



Timberland investments in an institutional portfolio

Copenhagen and Singapore, March 2013



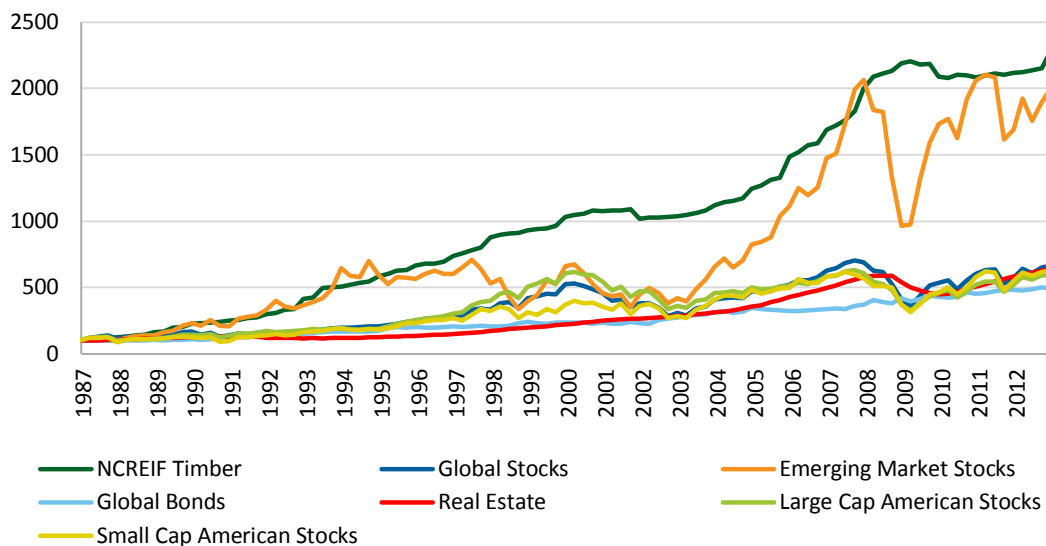
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Executive Summary

This study emphasizes the attractiveness of timberland investments for long term investors, with good risk-adjusted returns, inflation protection characteristics, and low correlation to main assets. Due to this range of attractive performance characteristics and diversification opportunities from including timberland in a diversified portfolio, institutional timberland ownership, especially in the USA, has grown significantly in the past 30 years.

The figure below displays cumulative total returns of timberland investments since 1987, as measured by the NCREIF Timberland Index, relative to other assets in the investable universe. Timberland has shown a steady, but overall high appreciation, making it the asset with the highest return since 1987.



Cumulative nominal returns for timberland investment, measured by the NCREIF, relative to other assets in the investable universe between 1987 and 2012.

Timberland investment returns can be described as a function of three main drivers:

- Biological tree growth
- Changes in timber products' price
- Changes in land value.

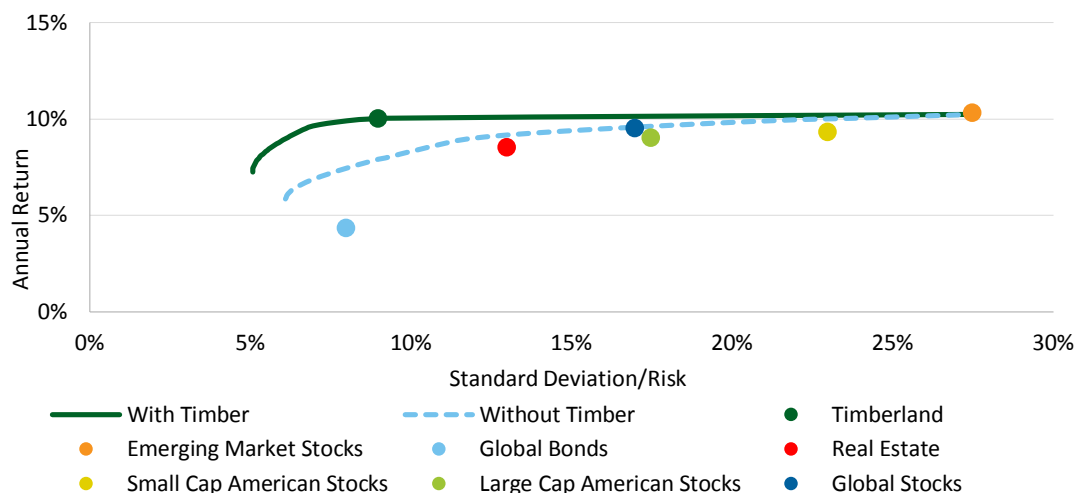
Ownership of timberland and the attendant biological growth, the flexibility in connection with timing of entry/exit and timing of harvests, provide investors with an attractive return structure as these reduce the risk of negative returns and results in a higher upside potential and a reduced downside risk compared to investments without these characteristics.

Also, returns between professionally managed timberland investment funds are almost normally distributed. This indicates that when investing in timberland funds, the number of investments which needs to be made is limited in order to achieve a mean return.

For asset allocation purposes, timberland investment return characteristics are attractive:

- According to an industry index, timberland in the USA has for the period 1987 -2012 yielded a time weighted return of 12.8% p.a. nominal before asset management fee. For an internationally diversified timberland portfolio, The International Woodland Company A/S (IWC) assumes an average future nominal annual rate of return of 10% - 12% before asset management fees (returns for different strategies may vary significantly from this, e.g. investing only in the US versus investing only outside the US).
- Historical standard deviation of US timberlands has been 11.3% p.a. IWC assumes an annual standard deviation of 8% - 10% for an international timberland portfolio.
- Timberland returns have historically shown low or negative correlations with returns from traditional asset classes in an institutional portfolio. IWC expects that timberland will continue to have less than perfect correlations with other asset classes.

The benefits of including timberland in an investment portfolio have been analyzed through modern portfolio theory. IWC has produced two efficient frontiers: one that allows allocations to timberland investments, and another where timberland is not included in the portfolio. The results are shown in the figure below.



From the figure, it is evident that including timberland in a portfolio is beneficial as, for any given standard deviation, the return from a portfolio including timberland is always superior. Examples of the risk reduction by including timberland for different annual target returns are shown in the table below. For example, if timberland is included in a portfolio with a target return of 8.5%, the expected standard deviation can be reduced from 13.3% to 6.1% p.a.

	Return Target	Risk Level	Change from Base
Incl. Timberland	8.0%	5.6%	5.8%
Excl. Timberland		11.4%	
Incl. Timberland	8.5%	6.1%	7.2%
Excl. Timberland		13.3%	
Incl. Timberland	10.0%	6.7%	11.1%
Excl. Timberland		17.8%	

In IWC's experience, investors typically target an allocation to timberland from between 2 to 5% of the overall portfolio.

1 Introduction

Institutional investments in timberland emerged in the USA in the early 1980s. Previously, institutional ownership of timberland was limited to investments in timber product companies, which in turn owned timberland to ensure the supply of primary resources.

As opposed to investing in timber product companies, ownership of timberland provides investors with attractive performance characteristics.

Following the establishment of the first US-based timberland investment management organization (TIMO) in 1981, institutional timberland investments have grown significantly. According to AMEC Forest Industry Consulting, the investments have grown from less than USD 1 billion in 1990 to more than USD 30 billion in 2006¹, while DANA Limited estimates that institutional investors have invested a total of approximately USD 60 billion as of early 2012². Timberland Investment Resources, LLC estimated in 2011 that the global investable commercial timberland exceeds USD 300 billion³, making it possible for the asset class to grow further in the years to come.

