and Canada account for about thirteen percent of the world's

¹ Plantations are forests that are regenerated artificially either by sowing or planting. National forests are regenerated either by natural seeding or from the vegetative reproduction of plants on the site.

timberland acreage. The US is the largest single producer of timber, accounting for nearly a third of the world's production, despite the fact that it contains only about seven percent of the world's timberland. Within the US, about forty percent of investable timberland is in the southeast. The north, which consists of the northeast and Great Lakes states, makes up another third, with the remaining acreage in the northwest. In the southeast, just under half of the timber is used to produce lumber and plywood products, and just over a third is used to produce pulp and paper products. In the northwest, about two-thirds of the logs are harvested to produce lumber and plywood products. The northeast is the primary producing region for high quality furniture and other finishing work.

Timberland possesses tremendous diversity with respect to tree species. Hardwood trees (with leaves) make up fifty-seven percent of the world's timberland area. The remaining forty-three percent is in softwood trees (with needles). The vast majority of the global softwood trees are located in the Northern Hemisphere. Softwoods are by far the most commercially used timber type, accounting for about two-thirds of industrial wood production on a global basis. In contrast, hardwood timberland is globally dispersed, although the largest concentrations of hardwood timberland are in South America and Asia.

Timberland Return Components

In the past, the returns available through timberland investing have come from three distinct components—biological growth of trees, price appreciation of timber, and price appreciation of the underlying land. In the following three sections, we discuss each of these components and their contribution to timberland returns.

Biological Growth

Predictable biological growth is an attractive feature of timberland assets because it contributes to predictable, long-term harvest planning. Biological growth is simply a tree's growth rate in terms of both its volume and value. Increased biological growth not only creates more wood volume per acre, but as the tree becomes larger, the wood becomes useable in higher value products. As a result, the value of a tree jumps significantly as it grows larger. For example, a small pine tree can be sold to a pulp mill for paper for around five dollars per ton, while a larger tree can be processed into lumber and may be worth several times as much per ton. Biological growth is a key attribute that distinguishes timberland from other asset classes. Most of the real return on an investment in timberland will come from this component.

Biological growth rates vary from region to region because of differences in weather, climate and soil conditions. Newly planted seedlings take 20 to 30 years to reach harvest maturity in the southern US, 45 to 60 years in the northwestern US, and 45 to 70 years in the northeastern US, depending on the desired product. While the biological growth rate of an individual species of trees grown in a specific region will vary, the pattern of growth remains the same. Specifically, a tree's growth begins quite slowly. After several years, the rate of growth increases substantially. Eventually the growth rate peaks, and from that point forward declines until the forest is harvested. This growth pattern is common to all trees. As a result, most

timberland investment managers break down the development of a forest into three distinct growth stages due to the important role biological growth plays in the return generating process. These three distinct biological growth stages are emerging growth, established growth, and mature growth. As discussed below, the three stages differ from each other in terms of their rate of growth, their products and product pricing, their risk/return characteristics, and their investment liquidity.

Emerging Growth: The emerging growth stage begins at the time of planting and ends when the forest may begin to be harvested, which for most tree species runs about ten years. Growth begins slowly in the first few years, but later in this stage occurs very rapidly as emerging growth transitions into established growth. Biological growth rates are typically 12% per year in this early stage. Given that the market for timber is much more liquid than the market for timberland investment, liquidity at this stage is extremely limited, especially in the very early years. Since harvesting is typically years away, returns are expected to be higher at this stage in relation to the more mature growth stages, reflecting the higher uncertainty over future timber prices.

Established Growth: Forests passing through this stage become merchantable. Trees, such as the southern pine, range in age from ten to twenty years in this stage, with biological growth rates running about 6% to 12% per year. As the forests transition through this stage, the trees reach larger diameters, and can be sold for successively higher value products. The smallest merchantable trees are sold as pulpwood, which is used to make paper and has the lowest value per unit volume. When trees reach a diameter of eight to nine inches, they become marketable for small sawtimber, which is referred to as chip-and-saw. (Chip-and-saw is a transitional product, which is chipped into pulp for making paper or cut into small-size lumber, such as two-by-fours.) As the established growth stage progresses, the ratio of sawtimber to pulpwood increases. Liquidity improves significantly through this stage. However, returns are expected to be lower in comparison to the emerging growth stage, but higher than the mature growth stage, reflecting the degree of uncertainty over future timber prices.

