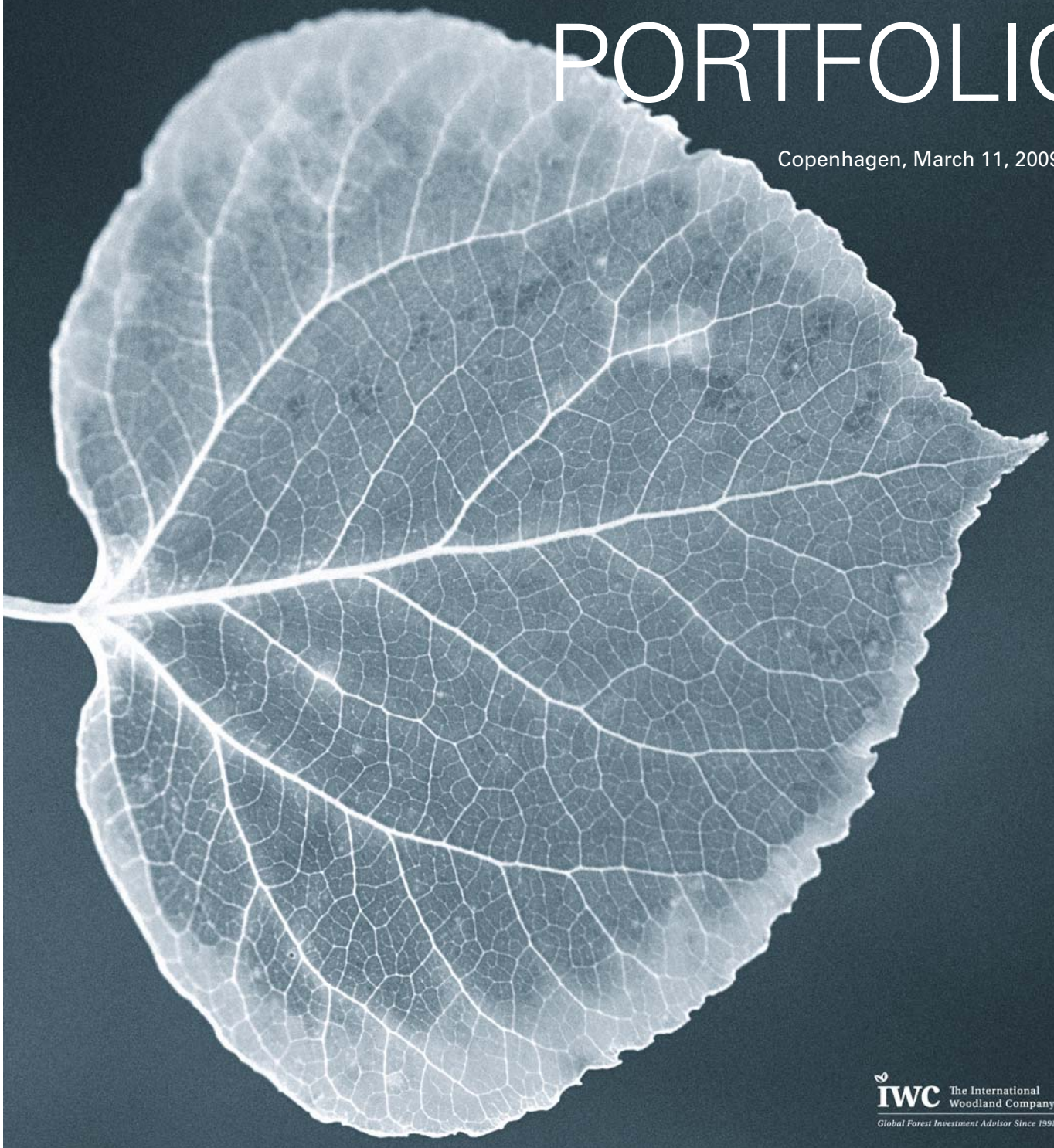
TIMBERLAND INVESTMENTS IN AN INSTITUTIONAL PORTFOLIO

Copenhagen, March 11, 2009



IWC The International Woodland Company

Global Forest Investment Advisor Since 1991

Executive Summary

Due to a range of attractive performance characteristics and diversification opportunities from including timberland in a diversified portfolio, institutional timberland investments, especially in the USA, have grown significantly in the last 25 years.

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

- Biological tree growth – main driver of attractive and stable returns
- Timber product price change
- Changes in land value.

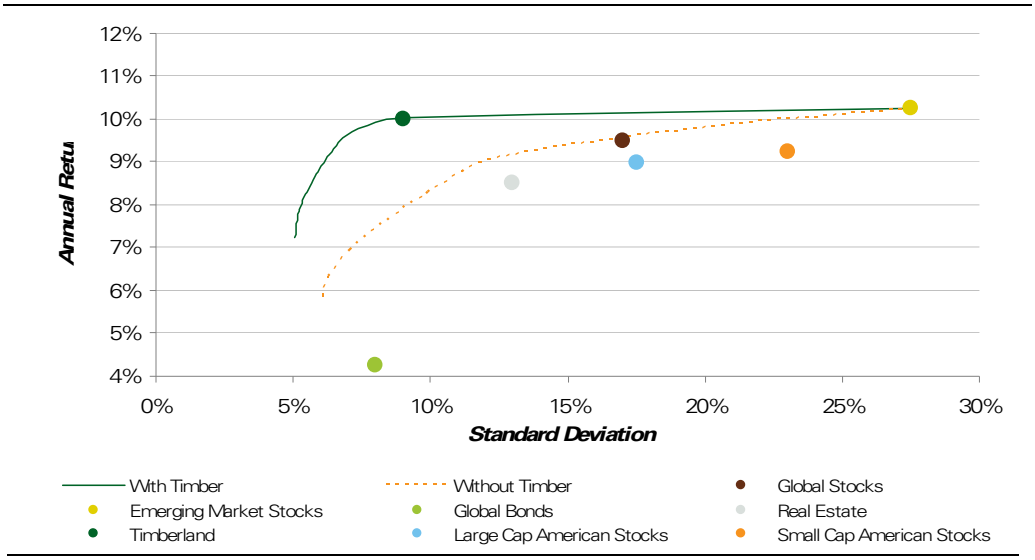
Ownership of timberland and the attendant biological growth and flexibility in connection with timing of entry/exit and timing of harvests provides investors with an attractive return structure. Biological growth and utilization of the timing options reduces the risk of negative returns and results in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

