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**TIMBER, LAND, AND OPTIONALITY:
RETHINKING RISK IN A TIMBERLAND PORTFOLIO**

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Introduction

It is a scenario you may have encountered or heard... An institutional investor makes an allocation to timberland and then instructs its manager to build the portfolio with "core timberland" assets that offer limited higher and better use (HBU) potential. The investor's stated goal is to achieve "pure" exposure to the timberland asset class without having to consider other factors that may be viewed as potentially distorting the portfolio's risk and return profile. Inevitably, the manager follows suit and heavily weights the investor's allocation to geographies that offer minimal HBU potential.

This scenario plays out repeatedly in the timberland investment sector because a segment of the investor community holds an often-unknowing biased perception of the asset class's risk profile – especially as it relates to the inclusion of assets with HBU in a portfolio.

HBU is defined as the ability to convert timberland to higher-valued land uses, such as agriculture, recreation, conservation and development. HBU value is hard to forecast, and a challenge to quantify with most timberland assets. Consequently, some investors believe that the inclusion of assets that have HBU potential increases the underlying risk of their portfolios. In many cases, the prospective monetization of a timberland asset's HBU potential is viewed simply as an exercise in land speculation, which, from an investment standpoint, is inherently more unpredictable and riskier than growing and harvesting timber and holding a timber asset to capitalize on its long-term appreciation potential.

But is that an accurate representation of the influence HBU can have on a timberland portfolio? At TIR we

view a timberland asset's HBU potential as infusing it with valuable optionality, not risk. By optionality, we mean the potential to extract additional value from an asset.

Timberland optionality extends beyond just HBU. It can include the creation and sale of carbon offset credits; leasing land for the establishment of wind farms; development of wetlands mitigation banks; and granting access rights for hunters.

In short, investors who view an investment's HBU potential as strictly conveying additional risk may be biasing their underwriting assumptions when evaluating prospective timberland investments. This can cause one to assume a forest asset is riskier than it actually may be and to miss out on attractive opportunities to capture value. Additionally, the failure to recognize and capitalize on a timberland holding's optionality attributes can make a seemingly low-risk investment more vulnerable to routine timber and land market fluctuations than may have been anticipated.

In this paper, we try to provide the investment community with a more informed perspective and better understanding of the underwriting risks associated with timberland investments. Our thesis is that more optionality – whether it is provided by HBU potential or other Alpha-producing activities – can result in less volatile returns. Conversely, we also argue that less optionality may result in more volatility. We believe investors who recognize these influences and relationships will be better able to build timberland portfolios that perform in accordance with their risk tolerances.



Applying Portfolio Theory to a Timberland Property

The foundation for understanding risk and optionality is recognizing that timberland is a multi-faceted asset class. It offers great variation with respect to sources of return and the management strategies that can be employed to generate it. A forest in the U.S. South, for example, can consist of intensively-operated loblolly pine plantations that are being managed first to produce pulpwood that will be suitable for use by pellet plants and pulp and paper mills. Alternatively, that same species may be grown over longer time horizons to produce large-diameter sawtimber logs that will be utilized by sawmills and plywood mills for the production of lumber and building panels. That same forest also may have large concentrations of natural, mixed hardwoods and softwoods that provide unique

With so many “levers” to pull for creating and capturing forest value, it can be difficult to measure and predict the relative attractiveness of each such opportunity. In other words, it can be challenging to quantify the relative attractiveness and priority of the sources of optionality that are resident in a particular timberland asset – or a timberland portfolio, in general. Some investors, however, mistakenly associate complexity with risk. However, fundamental portfolio theory provides us with a different lens with which to view such scenarios.

Macro and Micro Level Diversification

Portfolio theory suggests that the aggregate risk of a collection of investments will be lower than the risk of each individual investment if returns move in different directions over time. Said in a different way, diversification is key to managing risk exposure. If the returns of each asset within a portfolio are not correlated with each other, then volatility in one part of the portfolio will be partially offset by volatility in a different part.

One of timberland's differentiating characteristics is that the asset class features both macro and micro-levels of diversification. Macro-level diversification is achieved by including different properties in a portfolio that have diverse characteristics. Each timberland asset offers unique attributes that are associated with, among other things, its geography, species composition, timber-age dispersion, log market characteristics and even its vintage year (when the property was added to the portfolio relative to others).