Much literature has been published since the 1980s on the subject of the benefits derived from including timberland in an institutional investment portfolio. Most of this literature is based on US institutional investment conditions⁴.

In Europe, IWC has pioneered institutional timberland investments since its establishment in 1991. Particularly during the past decade, IWC has seen growing interest among European institutional investors in international timberland investments.

This paper describes the general timberland return characteristics and the diversification opportunities offered by including timberland in an institutional investment portfolio.

2 Timberland return characteristics

2.1 Return drivers

Timberland investment returns is often described as a function of three main drivers⁵ – biological growth, change in timber prices and change in land value – as depicted in Figure 1 below.

¹ Merrill Lynch, 2007

² Neilson, 2012

³ Chung-Hong Fu, 2012

⁴ Among others: Akers, 2000; Binkley *et al.*, 1996; Caulfield, 1998a; Caulfield and Newman, 1999; Conroy and Miles, 1989; Hancock Timber Resource Group, 2003a; Redmond and Cubbage, 1988; Reinhart, 1985; Zinkhan, 1990; and Zinkhan *et al.*, 1992

⁵ Caulfield, 1998b

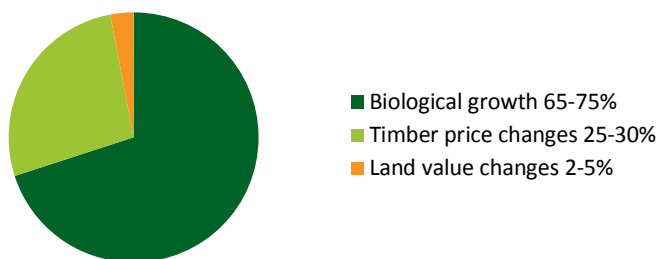


Figure 1. Sources of Timberland Return⁶.

The split between the return components can vary considerably between individual investments. Other income sources such as higher and better use (HBU), hunting, mining royalties, conservation easements, etc., are applicable to some investments.

Biological tree growth

Biological growth is what separates timberland from other types of investments, including property, and it is estimated to be the most important return driver.

The effect from biological growth on return is two-dimensional. Not only do trees grow in volume, but as they grow, they also turn into higher value products (called “ingrowth”). The resulting extra volume and consequent value change over time are, to a large extent, independent of macroeconomic or financial market conditions (“trees do not read the Financial Times”).

Figure 2 below illustrates how pine trees biological growth not only provides additional volume but higher valued products as the tree matures.

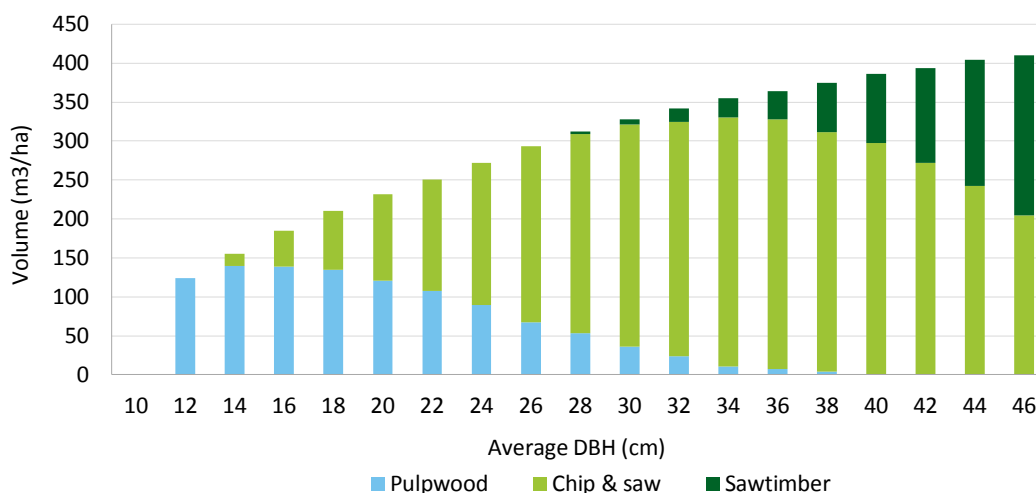


Figure 2. Sources of timberland investment returns: significance of biological growth⁷.

⁶ RMK Timberland Group

⁷ IWC internal analysis

Timber price change

Numerous macroeconomic factors influence the price of timber, including population growth, GDP per capita, activity in the construction sector, interest rates, and the overall level of economic activity. Moreover, micro factors such as environmental/legacy issues affect the stumpage price within regions⁸. However, it is important to note that during periods of declining timber prices, biological growth counters the impact of reduced timber prices. Therefore, timberland investments have a natural built-in hedge against timber price fluctuations. Furthermore, flexibility exists when it comes to timing the harvest of trees, taking fund life, potential leverage, etc., into account. By utilizing positive market conditions, management can maximize the return from the investment.

Changes in land value

Historically, land value only represents a small percentage of the total timberland investment value. Land values are related to local supply and demand conditions and therefore vary spatially. In addition, price is also partly a function of quality. Nevertheless, increasing competition for land to be used for agriculture, bioenergy production or recreational use, as well as for forestry, can provide major upside potential based on land appreciation⁹.

Furthermore, a study by Washburn¹⁰ demonstrates that the strongest indicators of real value of land over time are the Consumer Price Index (CPI) and the nominal risk-free rate of interest. During periods of low inflation and relative timber product price stability, timberland prices tend to change slowly, and vice versa.

2.2 Return structure

The introduction of managerial flexibility through the ownership of timberland, as opposed to traditional investments (e.g. into timber product companies), can be viewed as investing in two timing options:

- *Entry/exit option:* Changes in the value of a timberland property are related to a number of factors, of which changes in timber prices and presence of timber industry are particularly important. Managers can utilize timberland market conditions when entering and exiting the investment and thus affect the return on the investment.
- *Harvest option:* By utilizing market conditions and harvesting the trees when timber prices are attractive, management can positively affect the rate of return on the investment.

If management is assumed to maximize value and utilize varying market conditions, which means to exercise the options optimally, the return structure of the investment will consequently be changed.

⁸ Caulfield, 1998b

⁹ Dasos Capital Oy, 2012

¹⁰ Washburn, 1992

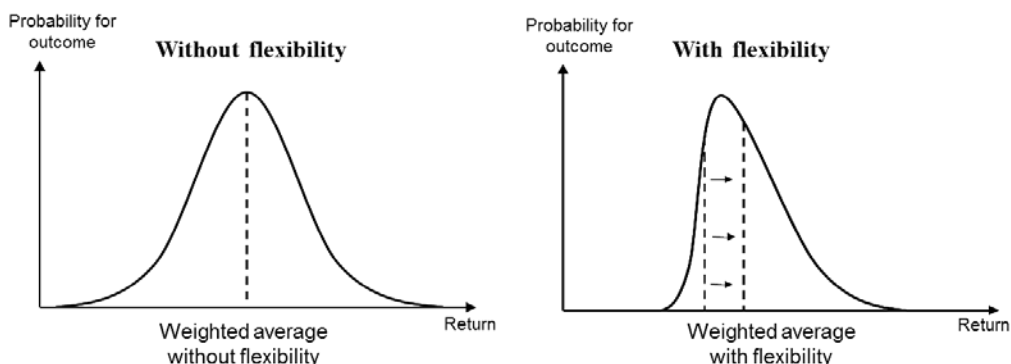


Figure 3. The effect on return structure of introducing options or flexibility in timberland investments¹¹.