Mature Growth: As the forest enters the mature growth stage, the biological growth rate slows significantly. Biological growth slows to around 3% to 4% per year, and contributes little incremental value. Mature growth forests are typically more than twenty years old. At this point, trees begin to become merchantable for the highest-value large sawtimber. Small sawtimber continues to be part of the product mix during this stage, as well as some pulpwood. The ratio of large sawtimber to small sawtimber continues to increase throughout the mature stage. Liquidity is very high at this stage. Since the time until harvest is relatively short, returns are expected to be lower in comparison to the other growth stages, resulting from the increased certainty of timber prices.

Timber Price Appreciation

Timber prices are a function of several economic variables. At the macroeconomic level, housing starts, interest rates, the supply of timber, and overall economic activity affect timber prices. Microeconomic factors

include the number of saw or pulp mills within a geographic area, the processing capacity of those mills, government restrictions, and weather (e.g., level of rainfall). Over the short-term, these factors, both micro and macro, can have a substantial impact on price changes. For instance, in the late 1980s, regulatory constraints from the Endangered Species Act restricted timber harvests from public land in the northwest. Because of this restriction, timber prices in this region rose dramatically, tripling between 1988 and 1994. In the south, demands on southern timber supplies increased due to rapid regional economic growth combined with added wood processing capacity. As a result, timber prices in the south rose over seventy percent between 1988 and 1994. Since then, timber prices in both regions have fallen substantially due largely to the economic stagnation in Japan, a major world importer of timber.

High short-term price volatility can be reduced through harvest timing strategies. One of the key advantages timberland investments have over some other commodity-producing real assets (e.g., farmland) is the flexibility to decide whether to harvest the timber in any given year. This option-like feature arises from the choice between harvesting standing timber today or simply allowing it to grow larger in response to price expectations. For instance, during unfavorable pricing periods, managers can leave the trees standing until more favorable pricing becomes available. In the meantime, biological growth does not stop. The standing inventory continues to grow both in volume and quality during unfavorable pricing periods. While this is one of the more desirable features of timberland, it is not without risk. When timber prices are depressed, there is no way to predict reliably when they will begin a period of sustained increases.

When viewed over very long periods, however, timber prices have appreciated faster than inflation. Since the early 1900s, the annualized real (after-inflation) price appreciation has been around 2%, due to the relatively scarce supplies of timber in relation to the relatively high demand for timber in the major industrial economies. However, timber is no longer considered a scarce commodity. Over the last decade, timber supplies have become more abundant, resulting from the ongoing globalization of the forest economy. Growing forest product demand in the emerging market countries has led to a substantial increase in the level of forestry investment in both developed and less-developed countries. This high level of investment has greatly expanded the timber supplies, diminishing the price appreciation. In the future, it is very likely that supplies will more closely meet demand; therefore, it is unrealistic to expect timber prices to appreciate faster than inflation.

Land Value Appreciation

The third component affecting timber returns involves the appreciation of the underlying land. This component historically played a small role in driving timberland returns. The prices paid for bare timberland should simply reflect the capitalized value of future timber crops. Changes in the value of timberland are entirely a function of anticipated timber prices, which reflect long-term aggregate trends. Further, academic studies have demonstrated that land appreciation is correlated with the long-term level of

timber prices. Similar to timber prices, it is likely that the underlying land will appreciate in line with inflation, offering no real return enhancement.

Other Considerations

There is a longstanding perception that physical risks inherent in timberland investments are high, potentially subject to natural catastrophes such as hurricanes, ice storms, insects, and fires. However, annual losses from these physical risk factors historically have averaged well under one percent on timberland in the US. Moreover, these physical risks are readily mitigated through good forest management practices and geographic diversification within a region.

Another concern relates to the impact timberland has on the overall environment. In recent years, an increasing number of investors have tended to prefer environmentally and socially responsible investments. This has particularly affected timberland managers because forests play such an important part in maintaining biodiversity. The pressure on timberland managers to follow good environmental practices has grown. In response, most timberland managers are now employing independent, third parties to certify that their forests are managed with the highest standards of environmental protection.