Returns between professionally managed timberland investment funds are almost normal 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 – 2008 yielded a return of 15.1% p.a. nominal before asset management fee. For an internationally diversified timberland portfolio, The International Woodland Company A/S (IWC) assumes an average future annual rate of return of 10% - 12% before asset management fees.
- Historical standard deviation of returns for the US index used above has been 8.4% p.a. IWC assumes an annual standard deviation of returns 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 this to continue in the future, leading to high diversification benefits when including timberland investments in an institutional portfolio.

The benefits of including timberland in an investment portfolio have been analyzed through modern portfolio theory. Based on IWC's asset allocation model, two efficient frontiers have been produced: one that allows allocations to timberland investments, and another where timberland is not included in the portfolio. The result is 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 for 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.

	Return Target	Risk Level	Change from Base
Incl. Timberland	8.0%	5.29%	3.93%
Excl. Timberland		9.22%	
Incl. Timberland	8.5%	5.64%	4.80%
Excl. Timberland		10.44%	
Incl. Timberland	9.0%	6.12%	5.80%
Excl. Timberland		11.92%	

The table shows that if an optimal allocation to timberland is included in a portfolio with a target rate of return of 8.5% p.a., the expected standard deviation can be reduced from 10.44% to 5.64% p.a.

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 2006[1], whereas DANA Limited has estimated that institutional investors have invested a total of approximately USD 50 billion as of early 2008.[2] In July 2006, Mercer estimated that the global investable commercial timberland exceeded USD 300 billion, of which timberland in the US accounted for more than USD 200 billion[3]. IWC's own study shows that the investable and leasable forestland worldwide is valued at nearly USD 480 billion[4].

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 conditions.[5]

In Europe, IWC has pioneered institutional timberland investments since its establishment in 1991. Particularly since the late 1990s, 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 a European institutional investment portfolio.

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[1] Merril Lynch, 2007
[2] Neilson, 2008
[3] Mercer, 2006
[4] IWC. Global Forestland Investment Study, 2005
[5] 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.

2 Timberland Return Characteristics

2.1 Return Drivers

Timberland investment returns can be described as a function of three drivers[6] (biological growth, change in timber prices and change in land value) as depicted in Figure 1.

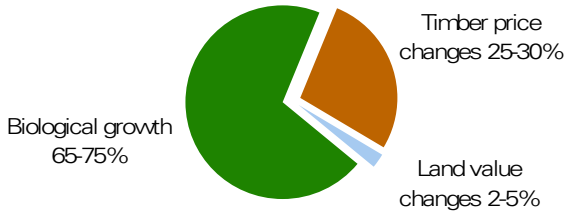

Figure 1. Sources of Timberland Return. Source: RMK.

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

Biological tree growth

Biological growth is what separates timberland investments from other types of real estate investments, and it is estimated to be the most important return driver. The resulting 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"). 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").

[6] Caulfield, 1998b

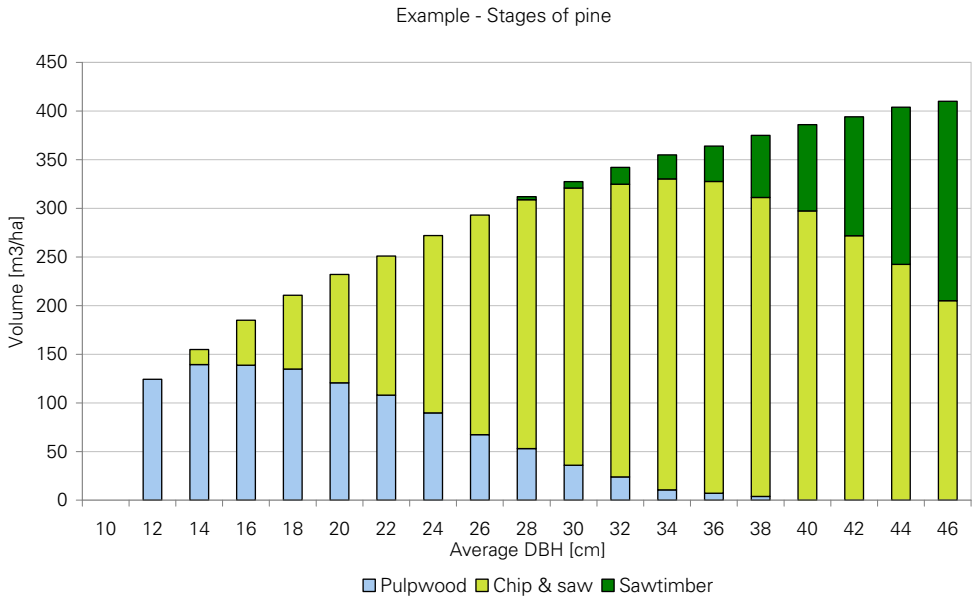

Figure 2. Sources of timberland investment returns – Significance of biological growth.
Source: IWC internal analysis.