As Figure 3 illustrates, the flexibility increases the weighted average return and thus the total return on investments. The explanation is that the flexibility makes it possible for management to reduce unfavorable outcomes. In that respect, a timberland investment has an asymmetric return structure, with a high upside potential and a low downside risk. Historical data, illustrated in Figure 4 below, seem to support this. The figure compares the annual total rate of return of the John Hancock Timber Index¹² and the NCREIF¹³ Timberland Index with the MSCI World¹⁴ from 1970 to 2012, demonstrating the difference between volatility on the upside (positive returns) and the downside (negative returns).

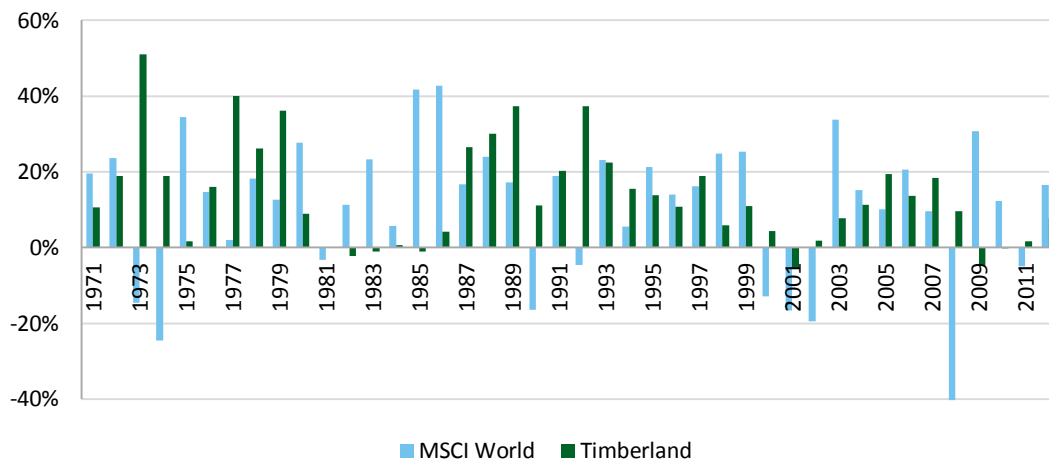


Figure 4. John Hancock Timber Index versus MSCI World¹⁵, 1970-1987, and NCREIF Timberland Index¹⁶ versus MSCI World, 1987-2012.

¹¹ Cordt and Degn, 2003

¹² Historic timberland performance figures calculated from the John Hancock Timber Index are based on a model constructed by Hancock Timber Resource Group (HTRG), the largest timberland investment management organization (TIMO) for institutional investors. HTRG manages timberland worldwide valued at about USD 11.4 billion as of December 2012

¹³ National Council of Real Estate Investment Fiduciaries

¹⁴ IWC's selected benchmark for global stocks

¹⁵ The MSCI World Equity Indices are designed to measure the performance of the global equity markets

¹⁶ Refer to section 3.1

The magnitude of the positive green bars (timberland) in Figure 4 is roughly the same as the magnitude of the positive blue bars (global stocks). In other words, the volatility on the upside is almost similar. However, there is a significant difference on the downside: the total magnitude of the blue bars is of completely different dimensions from the magnitude of the green bars.

The conclusion is that returns are highly elastic on the upside, but close to inelastic on the downside for timberland investments, which is the ideal situation¹⁷.

2.3 Catastrophic loss risks

When considering the risks of timberland investments, biotic and climatic factors are often addressed by investors. Figure 5 below indicates that professionally managed timberland has hardly experienced adverse natural events.

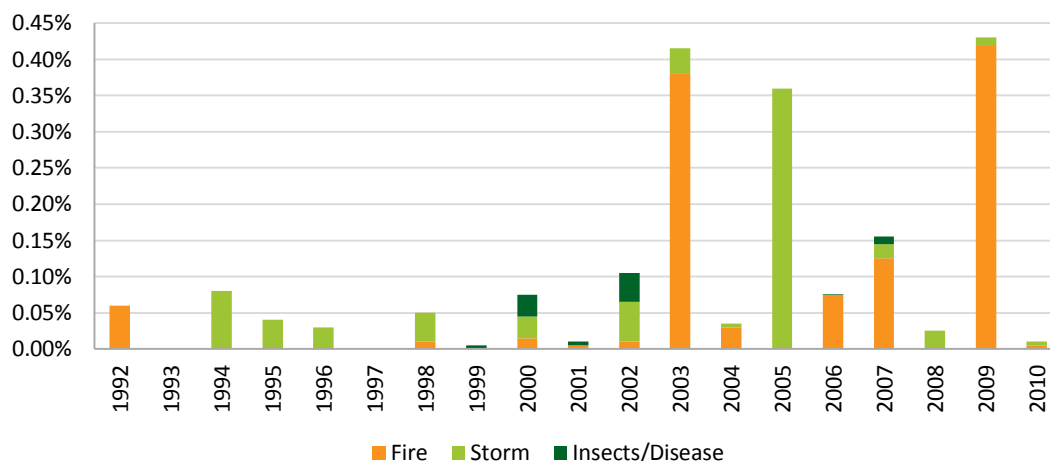


Figure 5. Percentage of asset value loss out of HTRG's entire investment pool in North America between 1992 and 2010¹⁸.

Less than 0.45% of the total value of the forest asset has been lost due to insects, storm, or fire in any given year. A key point is that after a fire has hit, it is estimated that up to 90 percent of the timber is still merchantable¹⁹.

2.4 Distribution of timberland returns

The asymmetric return structure of individual timberland investments, as described above, should not be confused with the distribution of returns between different timberland investments (such as institutional timberland investment funds).

If the return distribution between investments is even, the mean and median rates of return will be identical. This implies that the number of underlying investments to be included in a portfolio is limited in order to achieve a mean rate of return.

¹⁷ Ineichen, 2003

¹⁸ Hancock Timber Resource Group, 2011 (the largest timberland investment management organization for institutional investors – see note 12). According to IWC's knowledge, no such study has been conducted on the average loss outside of the United States

¹⁹ Goar, 2001

This is not the case when the returns of different investments are unevenly (e.g. lognormal) distributed, where the median is lower than the mean rate of return. Under those circumstances, the number of investments to be included in the portfolio is substantially larger. This is illustrated in Figure 6 below.

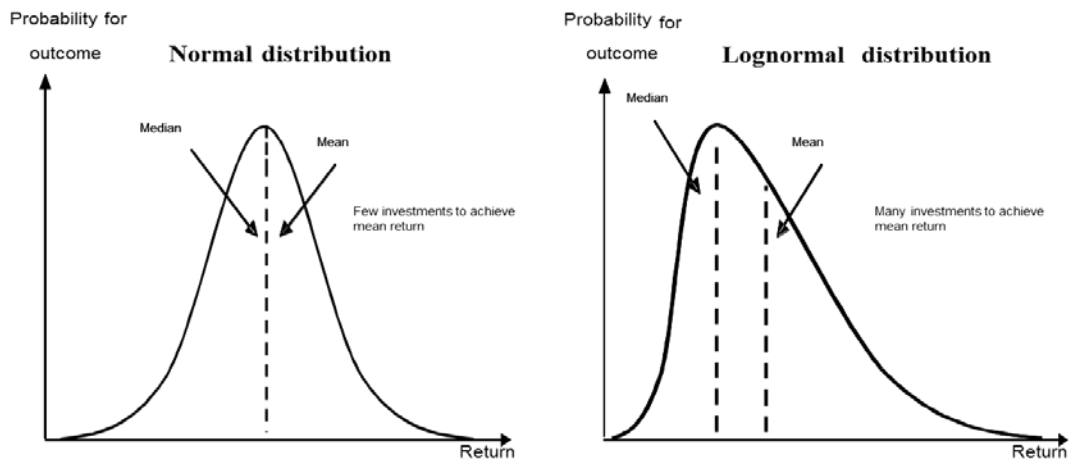


Figure 6. Illustration of two different distributions of returns between investments²⁰.

