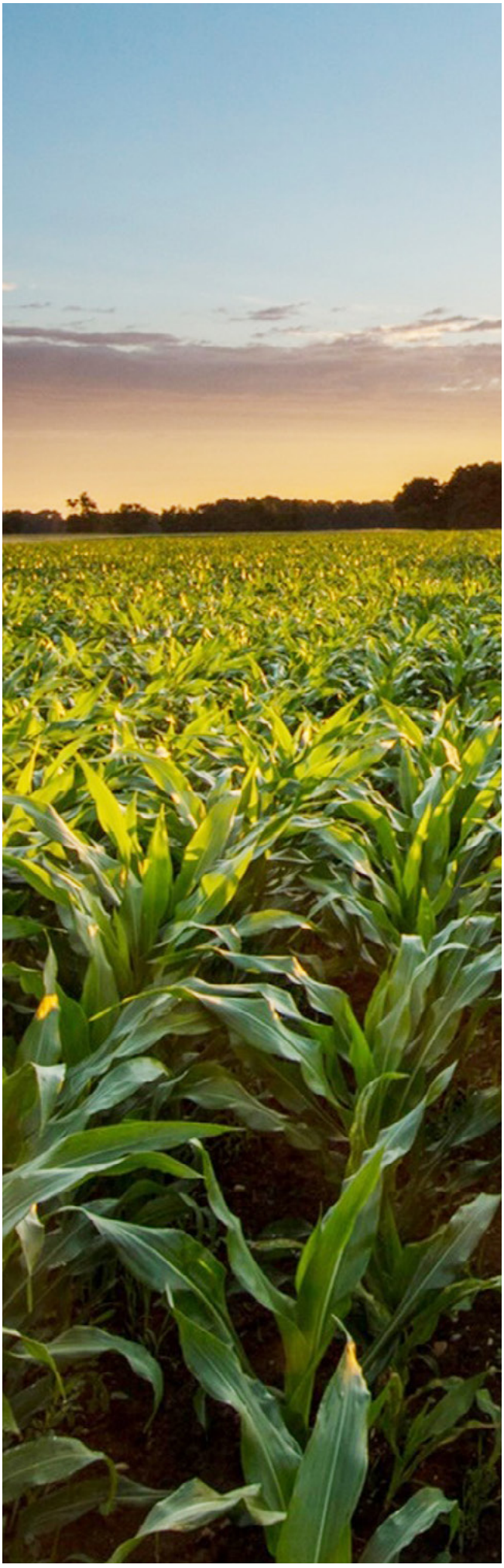

Manulife
Investment Management

Why *invest* in timberland and agriculture

Timberland and farmland are real assets with complementary investment attributes whose performance records indicate that they can contribute to investors' financial goals while addressing our most urgent global challenges.

Interest in natural capital is on the rise, and natural resource asset classes, such as timberland and farmland, have attracted increasing attention from investors over the past three-plus decades. The historical performance record of timberland and farmland investments indicates that they can be incorporated into multi-asset investment strategies to achieve financial goals that include, competitive risk adjusted and stable long-term returns, portfolio diversification, and capital preservation. These investment characteristics are supported by sound market fundamentals driven by increasing demand for basic human needs including shelter, food, feed, fuel, and fiber. Additionally, the inherent characteristics of sustainably managed timberland and farmland can help address the major global challenges of climate change, nature loss, and rising inequality. We believe these characteristics are increasingly assigned tangible value, adding optionality to land management, increasing the investable universe, and accretive to returns.

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Evolution of the investment landscape for timberland and farmland

The steadily expanding participation of institutional investment into the timberland and farmland sectors has fostered the development of deeper, more transparent, and more efficient markets for these real assets.

Prior to the mid-1980s, institutional direct investment in timberland and farmland was extremely limited. Private commercial timberland ownership in the United States and other core-producing regions was dominated by small-scale private holdings and large-scale industrial ownerships by vertically integrated forest product companies, and U.S. farmland ownership was dominated by highly fragmented individual ownership.

Over the subsequent three decades, steadily expanding participation of institutional investment into the timberland and farmland sectors has fostered the development of deeper, more transparent, and more efficient markets for these real assets. A convergence of several factors during the 1970s and 1980s set in motion the shift to institutional ownership of both timberland and farmland. In 1974, the Employee Retirement Income Security Act (ERISA) required pension plans to enhance diversification of assets, which catalyzed institutional investors' interest in alternative investment assets. The deep recession of 1980 through 1982, together with global geopolitical events, such as the U.S. grain embargo against the Soviet Union, resulted in a sharp correction in timberland and farmland values, while higher interest rates led to a surge in farmland foreclosures and the subsequent U.S. farm crisis due to unfavorable loan structures.

The farm crisis essentially made it necessary for insurance companies and lenders to start managing these foreclosed rural properties, beginning significant institutional investment into timberland and farmland in the country. Major U.S. farmland lenders, such as insurance companies and large banks, established asset management arms to manage the large volume of farms acquired through foreclosure. It was this experience of managing farmland portfolios that led to a number of these organization establishing entities for investing in farmland equity on behalf of third-party investors.