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, microeconomic factors affect the stumpage price within regions.[7] 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, management has significant flexibility when it comes to timing the harvest of trees. By utilizing positive market conditions, management can maximize the return from the investment. Timber prices have generally appreciated by 2 percent annually during the past century.[8]

Changes in land value

Usually, land value only represents a very 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. A study by Washburn[9] demonstrates that the strongest indicators of real value of land over time are the 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.

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[7] Caulfield, 1998b
[8] Mercer, 2006
[9] Washburn, 1992

2.2 Return Structure

The introduction of managerial flexibility by ownership of timberland, as opposed to traditional securitized investments (e.g. timber product companies), can be perceived as acquiring two important 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. Investors 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.[10]

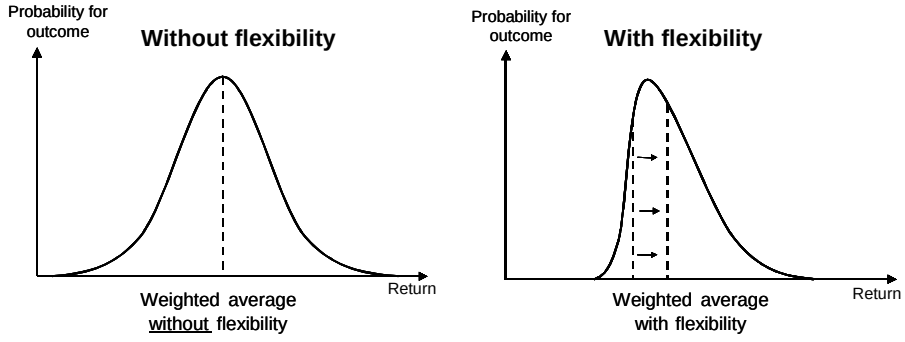

Figure 3. The effect on return structure by introducing options or flexibility in timberland investments.

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 NCREIF[11] Timberland Index[12] with the MSCI World[13] from 1970 to 2008.

[10] Cordt and Degn, 2003
[11] National Council of Real Estate Investment Fiduciaries
[12] For the period before 1987 the John Hancock Timber Index is used.
[13] IWC's benchmark for global stocks

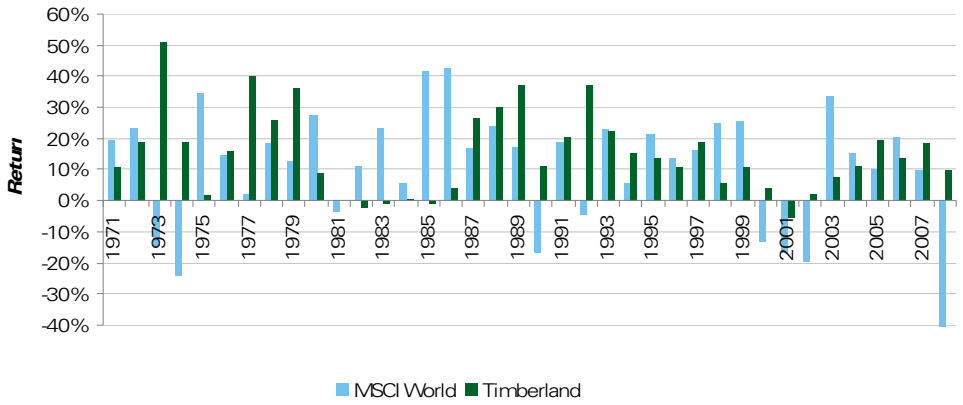

Figure 4. John Hancock Timber Index[14] versus MSCI World[15], 1970-1987, and NCREIF Timberland Index[16] versus MSCI World, 1987-2008.

The chart demonstrates the difference between volatility on the upside (positive returns) and the downside (negative returns).

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 situation.[17]

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 events. Less than 0.1% of the total value of the forest asset has been lost due to insects, storm, or fire in any given year.[18] A reason is that after a fire has hit, it is estimated that up to 90 percent of the timber is still merchantable.[19] However, according to IWC 's experience, there is a higher risk of losses from hazards in less well managed timberland forests, like public lands.

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[14] Historic timberland performance figures calculated from the John Hancock Timber Index are based on a model constructed by Hancock Timber Resource Group, the largest timberland investment management organization (TIMO) for institutional investors
[15] The MSCI World Equity Indices are designed to measure the performance of the global equity markets
[16] Refer to page 10
[17] Ineichen, 2003
[18] According to IWC's knowledge, neither a more recent study has been conducted nor one focusing on the average loss outside of United States.
[19] Goar , 2001

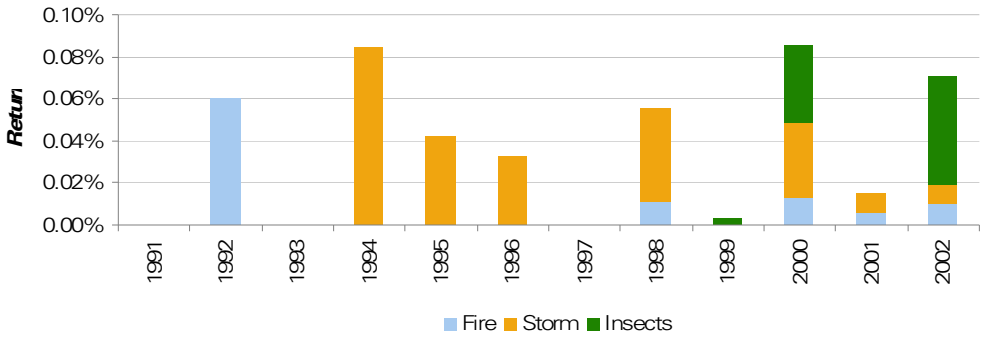

Figure 5. Percentage asset value loss of total in Hancock's[20] investments in North America. Hancock had during that time managed timberland valued at about USD 2 billion.
Source: Hancock Timber Resource Group, 2003d.

