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The enduring case for *timberland*

Enduring principles support the fundamental case for timberland investing.

FOUR PRINCIPLES

The argument for investing in timberland rests on four principles:

1. *Strong market fundamentals*
2. *Potential for attractive returns*
3. *Lack of correlation with other asset classes*
4. *A hedge against inflation*

CPI

Timberland — and the wood fiber it generates — is vital to the global economy, providing a renewable resource for housing, furniture, packaging, tissue, heat, energy and communications. For many decades, timberland was owned primarily by governments, wealthy families and corporate operators. But that all began to change about 50 years ago, creating a timberland investment landscape that continues to evolve.

In response to the 1974 Employee Retirement Income Security Act, pension funds began to view timber as a way to fulfill their legal obligations to diversify plan investments as a means of minimizing the risk of large losses. Rising demand for timberland in the 1980s was met by restructuring the forest products industry so that ownership of timberland shifted from operating companies to financial investors. Timber investment management organizations (TIMOs) arose to facilitate these transactions and organize and manage investment partnerships.

Many of these new investment strategies built compelling track records over the subsequent years, demonstrating timberland's ability to produce strong, consistent returns through both current income and capital appreciation. The asset class's unique characteristics also provided portfolio-level benefits that have made timberland an enduring part of many institutional portfolios.

"*The asset class's unique characteristics also provided **portfolio-level benefits** that have made timberland an enduring part of many institutional portfolios.*"

Re-examining the case for timberland

Institutional portfolios include a mix of traditional and alternative assets. Pensions & Investments (2018) reports the typical defined benefit allocation to be about 50% equity, 25% fixed income and 25% alternatives. The allocation to alternatives may include private equity, real estate, farmland and/or timberland.

Capital allocation across industries is competitive and, like all alternative asset classes, timberland must earn its position in an institutional portfolio. The argument for investing in timberland has historically rested on four principles:

1. Strong market fundamentals
2. Potential for attractive returns
3. Lack of correlation to other asset classes
4. A hedge against inflation

Using current data and in the context of recent market trends, here we re-examine the case for timberland to determine whether these principles still hold and, if not, what has changed.

PRINCIPLE 1:
Strong market fundamentals

Investing in timberland is a fundamental way to benefit from growing worldwide demand for wood. As populations expand and become wealthier, their large and growing wood demand provides attractive opportunities for timberland investors in key geographies.

"**Capital allocation** *across industries is competitive and, like all alternative asset classes, timberland must earn its position in an institutional portfolio."*

The world's expanding population and economic growth, particularly in emerging market countries like Brazil, India and China, continues to support demand for wood. According to the World Bank, per capita GDP is expected to rise from about $10,000 today to over $17,000 by 2040 (2010 USD), with the greatest increases in Asia and Latin America. As per capita income increases in these emerging market countries, demand for forest products is expected to rise as well.

Timber demand is driven by industry's need for a range of wood-based products:

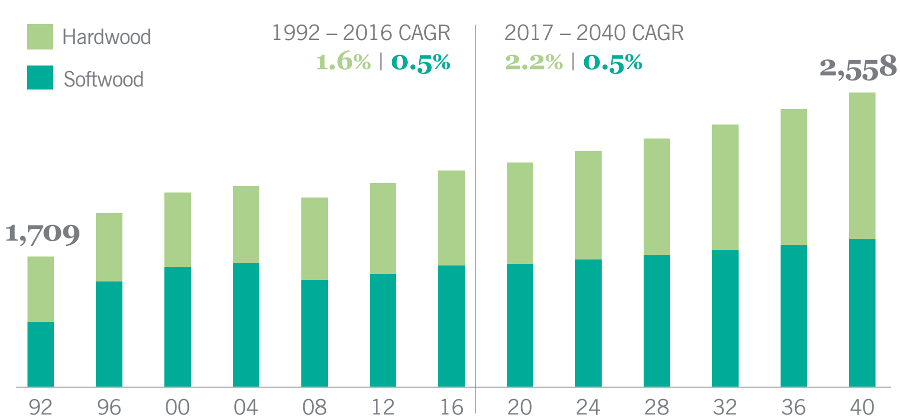
- **Lumber**
- **Plywood and veneer**
- **Wood-based panels**
- **Chemical pulp**
- **Bioenergy and green chemical feedstocks**

Major end-use markets for these products include housing, tissue, furniture, paper and packaging. In addition to traditional markets, growing demand for engineered wood products (e.g., cross-laminated timber), biofuels, and renewable alternatives for plastics and chemicals represent potentially massive new markets for timber.