Most experienced timberland investors recognize and understand how these macro-level characteristics impact a portfolio's risk and return profile. What is not always fully appreciated is the micro-level diversification. Micro-level diversification is achieved at the property level. Consider each timber asset as a miniature portfolio with a collection of assets – such as pulpwood, sawlogs, scenic beauty and wildlife – that can generate income or capital appreciation. This collection of assets within a property inevitably will have varying degrees of correlation with each other.



Figure 1. Sample of values that can be monetized from a forest. Clockwise from top left: wood pellets made from pulpwood; lumber made from sawlogs; birding as a recreational pursuit in a forest; wind farm in a forest landscape

wildlife habitat or that have important conservation or public relations attributes. Such tracts may be suitable for sale to public agencies or private conservation organizations. The forest also may have water or mineral assets that could be monetized – or it could have land features that make it suitable for the establishment of solar or wind farm leases, which offer the potential to generate attractive royalty streams.



Taken from that perspective, HBU potential, with its low correlation against timber sales can serve to reduce the risk level of a forest asset.

Another way to look at this concept is through an analogy – a dairy farm, for example.

A dairy farm that only produces milk will perform well or poorly based on the strength of the market for milk. In contrast, a dairy that produces milk products as well as cheese, butter and yogurt will be more resilient in the face of the market forces that are influencing any one of its products. While the markets for milk, cheese and butter may be challenging at any given time, those for yogurt may be strong – and therefore the dairy's total revenue stream will be less volatile than that of its peer that is focused exclusively on selling milk. The real challenge with a dairy farm that offers a diverse product mix, however, is how well it is managed and how effectively its capital is deployed. A multi-product dairy farm is a more complex enterprise, which means

it needs a more skilled and versatile management team.

This dairy farm analogy can help us make another relative comparison – one that is more germane to the timberland asset class. A eucalyptus plantation in Brazil may rely on a single income source to generate a return: the harvest and sale of eucalyptus pulpwood to a nearby pulp mill (Figure 2). Any HBU opportunity associated with such an asset will likely come from its potential conversion to cropland or pasture. In contrast, a forest property in the U.S. South may have several sources of potential income (Figure 3). A timberland asset in the U.S. South, therefore, has greater optionality than does a Brazilian pulpwood plantation. The challenge, however, is one of management. The timberland property located in the U.S. South is a more complex asset to operate because capitalizing on those varied opportunities is a more difficult endeavor than simply running a large, monoculture eucalyptus plantation that is completely harvested at seven years of age.

Brazilian Eucalyptus Plantation

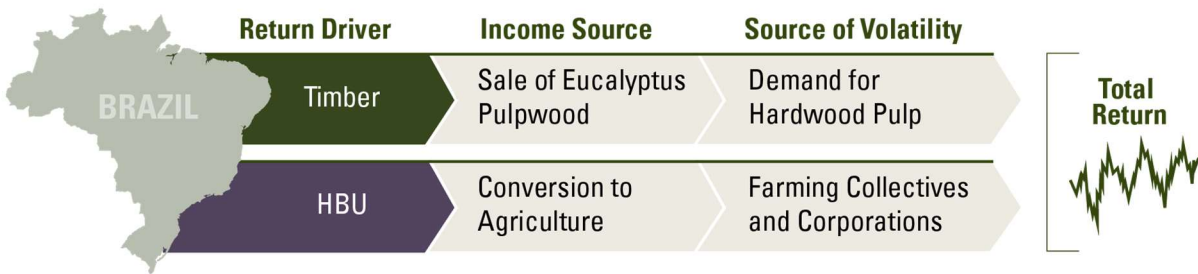


Figure 2. The main sources of return and its associated risk factors for a typical investment in a Brazilian eucalyptus plantation.