Table 1. Distribution of annual returns of US timberland vs. US private equity/buyout funds over a 10 year period (2002-2011)²¹.

2002 - 2011	Mean	Median	Max	Min	Upper	Lower
Timberland (NCREIF)	7.6%	8.6%	19.4%	-4.7%	18.5%	-0.6%
US Private Equity	4.7%	2.4%	491.4%	-100.0%	16.5%	-30.5%

Table 1 above shows that compared to US private equity, the annual returns of timberland have not only a higher mean, but also have far smaller “tails”, i.e. is platykurtic. This indicates that extreme returns are much less likely for timberland than for investments in private equity, which shows a distribution with larger tails, i.e. is leptokurtic. Therefore, fewer investments in timberland will lead to a mean rate of returns.

IWC has gathered return data from 116 institutional timberland investment funds and separates accounts investing mainly in the US. The gross IRRs are reported since inception and may contain both realized and unrealized returns. The distribution of the return data is displayed in Figure 7 below.

²⁰ Cordt and Degn, 2003

²¹ Data from the NCREIF Timberland Index and VentureXpert, respectively

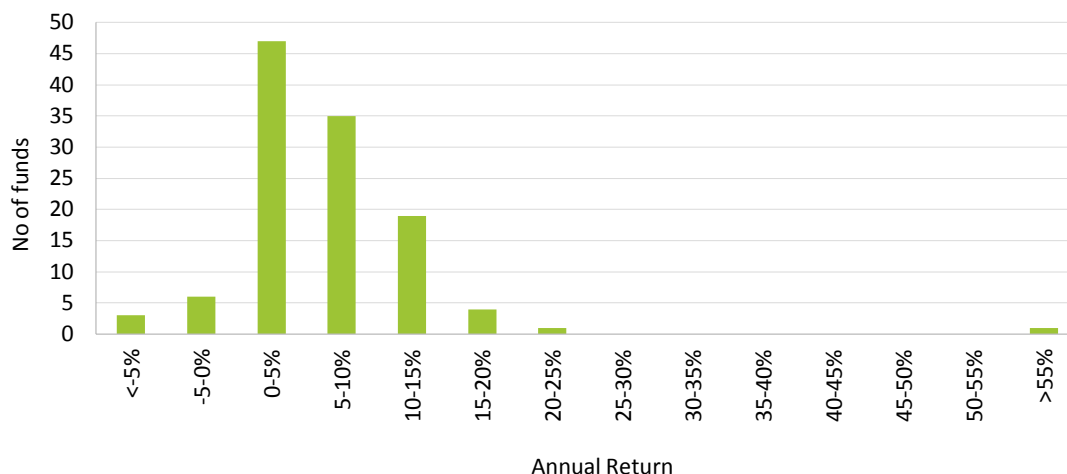


Figure 7. Return distribution from 116 institutional timberland investment funds and separate accounts reported as annual gross IRR returns since inception as of 2011 year-end²².

The figure shows that the distribution of the annual returns is not purely normal, nor lognormal. This indicates that a timberland portfolio should include more than a few funds, but not as many as when investing in private equity in order to achieve a mean rate of return.

3 Historical timberland performance

The remainder of this paper focuses on the historical and expected benefits of including timberland investments in an institutional portfolio.

The historical data are based on reported returns between the first quarter 1987 and the fourth quarter 2012, and the asset classes employed in the present study are the ones identified in Table 2 below.

Table 2. Asset classes and respective benchmarks used in the asset allocation study.

Asset class	Benchmark
Timberland	NCREIF Timberland Index
Global stocks	MSCI World Total return*
Large Cap American Stocks	SP 500*
Small Cap American Stock	Russell 2000*
Emerging Markets Stocks	MSCI EM Total Return* and **
Global Bonds	EFFAS GBI Global Bond Series***
Real estate	NCREIF Property Index
CPI	US CPI
Risk-free rate	LIBOR USD 3 Month

* Including reinvested dividends
 ** Data only dates back to 1988
 *** Data only dates back to 1995

²² IWC internal analysis 2012 based on data provided by TIMOs

The valuation of private timberland holdings is typically carried out on an annual basis by specialists, so-called appraisers. There is no centralized auction market that continuously prices timberland assets, not to say monitors the returns. Consequently, several analysts have designed models of what the past performance of timberland might have been, had it been possible to observe and record the data²³.

Based on actual returns, two indices have historically reported quarterly and annual returns: the Timberland Performance Index (TPI) and the NCREIF Timberland Index. The former was discontinued in 1999; hence, the present study mainly uses the NCREIF Timberland Index which is denominated in US dollars.

3.1 Timberland performance indexes

The NCREIF Timberland Index has been published since 1994 and includes returns dating back to 1987. It is a property-based index reporting aggregated returns for the US as well as for four regional sub-indices (US South, Pacific Northwest, Northeast and Lake States) as of the end of 2012. The index is based on generally accepted measures of asset valuation. Additionally, the reported income and appreciation return series conforms to theoretically appropriate concepts of asset returns.

As of the end of 2012, the index accounted for 15 million acres of forestland (6 million hectares) and the total value of the 443 properties was about USD 26 billion, a substantial share of institutional timberland investments in the United States²⁴.

However, there are at least four limitations to the NCREIF Timberland Index:

1. The number of contributing TIMOs has historically been limited and currently the index has eleven contributing members.
2. The index series only dates back to 1987, which is a relatively short period. This will be of less concern over time as more years are added.
3. The index covers only timberland investments in the United States, which as it will be shown later, is not the only market for timberland investments.
4. Only quarterly appreciation returns are reported by the NCREIF. In quarters when properties are not appraised, the appreciation is reported as zero. As a result, the quarterly return series shows a higher volatility than there actually is.

In spite of these limitations, the index is the best available measure of historical performance and it provides some indication of expected return characteristics for timberland investments. The annual returns for the NCREIF Timberland Index since 1987 are displayed in Figure 8 below.