The UN Food and Agriculture Organization (FAO) reports increasing global consumption of "industrial roundwood," which refers to wood used in manufacturing a broad range of products. Worldwide, between 1992 and 2016, industrial roundwood consumption increased at an average annual rate of 1.6% for hardwoods and 0.5% for softwoods **(Exhibit 1).** Growth in hardwood consumption has been driven primarily by demand for consumer products such as tissue, which are less sensitive to economic cycles. By contrast, industrial softwood consumption is related to housing construction and was more volatile during the Global Financial Crisis (GFC).

Based on the historical relationship between per capita income and industrial roundwood consumption and the World Bank's 2018 economic outlook, worldwide demand for wood is expected to continue growing. Between 2017 and 2040, hardwood and softwood consumption is expected to increase at compound annual rates of 2.2% and 0.5%.

Exhibit 1: Worldwide industrial roundwood consumption
(Volume: million cubic meters)



Sources: UN FAO, the World Bank, GWR research.

PRINCIPLE 2:
Potential for attractive returns

Timberland returns have moderated in the last decade as a result of both cyclical and structural factors.

Since inception, NCREIF timberland returns appear highly competitive with traditional asset classes. For the period 1987 – 2017 and across a range of asset classes, timberland generated the highest mean return — outperforming U.S. equities by over 300 basis points — and risk-adjusted return across a range of asset classes **(Exhibit 2)**. However, poor performance in recent years has caused many investors to wonder whether above-average timberland returns from the 1990s and early 2000s have masked underperformance over the past decade.

Between 2008 and 2017, mean returns for many asset classes have declined — and timberland is no exception. Since 2008, timberland underperformed U.S. equities by nearly 200 basis points. During the same period, however, the volatility of timberland decreased, while volatility in equities markets increased. As a result, timberland continues to outperform U.S. equities on a risk-adjusted return basis as measured by the Sharpe Ratio **(Exhibit 3)**.

Exhibit 2: Timberland has outperformed traditional asset classes since 1987

20-year performance of timberland and traditional asset classes (Annual returns, 1987 – 2017)

	Mean	Standard Deviation	Sharpe Ratio
U.S. Equities	8.89%	16.55%	0.37
Non-U.S. Equities	5.44%	18.91%	0.14
U.S. Fixed Income	6.47%	4.50%	0.81
Non-U.S. Fixed Income	5.96%	6.06%	0.52
Timberland	12.28%	11.25%	0.84

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1987 through 31 Dec 2017. Asset classes represent the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex USA Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; timberland – NCREIF Timberland Index. It is not possible to invest in an index. Performance for indices does not reflect investment fees or transactions costs.

Exhibit 3: Timberland has continued to outperform on a risk-adjusted basis since 2008

10-year performance of real assets, commodities, and REITs (Annual returns, 2008 – 2017)

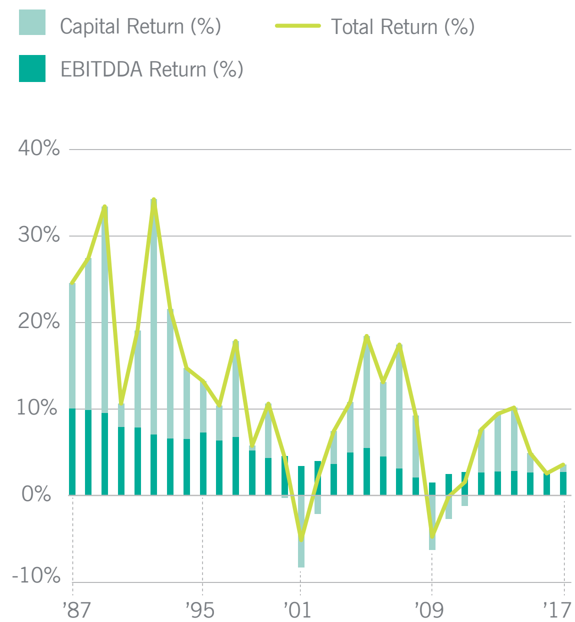
	Mean	Standard Deviation	Sharpe Ratio
U.S. Equities	7.31%	18.22%	0.25
Non-U.S. Equities	0.93%	20.43%	-0.09
U.S. Fixed Income	4.30%	3.10%	0.48
Non-U.S. Fixed Income	3.49%	5.31%	0.12
Timberland	5.39%	6.09%	0.42

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 2008 through 31 Dec 2017. Asset classes represent the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex USA Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; timberland – NCREIF Timberland Index. It is not possible to invest in an index. Performance for indices does not reflect investment fees or transactions costs.