2.3 Distribution of Timberland Returns

The asymmetric return structure of the 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.

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.

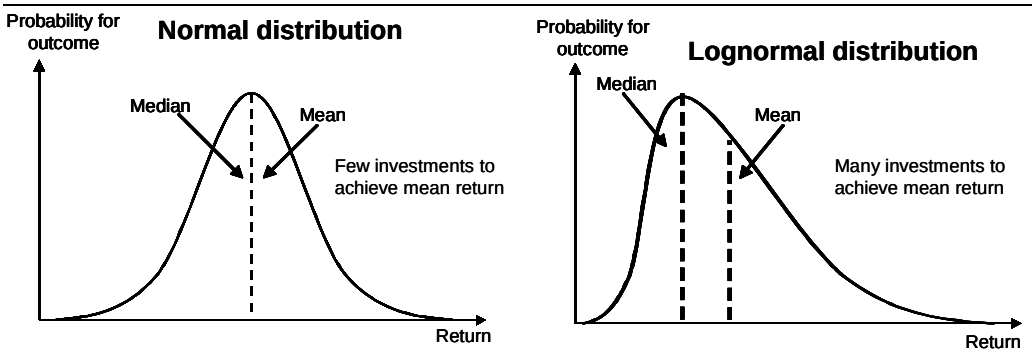

Figure 6. Illustration of two different distributions of returns between investments.

Table 1. Distribution of annual returns in Timberland and US Private Equity/Buyout Funds[21].

1999-2008Q3	Mean	Median	Max	Min	Upper	Lower
Timberland (NCREIF)	8.9%	10.2%	19.4%	-5.2%	18.5%	1.2%
US Private Equity	5.4%	4.2%	112.1%	-93.5%	15.1%	-3.2%

[20] Hancock Timber Resource Group is the largest timberland investment management organization (TIMO) for institutional investors
[21] Data is obtained from VentureXpert. Please note that data is as of Q3 2008.

Table 1 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 77 institutional timberland investment funds and accounts with mainly US-based investments. The returns are reported as annual returns since inception. The distribution of the return data is displayed in Figure 7 below.

Figure 7. Return distribution from 77 institutional timberland investment funds reported as annual gross IRR returns since inception.
Source: IWC internal analysis 2007, based on data provided by TIMOs.

The chart 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 quarterly reported returns between first quarter 1987 and fourth quarter 2008, 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*, **
Global Bonds	JPM GBI Broad**
Real estate	NCREIF Property Index
CPI	US CPI
Risk-free rate	LIBOR USD 3 Month

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

Measuring timberland performance is complicated due to the fact that there is no centralized auction market which 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 data.[22]

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 will apply the NCREIF Timberland Index which is denominated in US dollars.

3.1 The NCREIF Timberland Index

The NCREIF Timberland Index has been published since 1994 and includes returns dating back to 1987. It is a property-based index reporting returns for three regions in the USA. 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.[23]

The index accounts for 12.8 million acres of forestland, and the total value of the 305 properties is about USD 23.9 billion, a substantial share of institutional timberland investments in the United States.[24]

However, there are four limitations to the NCREIF Timberland Index[25]:

1. The number of contributing TIMOs has historically been limited and currently the index has eight 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.

[22] Binkley *et al.*, 1996
[23] Hancock Timber Resource Group, 2003b
[24] NCREIF, 2008; and Washburn, 2003
[25] Lutz, 1999

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 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.

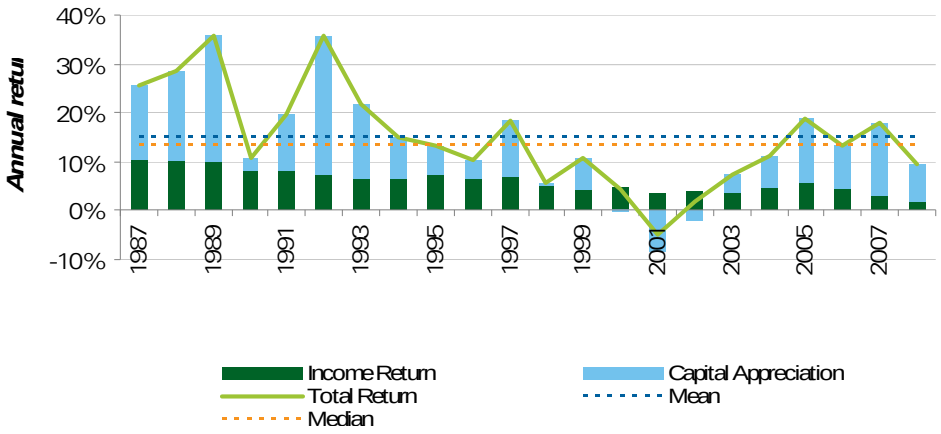

Figure 8. Annual reported return (%/year) since 1987 for the NCREIF Timberland Index.

As it can be seen from Figure 8, timberland investments have had good historical performance. The decomposition show a steady income return, while capital appreciation is more volatile and even experienced depreciation in 2001 and 2002 predominantly due to falling stumpage prices in the USA. Timberland investments have historically yielded an annual nominal return of 15.1% since 1987. The median of the returns is 13.8%, indicating a positive skewness in the annual returns.