²³ Binkley *et al.*, 1996

²⁴ NCREIF, 2012 and Washburn, 2003

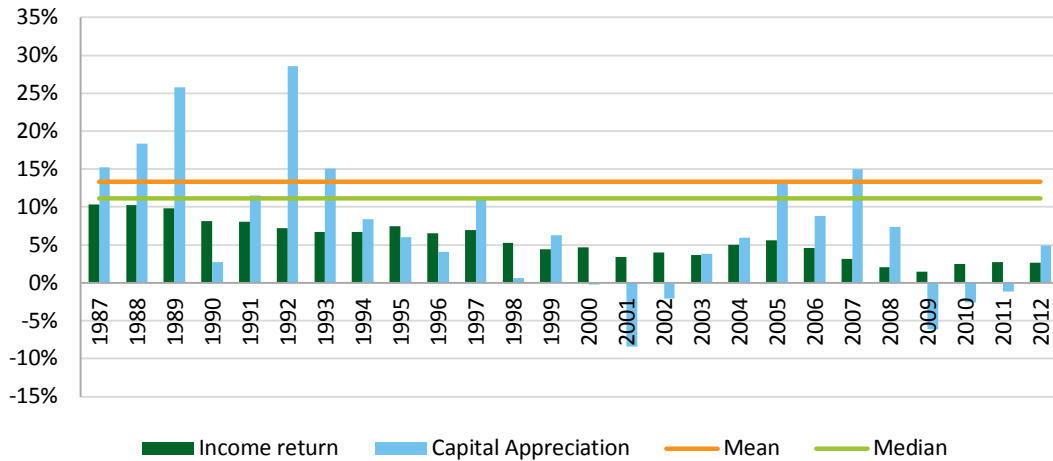


Figure 8. Annual reported return (%/year) since 1987 for the NCREIF Timberland Index.

As it can be seen in Figure 8, timberland investments have had good historical performance. The decomposition shows a steady, although decreasing, income return, while capital appreciation is more volatile and has even experienced depreciation in 2001 and 2002 and again in 2009-2011. US timberland investments have historically yielded an annual nominal return of 12.8% since 1987. The median of the returns is 11.1%, indicating a positive skewness of the annual returns.



Figure 9. Histogram of historical return p.a. since 1971 for John Hancock Timberland Index (1971-1986) and the NCREIF Timberland Index (1987-2012).

Figure 9 above illustrates that there is a positive skewness in the annual timberland returns, making a large negative return less likely than a large positive return, and a high average return, which is in line with the overall characteristics of timberland, an attractive risk-adjusted return.

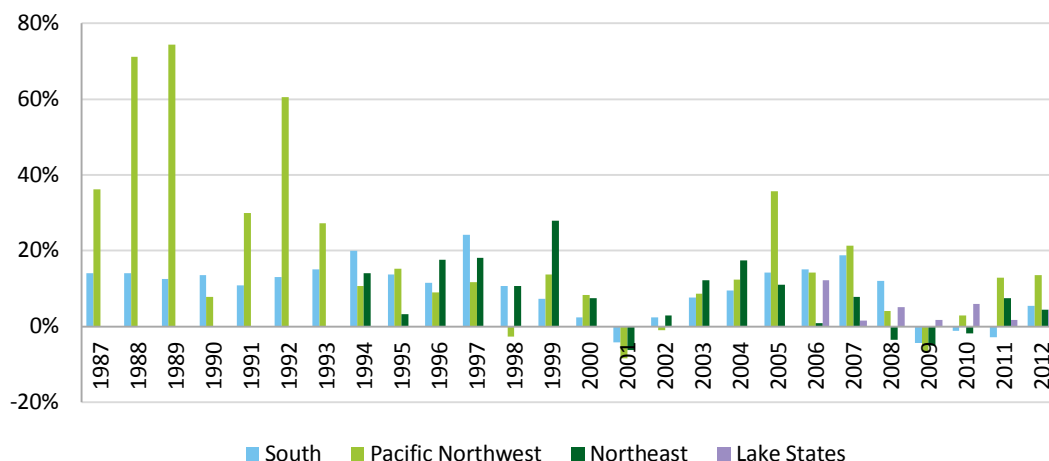


Figure 10. Annual reported TWRs since 1987 for the regions covered by NCREIF Timberland Index.

Figure 10 shows that the annual returns vary within and between the different US regions. Looking at the inception to date TWRs as of the end of 2012, investments in the US Northeast yielded 7.4%, 9.6% in US South, and 16.9% in the US Pacific Northwest. The return in the Pacific Northwest is highly impacted by positive outliers. Correcting for that by looking at the median instead, the return is 12.6%. The Lake States region was included in the NCREIF index in 2006 and has yielded a 4.0% p.a. since inception.

As previously mentioned, a major drawback of the NCREIF Timberland Index is that it only consists of data from the US market. For institutional investors, there are alternatives to the US timberland market, as timberland investments outside the US are continuously getting easier to access. This means that it is possible for investors to invest in a combination of regions that matches investors' preferences. HTRG has estimated annual returns since 1960 on timberland investments in the main investable regions, based on timber prices during the prior eight quarters. This gives an indicator of the characteristics of return in the different regions.

Table 3. Regional annual returns between 1960 to 2010 according to HTRG²⁵.

Annual returns	US South	US PNW	US NE	Coastal BC	New Zealand	Australia	Brazil
Since inception	10.4%	15.5%	8.6%	12.5%	10.6%	10.7%	17.0%
Median	12.3%	12.0%	8.7%	12.1%	10.3%	13.0%	14.9%

IWC considers Figure 10 as a good proxy of how the returns in the different regions have been relative to each other. As more and more timberland investment opportunities arise in emerging markets, like Central America, Asia, and Africa, it should be possible to achieve returns that are above the NCREIF Timberland Index.

²⁵ In order to make a comparison with the NCREIF Timberland Index, as no figures exist from the outside the US prior to 1975, only returns since 1987 are used. No returns from Brazil prior to 1992 are found. Note that IWC carries out regional studies, where expected future performance, risk and correlations within geographical regions are estimated.

According to DANA Limited, even though there are geographical diversification opportunities within the timberland investment universe, by far the most money (78%) is invested in North American timberland assets. Oceania accounts for 14%, South American for 6% and others for 3%²⁶.

3.2 Returns for timberland compared to other asset classes

Figure 11 below displays cumulative returns of timberland investments since 1987, measured by the NCREIF Timberland Index, relative to other assets in the investable universe.

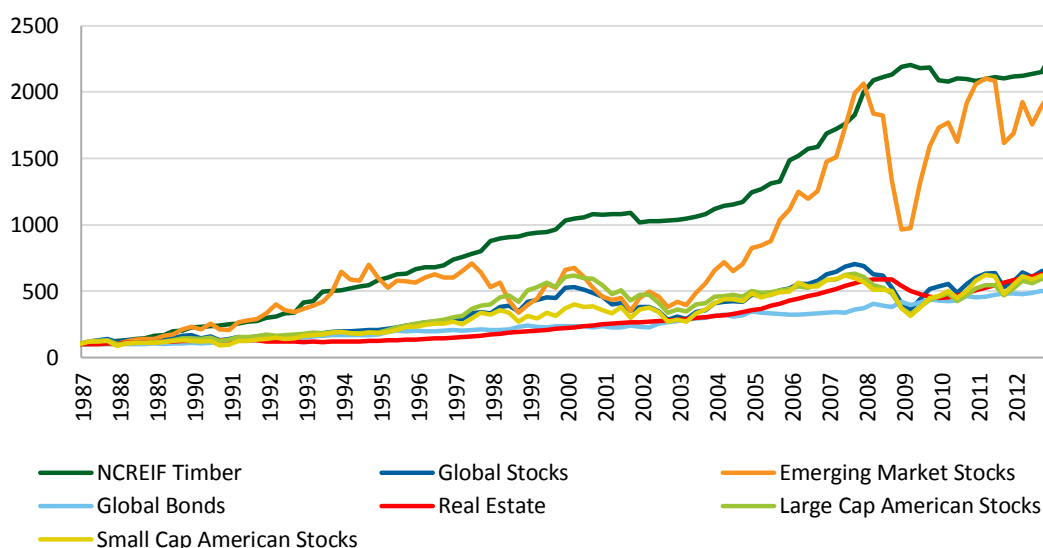


Figure 11. Cumulative nominal returns measured by the NCREIF Timberland Index vs. other assets in the investable universe between 1987 and 2012.