Since 2008, the underlying drivers of moderating returns in the U.S. include improved market efficiency and a prolonged recovery. As an asset class, timberland has matured — earning greater investor acceptance, generating clearer information on markets and assets, and providing improved liquidity. As a result, timberland markets have become increasingly competitive and return expectations for U.S. timberland investments have moderated **(Exhibit 4)**. In the near term, this situation is unlikely to change.

Timberland performance in the past decade has also suffered due to the prolonged economic recovery. Housing comprises the most important end-use market for wood products, and construction starts remain below the long-term average and underlying demographic demand. In the U.S. South, a slow-to-recover housing market and efficiency improvements in manufacturing have caused average log prices in the region to remain near historic lows. In contrast, Pacific Northwest timber markets have benefited from strong export and domestic demand, raising timber prices to decade-highs and lifting returns. With the U.S. South making up over half of the NCREIF Timberland Index, the difficult recovery in the region has hindered overall market performance. Markets in the U.S. South are likely to improve as a result of the region's continuing expansion of manufacturing capacity and to strengthen in all regions with growing demand for timber.

Exhibit 4: NCREIF Timberland Index Returns, 1987 – 2017



Source: NCREIF.

Though timberland performance has moderated in recent years, the outlook remains positive for disciplined investors. Since inception, NCREIF income return has remained a relatively steady component of total return, and a consistent cash yield is an important characteristic of timberland for many institutional investors. The capital return component of total timberland return has shown greater volatility, initially as a result of market inefficiencies in the emerging asset class and more recently in response to broader economic cycles and investor preferences. Looking ahead, we expect top-performing assets to include income return as a core component of total return, and capital return to be maximized through a long-term management approach and disciplined underwriting and dispositions.

PRINCIPLE 3: Lack of correlation with other asset classes

Over the past several decades, U.S. timberland returns have exhibited a lack of correlation with traditional asset classes.

To improve portfolio efficiency, investors seek asset classes with low and negative correlations to improve diversification and reduce risk. Recent research suggests that private investments in relatively illiquid categories of real assets — timberland, farmland and commercial real estate — have exhibited low or negative correlations to equities and fixed income. (*Private real Assets: improving portfolio diversification with uncorrelated market exposure,* Nuveen, 2018) Indeed, between 1992 and 2017, low correlations between timberland returns and traditional assets classes (ranging from 0.15 to 0.17) suggests that timberland provided efficiency gains for institutional investors **(Exhibit 5)**. However, a closer look reveals that the relationship between returns across asset classes is continuously evolving.

In the last decade, correlations with traditional asset classes dropped even further, ranging from -0.11 to -0.35, suggesting that timberland can potentially deliver even greater efficiency gains in institutional portfolios.

Exhibit 5: Low or negative correlations with traditional asset classes

20-year correlation of timberland and traditional asset classes
(Annual returns, 1987 – 2017)

	U.S. Equities	Non-U.S. Equities	U.S. Fixed Income	Non-U.S. Fixed Income	Timberland
U.S. Equities	1	0.77	-0.07	0.04	0.15
Non-U.S. Equities	0.77	1	-0.3	0.03	0.17
U.S. Fixed Income	-0.07	-0.3	1	0.7	0.17
Non-U.S. Fixed Income	0.04	0.03	0.7	1	0.15
Timberland	0.15	0.17	0.17	0.15	1

10-year correlation of timberland and traditional asset classes
(Annual returns, 2008 – 2017)

	U.S. Equities	Non-U.S. Equities	U.S. Fixed Income	Non-U.S. Fixed Income	Timberland
U.S. Equities	1	0.92	-0.21	0.04	-0.35
Non-U.S. Equities	0.92	1	-0.1	0.24	-0.34
U.S. Fixed Income	-0.21	-0.1	1	0.68	-0.26
Non-U.S. Fixed Income	0.04	0.24	0.68	1	-0.11
Timberland	-0.35	-0.34	-0.26	-0.11	1