Figure 9. Histogram of reported return (%/year) since 1971 for John Hancock Timberland Index (1971-1986) and the NCREIF Timberland Index (1987-2008).

Figure 9 shows that there is a positive skewness in the annual 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; high risk adjusted return.

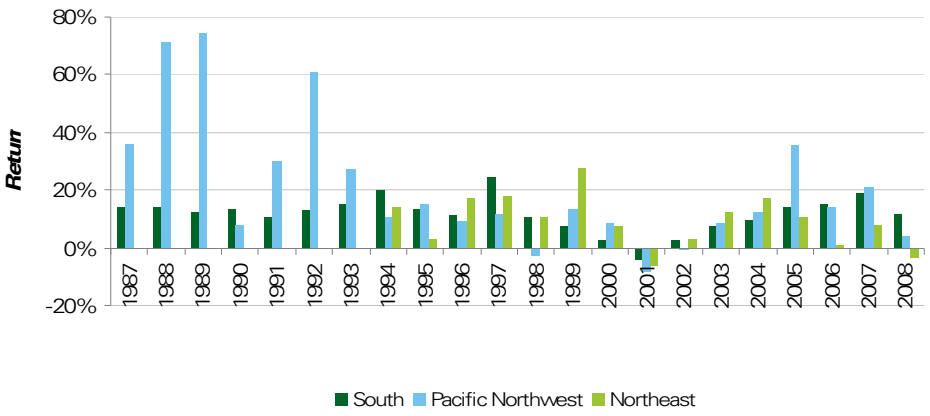

Figure 10. Annual reported return (%/year) since 1987 for the regions covered by NCREIF Timberland Index.

Figure 10 shows that the annual returns vary quite a lot in the different US regions, ranging from an arithmetic average of 9.5% in US Northeast, 11.6% in US South, peaking at 20.9% in US Pacific Northwest. The return in Pacific Northwest is highly impacted by positive outliers, correcting for that by looking at the median instead, the median of the annual returns are at the same level ranging from 10.7% to 13.7%. This indicates that timberland investment is not a unified asset, as e.g. climate, soil, maturity, species etc. impact the return characteristics.

As previously mentioned, a major drawback of the NCREIF Timberland Index is that it only consists of data from the US market. For the institutional investor, there are alternatives to the US timberland market, as timberland investments outside the US are getting more and more feasible to invest in, which means that it is possible for investors to invest in a combination of regions that matches the investor's preferences. Hancock has estimated annual returns since 1960 on timberland investments in the main investable regions, based on timber prices during the prior 8 quarters. This gives an indicator of the characteristics of return in the different regions.

Table 3. Annual returns since 1987 according to Hancock in different regions[26]

Annual Returns since 1987	U.S. South	U.S. Pacific Northwest	U.S. Northeast	U.S. Domestic	Coastal B.C.	New Zealand	Australia	Brazil
Mean of returns	11.7%	20.9%	9.8%	15.2%	11.7%	9.6%	11.9%	18.4%
Stdev of returns	6.2%	22.6%	7.9%	10.7%	17.8%	14.4%	11.1%	18.9%
Median of returns	12.8%	13.1%	9.3%	13.3%	12.1%	10.5%	12.0%	15.2%
Correlation to US Domestic	0.59	0.95	0.30	1.00	0.50	0.30	0.40	0.45

[26] In order to compare with the NCREIF Timberland Index and as no figures are present from the outside the US prior to 1975, only returns since 1987 are used. No returns from Brazil prior to 1992 are present. Note that IWC carries out regional studies, where expected future performance and correlation within geographical regions are estimated

By combining the output from Figure 10 and Table 3, it becomes clear that there is a minor discrepancy between the average annual returns in the US regions. However, as the discrepancy is relatively small, Figure 10 is a good proxy of how the returns/risk in the different regions have been relative to each other and of how much the returns in the markets outside of the US correlate to the returns in the US market. It is obvious that the correlation between the returns in the US and other markets are low, making it possible to diversify a portfolio of US market timberland with timberland investment in other markets. Moreover, Brazil has shown high returns above the average of the US timberland markets for the past 20 years, especially when adjusting for outliers by looking at the median instead of the mean. As more and more timberland investment opportunities arise in emerging markets, like Russia, Asia, Africa, etc., it is possible to achieve returns that are above the NCREIF Timberland Index.

Even though there are geographical diversification opportunities within the timberland investment universe, by far the most money (91%) is invested in the North American timber assets. Oceania accounts for 5%, South American for 2% and "other" for 2%.[27]

3.2 Return Characteristics for Timberland and Other Assets

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

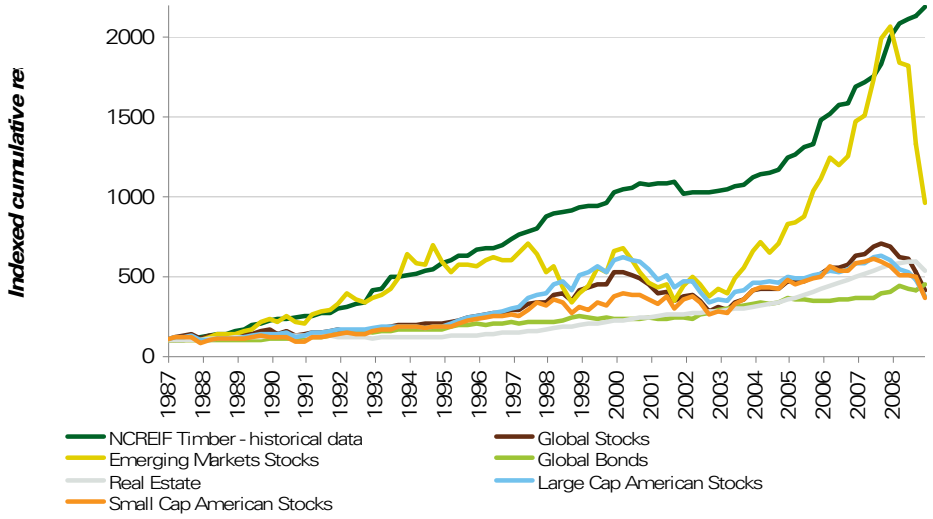

Figure 11. Cumulative nominal returns for timberland investment, measured by the NCREIF, relative to other assets in the investable universe between 1987 and 2008.