From Figure 11, it is evident that between 2003 and 2007, the stock markets appreciated significantly and especially the emerging markets showed extraordinary performance. Bonds and real estate showed a steadier, but limited appreciation up to 2007, which is in line with the characteristics of those asset classes. When the financial crisis started in 2008, the financial capital markets were severely hit and the global stock markets had lost almost half by first quarter of 2009. With some delay, the real estate markets were also tempered but not as brutally as the stock markets. Up until mid-2011 stocks were regaining most of the lost – just to experience a decrease again during second half of 2011. Timberland on the other hand has shown a steady, but overall high appreciation, making it the asset with the highest cumulative return since 1987.

Table 4 below shows the annualized compounded returns for different time horizons for the asset classes analyzed in this paper.

²⁶ Dennis Nielson’s presentation at IQPC Timberland World Investment Summit, January 2012. Data is based on 2009 estimates

Table 4. Annualized compounded returns for the different asset classes utilized in this study as of 2012 year-end. Inception used in inception to date (ITD) return is Q1 1987.

Compounded returns	Timberland	Global Stocks	Emerging Market Stocks	Large Cap American Stocks	Small Cap American Stocks	Global Bonds	Real Estate
1 year	7.75%	16.54%	18.63%	13.41%	14.63%	1.64%	10.54%
3 years	3.00%	7.53%	4.98%	8.55%	10.74%	4.66%	12.63%
5 years	2.66%	-0.60%	-0.61%	-0.58%	2.09%	5.73%	2.13%
10 years	8.17%	8.08%	16.88%	4.95%	8.29%	5.91%	8.44%
15 years	6.57%	4.70%	9.24%	2.60%	4.53%	5.85%	9.20%
20 years	8.90%	7.39%	8.82%	6.11%	6.96%	6.06%	8.85%
ITD	12.78%	7.58%	12.22%	7.06%	7.33%	6.57%	7.42%
Highest	37.35%	33.76%	79.02%	34.11%	45.37%	19.01%	20.06%
Lowest	-5.24%	-40.33%	-53.18%	-38.49%	-34.80%	-6.76%	-16.85%

In addition, to illustrate timberland investments’ historical attractive returns in terms of variability characteristics, a chart of the rates of returns and standard deviations for the assets included in the investable universe has been prepared. The rates of return and standard deviations are based on the historical return series mentioned in Table 4. The resulting chart is displayed in Figure 12 below.

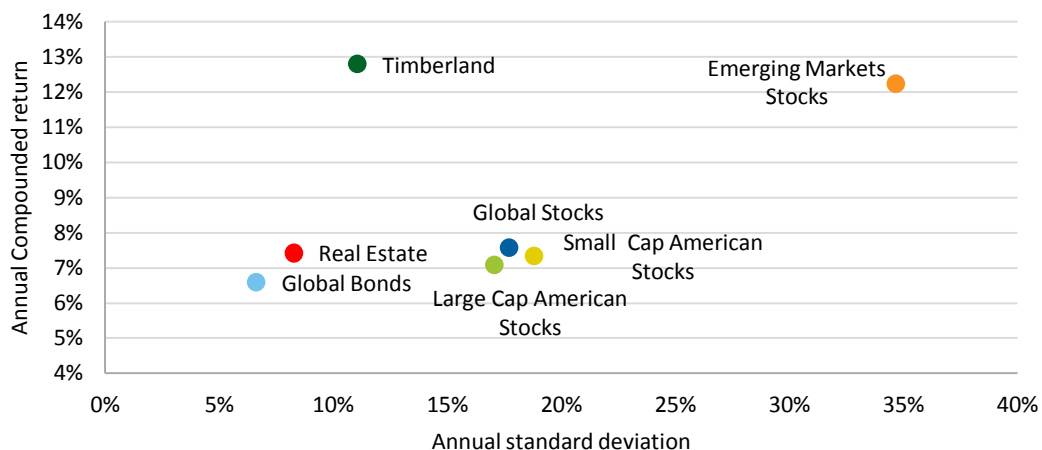


Figure 12. Compounded annual rates of return and standard deviations of investable assets based on historical data from the 1987 to 2012.

The chart clearly shows that on a historical basis, timberland investments have attractive return and risk characteristics.

The historical data will be used as a reference point when forecasting the performance of the asset classes. This will be developed in IWC’s Asset Allocation Model section of this report.

3.3 Correlations of timberland returns to other asset classes

Besides attractive risk and return characteristics, timberland investments have shown low correlations with the traditional asset classes in the investable universe, which is evidently beneficial on a portfolio basis.

Figure 13 below shows the correlations between yearly timberland returns, measured by the NCREIF Timberland Index, and the remaining investable universe.

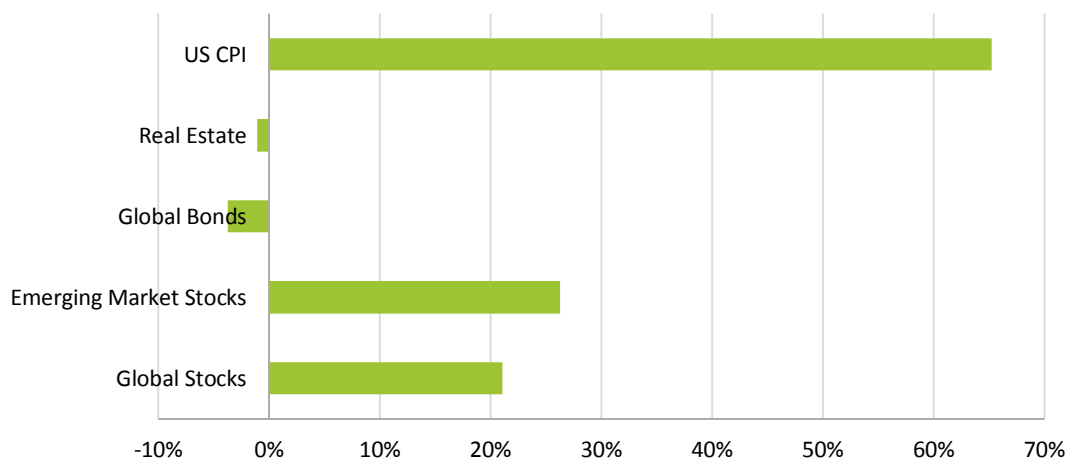


Figure 13. Historical yearly correlations with timberland returns between 1987 and 2012.

As shown in Figure 13, timberland returns have historically correlated fairly well with inflation, indicating that timberland investments, to some extent, provide a hedge against inflation. This is also supported by a study made by Lutz in 2012, which concluded that a geographically diversified timberland portfolio acts as an inflation hedge²⁷.

Furthermore, timberland returns have correlated only slightly with most asset classes, indicating that there are sizeable benefits to be achieved by including timberland in a diversified portfolio. Interesting is the correlation between timberland and real estate returns which is slightly negative. This is quite remarkable since timberland is often categorized as an alternative real estate investment. According to the data presented in this study, there are substantial benefits to be achieved by including timberland in a real estate portfolio²⁸.

3.4 Performance measurements

This section encompasses a range of well-known financial key figures which are measuring the historical performance of investable assets in different ways.