In 1986, the Tax Reform Act changed the tax status of income from corporate timberland operations from capital gain status to ordinary income, resulting in forest product firms losing favorable tax treatments for their timberland assets. This change in timber tax treatment stimulated a reassessment of the financial rationale for forest product companies to hold onto their timberlands. Over the course of the 1990s and the first half of the 2000s, these forest product companies' large timberland holdings migrated to institutional investors at an accelerating pace, reinvigorating timberland valuation and bolstering appreciation returns for investors on top of healthy income returns, which enhanced the asset class's attractiveness to investors.

Institutional investors also began to establish positions in farmland in the 1980s. In subsequent decades, institutional farmland investment grew significantly in the 1990s and 2000s, but at a slower pace than timberland, due to the need to overcome investors' lingering concerns about recovery following the farm crisis. An additional hurdle in the formation of institutional positions in farmland was the fragmented nature of the asset class: The relatively smaller size of commercial-scale farmland properties compared with timberland potentially requires more time and resources to assemble large portfolios of farmland properties for institutional investors. On the flip side, this fragmented nature also enables managers to source properties from a more diverse range of sellers.

Desirable investment attributes

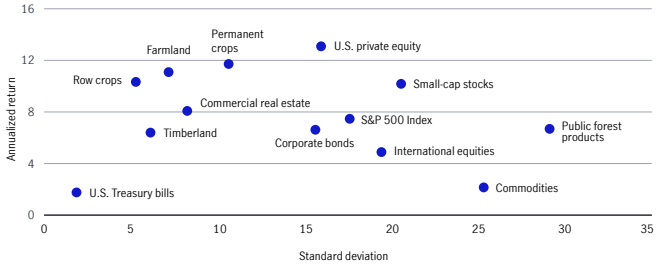
Timberland and farmland investments offer investors a variety of desirable attributes when included in a larger multi-asset portfolio including attractive risk and return characteristics, diversification benefits, and the potential to hedge inflation along with a constructive outlook for the market fundamentals underlying these assets.

Competitive risk-adjusted and stable long-term returns

Timberland and farmland are both land-based real assets that have solid historical track records of generating competitive risk-adjusted returns. Over the past 25 years, timberland and

farmland have delivered returns comparable to public equities with much lower associated volatility. Using Sharpe ratios as a measure of risk-adjusted return, U.S. timberland and farmland outperformed most traditional financial assets, such as public equities, bonds, and commodities, and were comparable in return profile to commercial real estate.

U.S. historical returns and standard deviation, 1999–2023 (% per year)



Source: Data for timberland is from the NCREIF Timberland Index. Data for farmland is from the NCREIF Farmland Index. Data for commercial real estate is from the NCREIF Property Index. Data for international equities is from the MSCI EAFE International Equities Index. Data for small-cap stocks is from the Ibbotson series IA SBBI US Small Stock TR USD. Data for corporate bonds is from the MSCI USD HY Corporate Bond Index. Data for U.S. Treasury bills is from the Ibbotson series IA SBBI US 30 Day Tbill TR USD. Data for the S&P 500 Index is from Macrobond. Data for commodities is from the Goldman Sachs Commodity Index. Data for public forest products is from the S&P Forest Products.

U.S. historical returns, standard deviation, and Sharpe

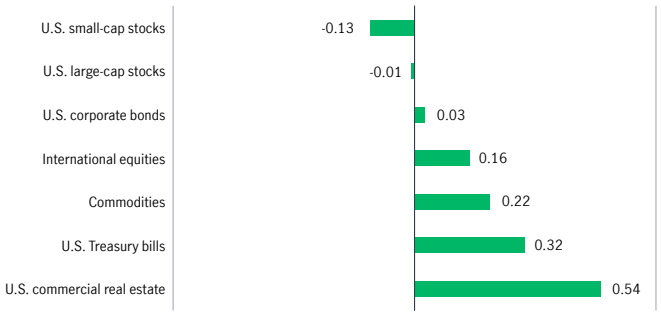
Asset class	Average return (%)	Standard deviation (%)	Sharpe ratio
Farmland	11.09	7.22	1.29
Commercial real estate	8.08	8.30	0.76
Timberland	6.40	6.17	0.75
Small-cap stocks	10.18	20.70	0.41
S&P 500 Index	7.47	17.72	0.32
Corporate bonds	6.62	15.73	0.31
Non-U.S. equities	4.89	19.56	0.16
Commodities	2.15	25.49	0.02
U.S. Treasury bills	1.76	1.88	—

Source: Data for timberland is from the NCREIF Timberland Index. Data for farmland is from the NCREIF Farmland Index. Data for commercial real estate is from the NCREIF Property Index. Data for international equities is from the MSCI EAFE International Equities Index. Data for small-cap stocks is from the Ibbotson series IA SBBI US Small Stock TR USD. Data for corporate bonds is from the MSCI USD HY Corporate Bond Index. Data for U.S. Treasury bills is from the Ibbotson series IA SBBI US 30 Day Tbill TR USD. Data for the S&P 500 Index is from Macrobond. Data for commodities is from the Goldman Sachs Commodity Index. In this historical comparison, the average return of U.S. Treasury bills at 1.76% was used as the risk-free rate to calculate Sharpe ratios.