[27] Merril Lynch. Timber Survey, 2007

It is evident that from 2003 to 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 assets. The 2008 turmoil severely hit the financial capital markets and many stock markets were down more than 40%. The real estate markets were also hit but not as brutally as the stock markets. Timberland on the other hand has shown a steady, but overall high appreciation, making it the asset with the highest return since 1987.

Table 4 shows the annualized compounded return for different time horizons since 1987 for the assets analyzed in this paper.

Table 4. Annualized Compounded Returns for the asset classes.

Annualized compounded return	NCREIF Timber	Global Stocks	Emerging Markets Stocks	Large Cap American	Global Bonds	Real Estate
1 year	9.5%	-40.3%	-53.2%	-38.5%	10.4%	-6.5%
5 years	14.4%	0.0%	8.0%	-4.1%	6.2%	11.7%
10 years	8.9%	-0.2%	9.3%	-3.0%	6.0%	10.5%
15 years	10.2%	5.0%	2.7%	4.5%	6.7%	10.6%
20 years	13.8%	5.4%	10.1%	6.1%	7.5%	7.9%
Inception	15.1%	6.6%	10.9%	6.2%	7.1%	8.0%
Highest	37.4%	33.8%	74.8%	34.1%	20.1%	20.1%
Lowest	-5.2%	-40.3%	-53.2%	-38.5%	-6.4%	-6.5%

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 2. The resulting chart is displayed in Figure 12 below.

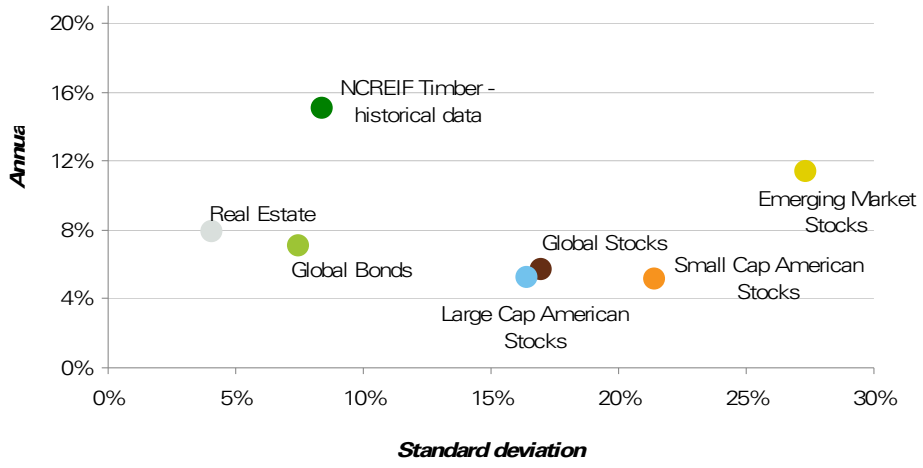

Figure 12. Geometric annual rates of return and standard deviations for the present studies in investable assets based on quarterly historical data from the Q1 1987 to Q4 2008.

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

As historical data is not necessarily a good indicator of future performance, the forecasted performance of the asset classes will be shown in IWC's Asset Allocation Model section of this report.

3.3 Correlations of Timberland Returns to Other Assets

Besides attractive risk and return characteristics, timberland investments have low correlations with the other assets in the investable universe, which is beneficial when a portfolio of assets is created from different asset classes.

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

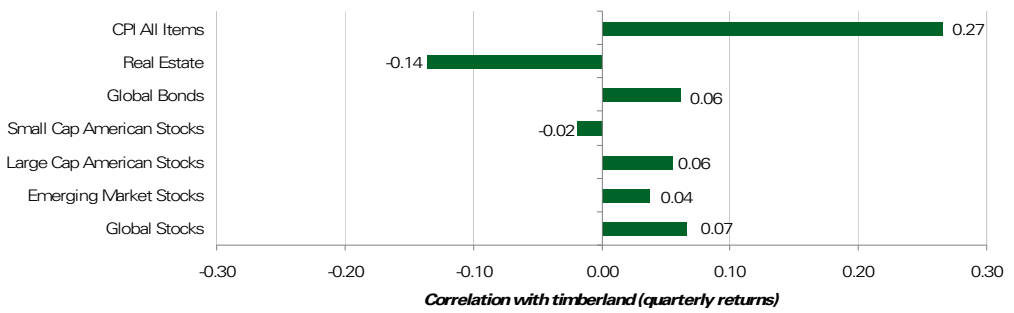

Figure 13. Historical yearly correlations with timberland returns based on quarterly data between Q1 1987 and Q4 2008.

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 2007, which concluded that a geographically diversified timberland portfolio acts as an inflation hedge.[28]

Quarterly timberland returns have correlated only slightly positively with most asset classes, indicating that there are sizeable benefits to be achieved by including timberland in a diversified portfolio.

Furthermore, timberland investment returns correlate negatively with real estate returns. This is quite interesting 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 portfolio.[29]

[28] Lutz, 2007
[29] 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.