Based on the risk and return characteristics identified, the Sharpe ratio has been calculated for each asset in the investable universe using the historical Libor 3M as the risk-free rate of return²⁹.

Figure 14 below illustrates the result of the analysis. As shown in the figure, the excess return to variability from timberland is attractive, and should stay so even when lowering the expected return and increasing the standard deviation of timberland returns.

²⁷ Lutz, 2012

²⁸ For more descriptions about the benefits of timberland in a real estate portfolio, see for example Hancock Timber Resource Group, 2003c; and Washburn et al., 2003

²⁹ The Sharpe ratio is often referred to as an excess return to variability measure, and is calculated by subtracting the risk-free rate from the expected rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns. Formula is as follows: $(\bar{R}_p - R_f) / \sigma_p$

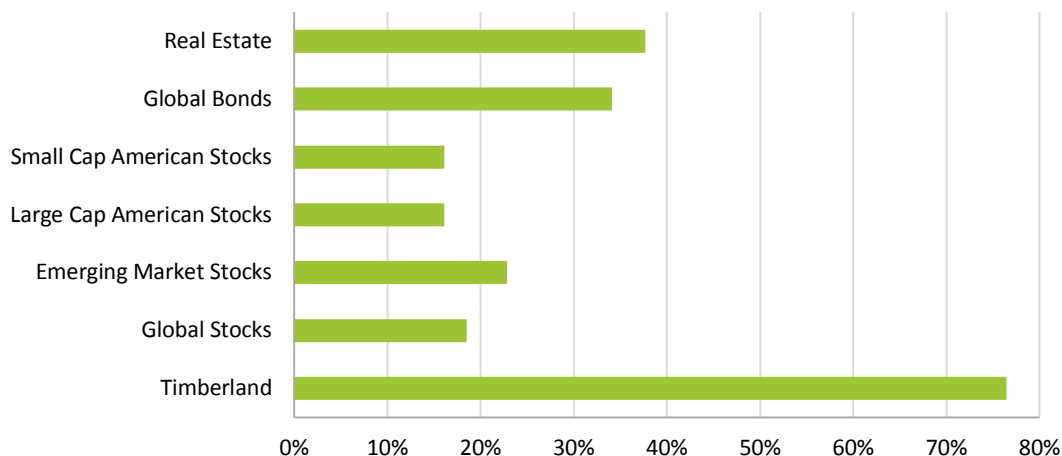


Figure 14. Sharpe Ratio for each asset in the investable universe (risk-free rate of return is obtained using Libor 3M and returns are based on historical data between 1987 and 2012).

In order to examine the fluctuations in the Sharpe ratios over time, an analysis of each asset’s Sharpe ratio over a 10 year horizon has been conducted, e.g. 1987-1996, 1988-1997, etc. The outcome is shown below in Figure 15, where it is clear that the NCREIF Timberland Index historically has not only had a high average Sharpe ratio, but also timberland investments’ lowest Sharpe ratio is significantly above those of other assets.

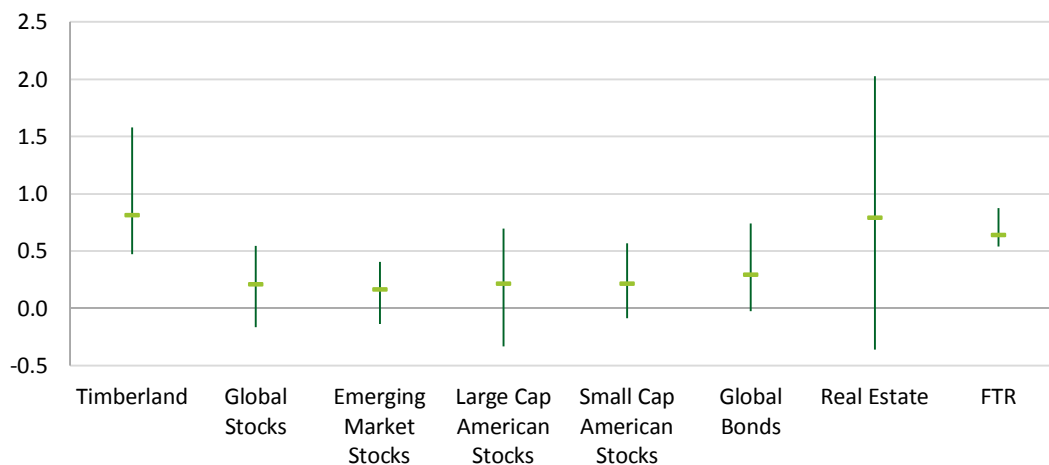


Figure 15. Maximum, minimum and average Sharpe Ratios for each asset class over the different 10-year periods between 1987 and 2012.

Another measure of an asset’s performance is by its alpha, which shows if an asset has yielded a higher or lower return than forecasted according to the CAPM theory³⁰. According to the CAPM-theory, the return of an asset must be directly correlated to the systematic risk (the risk that cannot be lowered by diversification). By definition, the market risk, beta (β^{31}) of the market (in this paper the global market³²) is 1.00. A straight (β /return) line, the Security Market Line (SML), can be drawn from the risk free rate to the market. In a perfect theoretical world, all assets should be on this line.

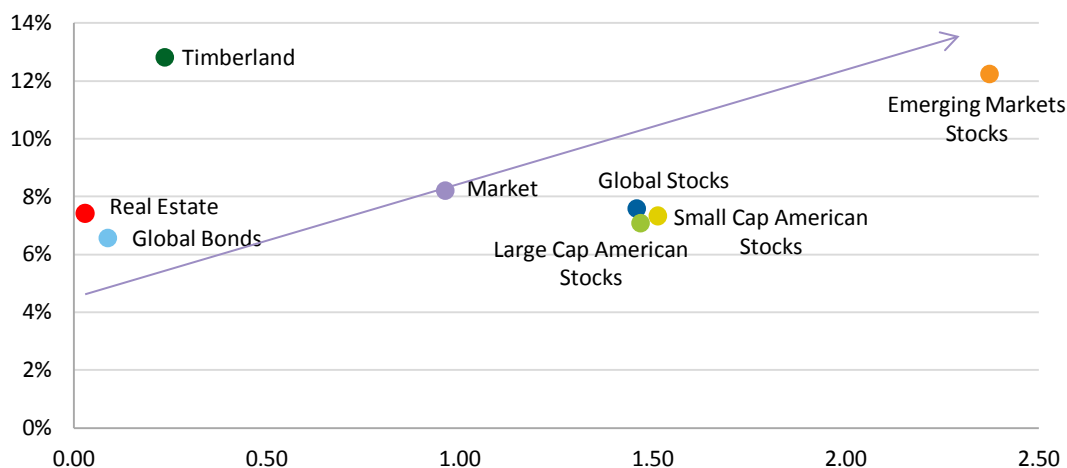


Figure 16. Security Market Line and beta/return of assets.

Alpha is defined as the superior/inferior return relative to the systematic risk, in other words the vertical distance from the asset to the SML³³.