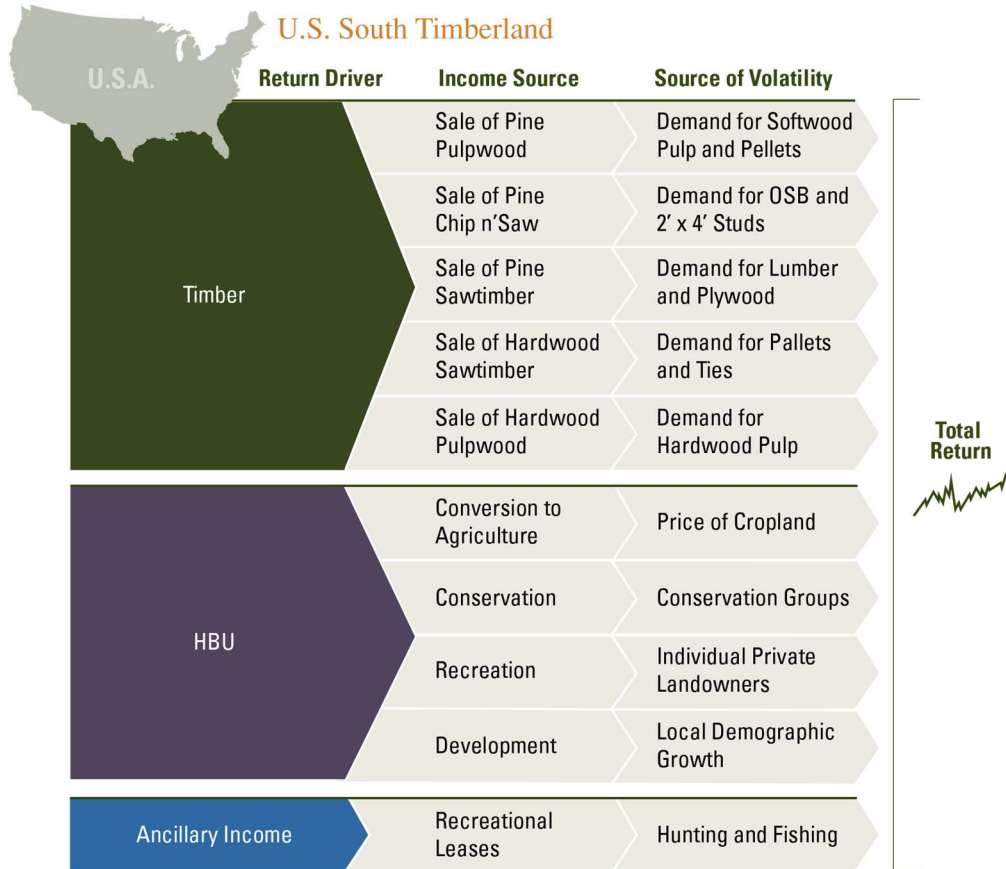


Figure 3. The main sources of return and its associated risk factors for a typical investment in timberland in the U.S. South.

Having presented the overarching rationale for embracing optionality, it is important to note that optionality does not inherently make one forest asset perform better than another. It just means its risk profile will be different.

Account for Risk through the Discount Rate

Understanding how optionality affects risk at a property level is valuable for a timberland investor because it can influence how investments are underwritten. If an investor overestimates the risk of a prospective investment because its option value has been overlooked this can result in one's offering price being uncompetitive for an investment opportunity that may be attractive and additive for a portfolio. On

the other hand, if an investor underestimates the risk of a prospective acquisition because of a failure to understand the limited nature of the option values it offers, one's offering price may be too rich.

This applies to all aspects of a timberland investment. For example, an investor can just as easily pay too much for a timberland property because of overly aggressive assumptions about future timber prices as another investor that makes equally aggressive assumptions about an asset's HBU potential. Instead of viewing HBU and other option values as adding risk to a portfolio, they should be viewed as potentially providing additional sources of revenue and return. When this approach is taken, the investment framework becomes



all about effectively pricing those additional sources of potential return – and the best way to do that is to evaluate each prospective contributor of return to a timberland asset (each option value) using an appropriately calibrated discount rate. HBU assets, for

instance, should be assigned higher discount rates than income that is expected to be generated from timber harvests. The aggregate net present value of each of these discounted return drivers is the maximum price an investor should pay for any forest asset.

What Data Suggests About Optionality and Risk

While portfolio theory suggests that greater optionality can lessen the risks of timberland investments, reasoned investors also wonder whether the available data aligns with this theory. In an ideal scenario, one would test the theory with return attribution data from individual timberland properties that have been operated by various managers (TIMOs) over long periods of time. Unfortunately, such statistics are not publicly available.

The next best option is to draw inferences based on aggregated return data. Such statistics are available through the National Council of Real Estate Fiduciaries (NCREIF). NCREIF’s Timberland Property Index tracks the performance of timberland investments by institutional investors for each U.S. region as well as the United States in its entirety. Fortunately, for our purposes, each region of the country features different levels of optionality (Table 1).