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 calculated rate of return from Libor 3M as the risk-free rate of return.[30]

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

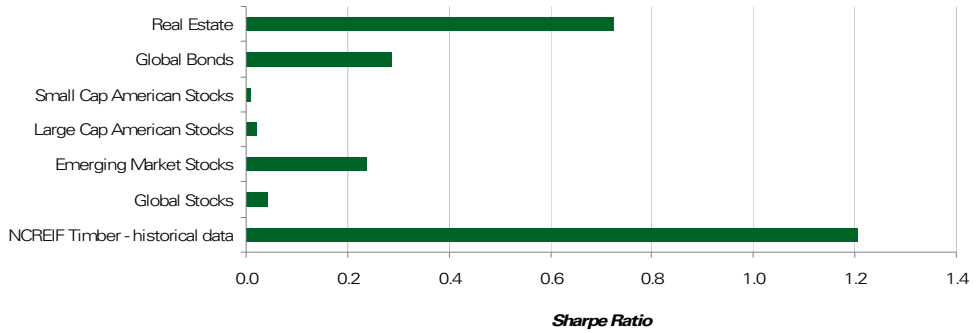

Figure 14. Sharpe Ratio for each asset in the investable universe (risk-free rate of return is estimated from Libor 3M). Returns are based on historical data Q1 1987 to Q4 2008.

In order to examine the fluctations 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 higher average Sharpe ratio, but also the lowest Sharpe ratio is significantly above those of the other assets.

[30] 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.

$$(\overline{R}_P - R_F)/\sigma_P$$

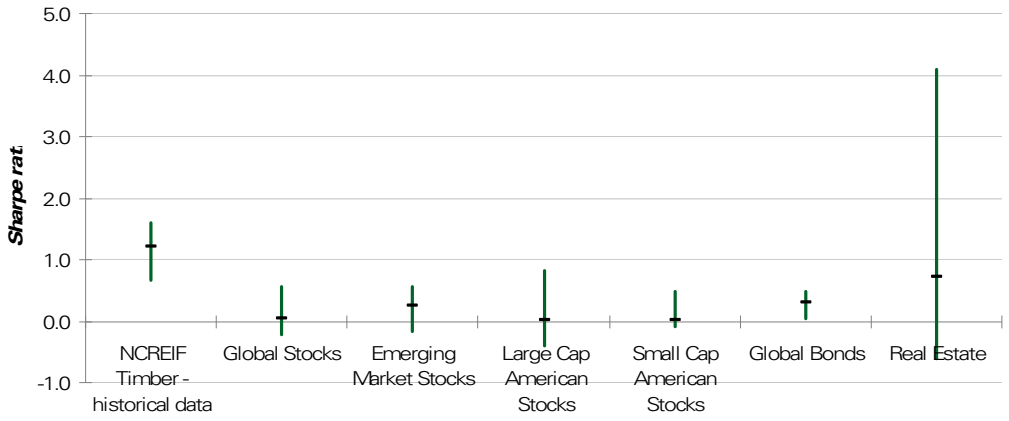

Figure 15. Max, Min and Average Sharpe Ratio for each asset over a 10-year horizon during 1987-2008.

Another measure of an asset's performance is by its alpha, which shows if an asset has yielded a higher or lower return than the CAPM theory forecasts[31]. 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, β[32] of the market (in this paper the global market[33]) 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.

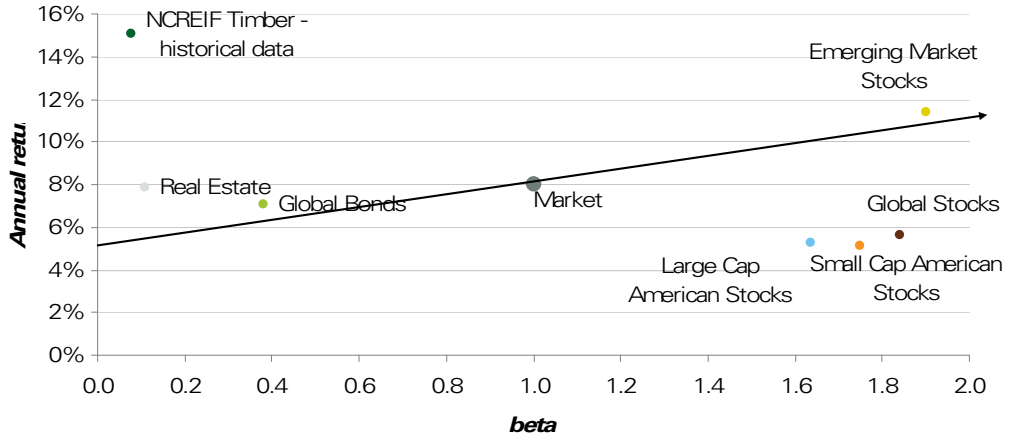

Figure 16. Security Market Line and beta/return of assets.