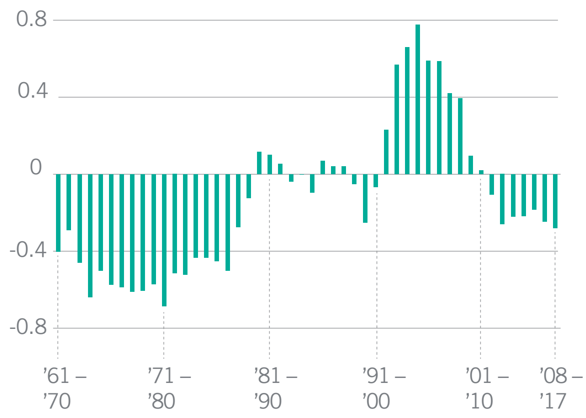
Correlation data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 2008 through 31 Dec 2017. Asset classes represent the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex USA Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; timberland – NCREIF Timberland Index.

> *"The correlation between timberland and traditional asset classes is not consistently positive or negative but depends on the asset class and broader economic conditions."*

The lack of correlation between timberland and U.S. equities in the most recent decade is shown in **Exhibit 6** below based on rolling 10-year correlation coefficients. However, this contrasts with positive correlation between asset classes in the prior decade, 2001 – 2010, and mostly negative correlations in earlier decades. This pattern indicates that the correlation between timberland and traditional asset classes is not consistently positive or negative, but depends on the asset class and broader economic conditions.

Exhibit 6: Low correlations with U.S. equities in the most recent decade

Correlation coefficient between annual timberland and U.S. equities over rolling 10-year periods (1961 – 2017)



Sources: John Hancock Timber Index (1960–1986), NCREIF (1987–2017), GWR research.

PRINCIPLE 4:
A hedge against inflation

Timberland continues to provide investors with a reliable hedge against inflation.

Institutional investors have historically been attracted to timberland as a hedge against inflation (*Do forest assets hedge inflation?,* Washburn and Binkley, 1993) Between 1987 and 2017, the correlation between the U.S. CPI and timberland was positive and exceeded the correlation between inflation and traditional asset classes — a pattern that remained consistent during the past decade, 2008–2017 **(Exhibit 7)**. In contrast, the correlation between U.S. and non-U.S. stocks and inflation has remained strongly negative regardless of time period.

The correlation between timberland return and inflation has remained reliably positive for many decades **(Exhibit 8).** The only exceptions were during periods of rapid price inflation driven by the oil crises of the 1970s and early 1980s. In the absence of another period of double-digit inflation, the data suggest that timberland will continue to provide a powerful hedge against inflation.

Exhibit 7: Timberland's inflation correlation exceeds other asset classes

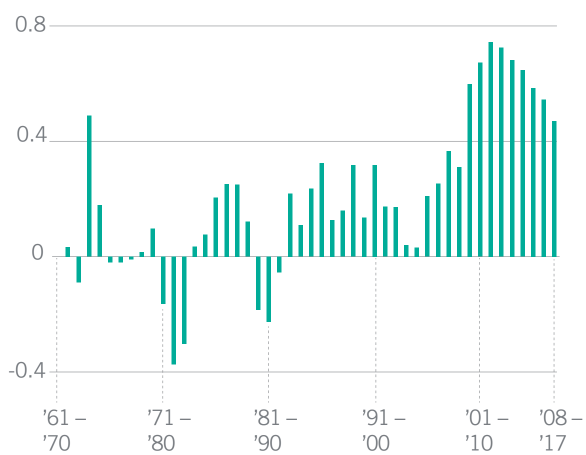
Correlation between inflation, traditional asset classes and timberland returns

	1987 – 2017	2008 – 2017
U.S. stocks	-0.20	-0.61
Non-U.S. stocks	-0.25	-0.67
U.S. bonds	0.40	0.34
Non-U.S. bonds	0.19	0.32
Timberland	0.58	0.45

Source: NCREIF; US Bureau of Labor Statistics, GWR research.

Exhibit 8: Timberland's inflation correlation has remained positive for decades

Correlation between timberland return and U.S. CPI over rolling 10-year periods (1961 – 2017)



Source: NCREIF; US Bureau of Labor Statistics, GWR research..