Contributors to Timberland Return

Source of Return	United States Timberland Region			
	Lake States	Northeast	Northwest	South
Return from Timber Harvest and Sale				
Softwood Poles			Occasional	Occasional
Softwood Sawlog	Occasional	Occasional	Common	Common
Softwood Pulpwood	Common	Common	Occasional	Common
Hardwood Quality Grade Sawlog (for furniture, flooring, etc.)	Common	Common		Occasional
Hardwood Lower Grade Sawlog (for pallets, ties, etc.)	Common	Common		Common
Hardwood Pulpwood	Common	Common		Common
Return from Non-Timber Sources				
Agricultural Conversion				Occasional
Commercial or Residential Development				Occasional
Conservation Easement or Sale to Conservation Organization	Occasional	Occasional	Occasional	Occasional
Energy (e.g., solar and wind farms)				Occasional
Mineral Rights	Occasional	Occasional	Occasional	Occasional
Pine Straw Raking				Occasional
Sale to Private Landowner for Recreation and/or Investment	Occasional	Occasional	Occasional	Common
Recreational Leases (e.g., hunting leases)				Common
Right-of-Way (utility, pipeline, communication tower, etc.)	Occasional	Occasional	Occasional	Occasional
Wetland & Stream Mitigation Banking	Occasional	Occasional	Occasional	Occasional

Blank Rare
 Occasional
 Common

Table 1. A qualitative evaluation of the optionality potential across the four major timberland investment regions in the U.S.: Lake States, Northeast, Northwest and South.



Timberland in the Pacific Northwest generally offers the least optionality for investment gain because income generated from timberland assets in that region is dominated by the softwood sawlog market. In fact, the Northwest’s hardwood markets are small or negligible in size.

The South, by comparison, generally offers the highest optionality. Its forests offer multiple species and log grades that are used by different types of processing facilities and end-use markets. The South also has an active HBU market, which commonly account for 5-to-15 percent of a given forest’s land base. In addition, there also is an active market in the region for non-timber products and services, which are sometimes referred to as ecosystem services. Among other things, this includes the sale of recreational leases, the establishment of wetlands mitigation banks and the sale of conservation easements.

On a relative scale, the U.S. Lake States and U.S. Northeast both offer more optionality to timberland investors than does the Pacific Northwest, but both regions offer less than is available in the South. If portfolio theory is applied to U.S. timberland, then the U.S. South, which offers the most optionality, should

feature returns with the lowest level of volatility and the Pacific Northwest, which offers the least optionality, should have the highest. NCREIF’s Timberland Property Index supports this thesis. In Table 2 below, over a 20-year period, the standard deviation of returns for timberland, which is a statistical measure of risk, is lowest in the U.S. South at 5.81 percent, and highest in the U.S. Pacific Northwest at 7.86 percent. The Lake States and Northeast regions are nested between the two.

Table 2. The standard deviation of total returns of timberland for the four major U.S. timberland investment regions over a 20-year period ending in Q2 2017, as reported by NCREIF. The exception is the Lake States, which NCREIF started coverage in Q4 2006.

20-Year Return Volatility by U.S. Timberland Region through Q2 2017

U.S. Timberland Region	Standard Deviation (Annualized)
Lake States (since 2006 Q4)	6.56%
Northeast	6.92%
Pacific Northwest	7.85%
South	5.81%

Conclusions and Application

Based on theory and suggestive evidence, optionality does not translate to increased investment risk. An investor should regard each timberland investment not just as a stand-alone source of return, but rather a bundle of different option values – each with the potential to be a source of return. Optionality, therefore, can impart a lower risk profile or raise the investment performance of a given forest asset.

The real risk an investor faces with any timberland investment lies not in its HBU attributes, or its other option values, but in the prospect of having paid too much to acquire it in the first place. When pricing a prospective investment, it is important to use the appropriate discount rate for every potential return

contributor to ensure that the acquisition is being valued appropriately. Once a timberland property is acquired, maximizing the potential of its optionality is the next key consideration. This is where manager choice is important. Some managers, for instance, have extensive experience in structuring and executing conservation easements on their clients' lands. Others may have strong track records of parceling large forest holdings into much smaller units and then selling them at premium prices to smaller private landowners. It is important for investors to understand the unique capabilities and proficiencies of their investment managers and to recognize how that expertise fits with the characteristics of the forest holdings those managers are acquiring on their behalf.

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