[31] Capital Asset Pricing Model

[32] βasset: Cov(rasset; rmarket) / σ market2

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

Alpha is defined as the superior/inferior return relative to the systematic risk, in other words the vertical distance from the asset to the SML.[34]

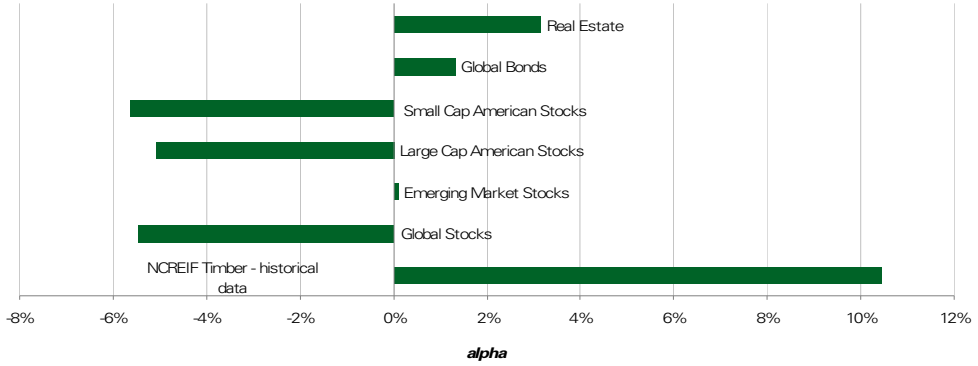

Figure 17. alpha of the investable assets.

As shown in Figure 15 and 16 the performance of the historical NCREIF Timberland is by far outperforming the other asset classes. Even with the reduced expected attractiveness of timberland in the future, the characteristics of timberland is superior to most other asset classes indicating that a superior return has been achievable and is expected to be so in the future as well.

[34] αasset: rasset - βasset * rmarket

4 IWC's Asset Allocation Model

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

4.1 Risk, Return and Correlation

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 10.60-11.25% before tax and asset management fees and an annual standard deviation of 8.75% and 10.60%.[35] 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 JPMorgan is along with IWC assumptions utilized[36].

The risk, return, and correlations are displayed in Table 5 below.

Table 5. Risk, return, and correlations for the 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	Global Stocks	Emerging Market Stocks	Large Cap American Stocks	Small Cap American Stocks	Global Bonds	Real Estate
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

[35] IWC internal analysis, 2007
[36] JP Morgan Asset Management Long-term Capital Markets Return Assumptions. 2008.

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.

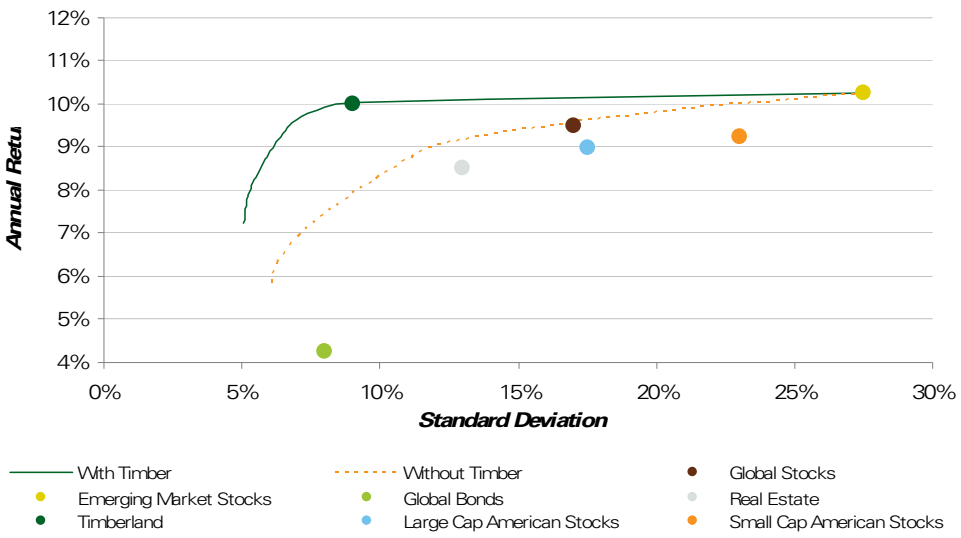

Figure 18. Efficient frontier for an institutional portfolio including and excluding timberland investments.

In Figure 18, the full-lined green-colored curve is the efficient frontier when timberland is allowed in the portfolio and the dashed orange-colored curve is the efficient frontier when timberland is not allowed in the portfolio. Note that the efficient frontier is reaching a larger return and a lower risk, when including timberland in the portfolio.

It is evident from Figure 18 that allowing an allocation to timberland in a portfolio is beneficial as a portfolio with timberland will be superior to a portfolio without timberland. This is further substantiated by the high optimal allocation to timberland.

The incremental benefits of including timberland in the portfolio are summarized in Table 6 below.

Table 6. Incremental benefits of allowing allocation to timberland.

	Return Target	Risk Level	Change from Base
Incl. Timberland	8.0%	5.29%	3.93%
Excl. Timberland		9.22%	
Incl. Timberland	8.5%	5.64%	4.80%
Excl. Timberland		10.44%	
Incl. Timberland	9.0%	6.12%	5.80%
Excl. Timberland		11.92%	

The table above 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 10.44% to 5.64%.

4.3 Threshold Analysis

A threshold analysis has been performed to establish at which rate of return timberland investments are not included in the optimal allocation.

Table 7. Threshold analysis showing at which return timberland should not be included in the optimal allocation.

Return			
Portfolio	Timber Normal	Timber Indifference Point	Decline to reach
8.0%	10.0%	3.9%	6.1%
8.5%	10.0%	4.2%	5.9%
9.0%	10.0%	6.6%	3.4%

Table 7 shows that timberland should still be included in an institutional portfolio with a return of 8.5%, even if the nominal return of timberland declines by 5.9% from the expected 10% to 4.2% annually.

From Table 6 and 7 it can be derived that timberland investments have a positive impact on the risk level of the total portfolio and that the return expectations of timberland investments could be lowered significantly before they should be omitted from the portfolio.

It is IWC's belief that timberland investments will continue to have a positive impact on the asset portfolio of an institutional investor as there are no indicators that a global portfolio of timberland will yield a nominal return significantly lower than 10% annually in the future.

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