There is also evidence that timberland investments provide a ***hedge against unexpected inflation.***

There is also evidence that timberland investments provide a hedge against unexpected inflation. This characteristic may be particularly beneficial in the current U.S. macroeconomic environment. The belief that inflation increases as unemployment falls, known as the Phillips curve, has come under scrutiny as the relationship has appeared to weaken in recent years. Even as U.S. unemployment has fallen from 9% in 2009 to 4% in 2018, inflation has remained relatively stable at about 2%. As the jobless rate continues to fall, however, the risk of an unexpected jump in inflation is likely to increase.

Timberland investing in today's markets

The case for investing in timberland remains compelling, but it requires new approaches to address the changing market environment. To justify its role in institutional portfolios, timberland investments must deliver competitive performance and low correlations. Nuveen and GreenWood Resources (GWR) have identified three innovative strategies offering the potential to increase returns:

Global diversification for exposure to faster-growing markets

Structural changes in U.S. timberland markets have increased competition and compressed returns. Despite moderating U.S. returns, timberland exposure continues to offer attractive risk-adjusted U.S. dollar-denominated returns, scale and access to some of the world's largest wood markets. In addition to core market exposure, investors should consider opportunities in fast-growing, emerging market countries to boost returns. GWR's global timberland portfolio optimization modeling results suggest that risk-efficient portfolios should include a substantial allocation to non-U.S. investments. Exposure to non-U.S. timberland investments with uncorrelated returns offers the potential to improve portfolio-level returns, benefiting from expected growth in global wood demand.

Impact investing to maximize timberland's potential environmental benefits

The growth of impact investing and observed lack of correlation between ecosystem service and commercial timber markets directly support investments in conservation impact forestry (CIF). GWR research has found that a combination of conservation easements, carbon offset credits and conservation-focused debt can materially increase timberland returns. These opportunities enhance GWR's commitment to environmental sustainability through rigorous timberland management (*Timberland sustainability report 2018*, Nuveen).

Return enhancers provide potential for higher alpha

In addition to core timberland investment strategies, opportunities for alpha are increasingly important in highly competitive timberland markets.

INCREASE PRODUCTIVITY
with improved plant material and silviculture to boost income.

The income portion of timberland returns from growing and harvesting trees is significant, stable and largely uncorrelated to the returns of other assets. Income has become an increasingly important component of return in developed markets. In emerging markets, productivity gains present an opportunity to increase yields and investor returns.

BUILD SCALE
to maximize operational and market efficiencies.

Capturing efficiencies through the timber value chain, from planting and merchandising to transporting harvested wood, may reduce operating costs and increase revenues. These gains may increase both the income and capital appreciation components of total returns.

UNDERSTAND
the market.

Primary research to inform strategy development and investment management is critical to a fully-developed understanding of timberland markets. In addition to traditional supply, demand and price studies, spatially explicit market analysis, portfolio optimization and and stochastic financial models of risk and return

> *"In addition to core timberland investment strategies,* ***opportunities for alpha*** *are increasingly important in highly competitive timberland markets."*

Conclusion

The case for investing in timberland remains compelling despite the market's evolution:

- Demand for wood and related products is likely to increase with global economic growth, particularly in emerging markets.
- Although returns have moderated in the past 10 years with the slow housing recovery, timberland has continued to outperform U.S. equities on a risk-adjusted basis due to its low volatility.
- The asset class has provided powerful diversification benefits based on consistently low or negative correlations with traditional asset classes.
- Timberland is likely to remain a reliable hedge against inflation.

Nuveen and GreenWood Resources advise clients to employ three key strategies to increase timber returns:

1. Global diversification for exposure to faster-growing markets
2. Impact investing to maximize timberland's potential environmental benefits
3. Return enhancers to provide potential for higher alpha

UNITED STATES
354,600

BRAZIL
229,200

URUGUAY
70,800

COLOMBIA
59,700

POLAND & ROMANIA
25,800

CHILE
5,100

*Acreage managed by GWR.

Nuveen and Greenwood Resources (GWR) are strong partners. Nuveen is the global asset management arm of TIAA, managing more than $900 billion in assets for over 1,500 institutional clients in 34 countries worldwide, across fixed income, equities, alternatives and solutions-based strategies. GreenWood Resources (GWR), Nuveen's timber investment affiliate, is a globally diversified investment and asset management company.

Working as a team, GWR and Nuveen balance industry knowledge with local insights to seek opportunities for investors interested in acquiring timberland. With more than 150 professionals working in field locations across North America, Latin America, Europe and Asia and about 745,000 gross acres under management, GWR has the capabilities to develop unique investment opportunities worldwide.

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