A third issue related to timberland is its ability to hedge inflation. There is support for timber serving as a hedge against inflation, especially with respect to unanticipated inflation. Academic research in this area has demonstrated that the land value and biological growth components of timberland hedge inflation in the long run. However, due to the very high volatility of timber prices, timberland offers less inflation protection over shorter periods.

Timberland Performance

Due to the lack of institutional ownership of timberland before 1987, a reliable measure of long-term performance for this asset class is unavailable. Prior to 1987, most asset allocation analyses of timberland investing were limited to using synthetic performance benchmarks. In 1987, the National Council of Real Estate Investment Fiduciaries (NCREIF) began reporting the NCREIF Timberland index, which is patterned after the NCREIF Property index for commercial real estate. The NCREIF Timberland index has weightings to all three major US regions (i.e., north, northwest, and south), with no allocations to international properties. As of December 31, 2001, the index was valued at approximately \$3.6 billion. The properties included in the index are concentrated in the south (\$2.3 billion) and the northwest (\$1.0 billion), with approximately \$0.3 billion in the north.

The NCREIF Timberland index has some shortcomings. Timberland is an illiquid asset. Although the end products can be sold within a reasonable time frame (especially a forest with current cash flow), it is not priced on a daily basis. Rather, the market values of the properties included in the index are primarily based on appraised values (although some are based on actual property sales). Appraisals tend to lag actual changes in timberland values, which acts to smooth the volatility in reported performance. Almost all the properties in the index are appraised only at year-end. This limits the usefulness of the quarterly return data in determining the diversification benefits of the asset class. Furthermore, although the NCREIF Timberland

index has historically covered a large proportion of all institutional timberland investments in the US, the number of managers reporting information has ranged from only two to the current four. Going forward, however, several additional timberland managers are expected to join NCREIF and contribute return data, which will increase the usefulness of the index as a general indicator of timberland performance.

Table 1, below, compares the performance of the NCREIF Timberland index to the performance of four traditional asset classes: US large-cap stocks (S&P 500 index), US small-cap stocks (Russell 2000 index), international large/mid-cap stocks (MSCI EAFE index) and US fixed income securities (Lehman Aggregate Bond index). As the data in Table 1 illustrate, US Timberland has performed well against the four asset classes over the last ten years through December 31, 2001. For instance, over this period, US timberland has returned an annualized 13.6%, outperforming all four competing asset classes. A likely explanation for the high past returns is that the forest products industry, simply, had systematically undervalued their timberland. Moreover, as mentioned earlier, the Endangered Species Act of the late 1980s greatly reduced the supply of available timber for harvest in the US West, which resulted in substantially higher timber prices through the mid 1990s. Although more recent performance has fallen off from previous periods, the asset class still enjoys relatively strong performance.

The recent falloff has been primarily due to the forest product industry's divestitures of their timber forests. Given weak profits throughout the industry as well as continued consolidation, forest product companies, the largest segment of timberland owners aside from the US Government, have been motivated to divest a substantial amount of their timberland assets. As a result, the divestitures have placed downward pressure on timberland values.

Table 1: Trailing Performance (Through December 31, 2001)

	<i>Last 10 Years (%)</i>	<i>Last 5 Years (%)</i>	<i>Last 3 Years (%)</i>
NCREIF Timberland Index	13.6 ±10.5	8.0 ±6.5	4.2 ±6.3
S&P 500 Index	12.9 ±16.4	10.7 ±21.8	(1.0) ±18.4
Russell 2000 Index	11.5 ±20.6	7.5 ±25.2	6.5 ±25.8
MSCI EAFE Index	4.8 ±16.4	1.0 ±20.6	(4.9) ±17.0
Lehman Aggregate Bond Index	7.2 ±4.5	7.4 ±3.8	6.3 ±3.9

Table 1 also compares the standard deviation of the Timberland returns to that of these traditional asset classes. These data must be interpreted with extreme caution. As mentioned earlier, the low frequency of the appraisals artificially dampens the volatility of returns, since appraisals lag actual changes in timberland values. With that said, US Timberland has thereby reported lower volatility than the S&P 500, Russell 2000, and MSCI EAFE indexes, but higher than the Lehman Aggregate Bond index. If more accurate data were available, we expect that the true volatility of timberland would approach that of equities.