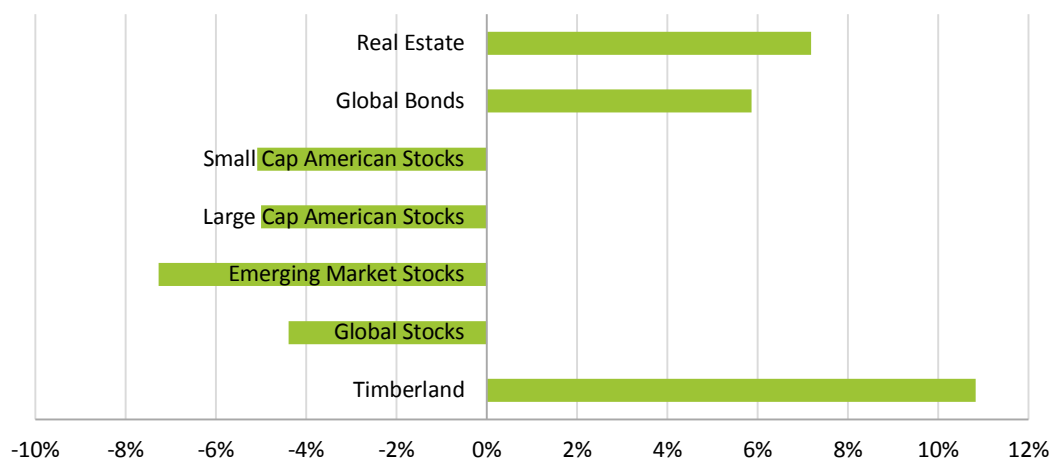


Figure 17. Alpha of the investable asset classes.

³⁰ Capital Asset Pricing Model

³¹ $\beta_{asset} = \text{Cov}(r_{asset}; r_{market}) / \sigma_{market}^2$

³² The market is derived based on the asset classes included in this paper, weighted with their approximate relative weight in a global portfolio.

³³ $\alpha_{asset} = r_{asset} - \beta_{asset} * r_{market}$

As shown in Figures 16 and 17, the performance of the historical NCREIF Timberland Index is by far outperforming the other asset classes in this study. Even with a reduced expected attractiveness of timberland in the future, the characteristics of timberland should remain attractive, indicating that a superior return is expected to be so in the future as well.

4 IWC's Asset Allocation Model

The previous sections have been focusing on historical performance, which are not in full alignment with future performance expectations. The intention of this section is to show the expected future benefits of timberland investments in an institutional portfolio. Therefore an efficient frontier analysis has been carried out using expected performance for timberland and other asset classes.

4.1 Expected risks, returns and correlations

The data needed for any asset allocation study are estimates of risk defined by the standard deviation, rate of return, and correlation of any asset combination represented in the investable universe.

According to IWC analysis, an international diversified timberland portfolio is expected to yield an annual nominal rate of return of 10.6-11.1% before tax and asset management fees and an annual standard deviation of 8.0% and 10.0%³⁴. The remainder of the present study will employ an expected nominal rate of return of 10% p.a. after asset management fees of 1% and an annual standard deviation of 9.0%.

For this asset allocation study, the investable universe has been defined as: Timberland, Global stocks, Emerging Market Stocks, Small Cap American Stocks, Large Cap American Stocks, Global Bonds, and Real Estate. As IWC does not have the expertise to forecast expected return of other asset classes, a study of 10-15 year expected returns, standard deviations and correlations prepared by JP Morgan is utilized³⁵. The resulting risks, returns, and correlations are displayed in Table 5 below.

Table 5. Risks, returns, and correlations for the different asset classes included in the model.

	Timberland	Global Stocks	Emerging Market Stocks	Large Cap American Stocks	Small Cap American Stocks	Global Bonds	Real Estate
Annual return	10.0%	9.5%	10.3%	9.0%	9.3%	4.3%	8.5%
Standard deviation	9.0%	17.0%	27.5%	17.5%	23.0%	8.0%	13.0%
Correlation on quarterly returns							
Timberland	1.00	0.05	0.07	0.07	0.06	0.05	0.06
Global Stocks		1.00	0.68	0.92	0.80	-0.01	0.24
Emerging Market Stocks			1.00	0.55	0.54	0.01	0.23
Large Cap American Stocks				1.00	0.88	-0.15	0.20
Small Cap American Stocks					1.00	-0.08	0.27
Global Bonds						1.00	-0.04
Real Estate							1.00

³⁴ IWC internal analysis, 2012

³⁵ JP Morgan Asset Management Long-term Capital Markets Return Assumptions, 2012.

4.2 Efficient Frontier Analysis

On the basis of IWC’s asset allocation model, two efficient frontiers have been produced: one that allows allocations to timberland investments, and another one where timberland is excluded from the portfolio. The results are shown in Figure 18 below.

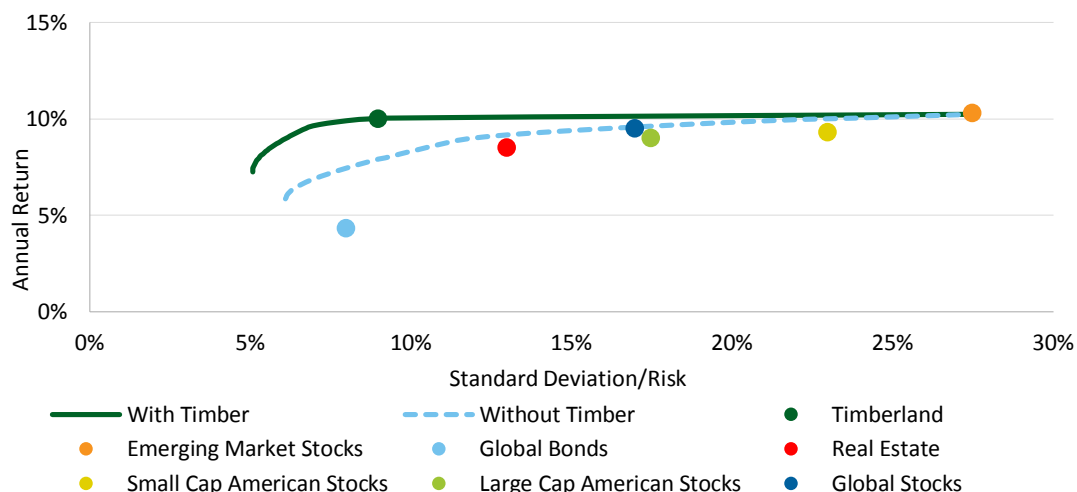


Figure 18. Efficient frontiers including and excluding timberland investments.

In Figure 18, the green curve is the efficient frontier when timberland is allowed in the portfolio and the dashed light blue dotted curve is the efficient frontier when timberland is excluded from the portfolio. The efficient frontier is reaching a larger return for a specific risk, when including timberland in the portfolio, indicating that allowing an allocation to timberland into a portfolio is beneficial. This is further substantiated by the high optimal allocation to timberland.

The incremental benefits of including timberland in the portfolio are summarized in the table below which shows the subsequent reduction of risk when including an allocation to timberland in a diversified portfolio. As an example, the table shows that if we include an optimal allocation to timberland in a portfolio with a target annual rate of return of 8.5%, the expected standard deviation can be reduced from 13.3% to 6.1%.

Table 6. Incremental benefits of allowing allocation to timberland.

	Return Target	Risk Level	Change from Base
Incl. Timberland	8.0%	5.6%	5.8%
Excl. Timberland		11.4%	
Incl. Timberland	8.5%	6.1%	7.2%
Excl. Timberland		13.3%	
Incl. Timberland	10.0%	6.7%	11.1%
Excl. Timberland		17.8%	

As a result, it is IWC’s belief that timberland investments will in the future continue to have a positive impact on an institutional portfolio.

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