Table 2, below, shows the correlation of the NCREIF Timberland index to the traditional asset classes. Again, these data must be interpreted with caution because of the valuation lag in the appraisal process. Timberland reported returns have exhibited low correlations with other traditional asset classes over the past ten years. The correlation statistics suggest that timberland can provide substantial diversification benefits relative to a multi-asset portfolio.

Table 2: Correlation Matrix (January 1992 through December 2001)

	<i>NCREIF Timberland</i>	<i>S&P 500</i>	<i>Russell 2000</i>	<i>MSCI EAFE</i>	<i>Lehman Aggregate Bond</i>
NCREIF Timberland	1.00				
S&P 500	0.08	1.00			
Russell 2000	0.06	0.86	1.00		
MSCI EAFE	0.10	0.77	0.59	1.00	
Lehman Aggregate Bond	0.04	-0.07	-0.11	-0.16	1.00

Expectations

Based on the strong returns and extraordinarily low correlation of timberland relative to equities, investors could easily conclude they should have a large allocation of their assets in timberland. However, timberland should generate returns consistent with the risk assumed. The price of timberland will reflect the discounted value of cash flows available from a property. Higher biological growth rates mean higher cash flows, and these cash flows should be priced into the deals. Going forward, it is unlikely that future timberland returns will match the returns shown by the NCREIF index over the last ten years. Depending upon the growth stage, we believe that timberland will earn a nominal long-term rate of return between 7% and 9%, similar what we expect for equities, with volatility in the mid-teens.

Implementation

Investors that desire exposure to timberland have a few options. One option is to invest in equity securities of an integrated paper and forest product company that has substantial timberland assets. While these companies have considerable timberland assets, they also have substantial investments in non-timber businesses, and thus do not represent pure plays. Moreover, these companies usually operate in an integrated fashion, necessitating the requirement for a continual supply of logs in order to keep the company-

owned mills in operation. As a result, forest product companies are not afforded flexibility in timing their harvests and will harvest in down markets. A second alternative is through real estate investment trusts (REITs) that are engaged solely in timberland. However, there are only a handful of REITs that focus purely on timberland.

The most widely used vehicles for timberland investment are timberland investment management organizations (TIMOs) that invest directly in timberland. A TIMO is typically structured as a limited liability company (LLC), which is the predominant form of business organization in the privately-held timberland industry. For larger investors, separately managed accounts may be formed, providing prospective investors with the opportunity to tailor the mix of investments in terms of age and geographic region. The manager of the TIMO is responsible for finding, analyzing, and acquiring investment-grade timber properties. In addition, the manager oversees the foresters who actually manage the timberland and sell the timber. Fees and investment terms will vary; however, a typical fee structure is a management fee of one percent, with a performance-based fee of twenty percent of the partnership's profits over the consumer price index (CPI). The investment term of a timberland partnership is generally structured with a ten-year term (including commitment period), and a two-year extension added, depending on prevailing market conditions.

Similar to other private investments, lack of liquidity for timberland investments is one of the key risks faced by investors. Investors should carefully consider their need for liquidity when investing in private timberland. Investors in a timberland fund would have difficulty in recouping their investment during the period between investing of the funds and the eventual sale of all the underlying timberland investments. It is possible to sell shares in a partnership to a third party, but it will often be at a significantly discounted price.

Conclusion

In this Research Note, we have discussed the merits of an investment in timberland. We believe that timberland will provide equity-like returns in the future, but will provide significant diversification benefits, allowing investors to reduce exposure to traditional equity-market risk without sacrificing return. The primary risk arising from diversified timberland investing is the volatility of timber prices. Declining prices reduce the value of harvested timber and could reduce the value of the timberland. In addition, since timberland is an illiquid investment, investors should evaluate their need for liquidity. Nonetheless, for an institution with a long time horizon, the lack of liquidity should be worth accepting for the benefits offered by this asset class.

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