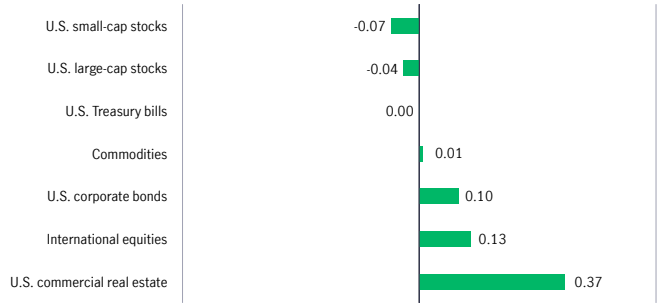
Increased portfolio diversification

Timberland and farmland can play a role in improving the overall performance of a mixed asset portfolio through diversification. Due to the moderate or negative correlation between timberland and farmland returns with traditional financial assets, the addition of timberland and farmland may provide diversification benefits to a multi-asset institutional portfolio.

Return correlation between U.S. timberland and other financial assets, 1999–2023



Return correlation between U.S. farmland and other financial assets, 1999–2023



Source: All data is as of December 31, 2023. Data for U.S. Timberland is from the NCREIF Timberland Property Index. Data for U.S. farmland is from the NCREIF Farmland Property Index. Data for U.S. commercial real estate is from the NCREIF Property Index. Data for U.S. small-cap stocks is from the Ibbotson series IA SBBI U.S. Small Stock TR USD. Data for International equities is from the MSCI/EAFE International Equities Index. Data for U.S. corporate bonds is from the MSCI USD HY Corporate Bond Index. Data for U.S. Treasury bills is from the Ibbotson series IA SBBI U.S. 30 Day Tbill TR USD. Data for U.S. large cap is from the S&P 500 series of Standard & Poor's Financial Services LLC. Data for commodities is from the Goldman Sachs Commodity Index.

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The potential of timberland and farmland to offer inflation protection

Given the positive correlation of their returns with inflation, the inclusion of timberland and farmland in a portfolio can help buffer the negative impacts of inflation. We can summarize the correlation of timberland and farmland returns with U.S. inflation rates over four different periods during 1991 to 2023 to highlight the dynamic relationship between both asset classes and inflation in different macroeconomic environments. The correlation analysis demonstrates the generally positive relationship between timberland and farmland returns and inflation over time. The positive relationship shows the propensity of timberland and farmland returns to increase as inflationary pressure builds, due in part to the use of timberland and farmland products for the basic human needs of shelter, food, feed, fuel, and fiber.

The correlation results for the period after the Global Financial Crisis (GFC) (2009–2015), and the period leading up to and including the global pandemic (2016–2023), illustrate the potential of the asset classes to offer inflation protection in two very different macroeconomic environments. During the period following the GFC, the U.S. economy endured an extended period of moribund economic growth and disinflation, with inflation averaging 1.70%, while timberland and farmland returns rebounded before returning to their historic steady performance leading up to the pandemic. This economic recovery and expansion picked up pace after 2016, leading into the global pandemic in 2020. The combination of demand and supply-side shocks alongside major fiscal and monetary stimulus in the aftermath of the pandemic resulted in the rapid acceleration of inflationary pressure and put the historical inflation protection characteristics of timberland and farmland to the test. As inflation reached a four-decade high in 2022, timberland and farmland returns kept pace with increasing general price levels and provided investors with healthy, positive, inflation-adjusted returns.

Timberland and farmland returns correlation with U.S. inflation rates in different environments

Correlation with U.S. inflation	U.S. inflation (%)	Timberland	Farmland
1991–1999	2.58	0.33	0.20
2000–2008	2.54	0.43	0.28
2009–2015	1.70	-0.64	-0.04
2016– 2023	3.34	0.86	0.72

Source: NCREIF as of Q4 2022, U.S. inflation data is sourced from U.S. Bureau of Labor Statistics, as of November 2023.

Total return investments providing stable current cash yield and long-run appreciation

Cash yield is primarily generated from the sale or lease income of crops and timber and can be augmented by a number of additional income streams for higher value and/or alternate uses. These opportunities may include recreational leases, small-tract land sales, cell phone towers, solar and wind projects, conservation easements, and the sale of wetland mitigation banking credits. Identifying and ultimately realizing the additional values that can be associated with these opportunities through partial land sales of a larger property can generate additional revenue for investors. More recently, the growing recognition of natural climate solutions as an important tool for combating climate change is increasingly appreciated by investors and asset managers as potential carbon values are incorporated into valuation and investment strategies. In addition, timberland and farmland investments have consistently generated positive income returns over the past 25 years that span three economic downturns (2001–2002, 2008–2009, and 2020), providing institutional investors with stable, long-term, cash flows to meet ongoing financial obligations and objectives.

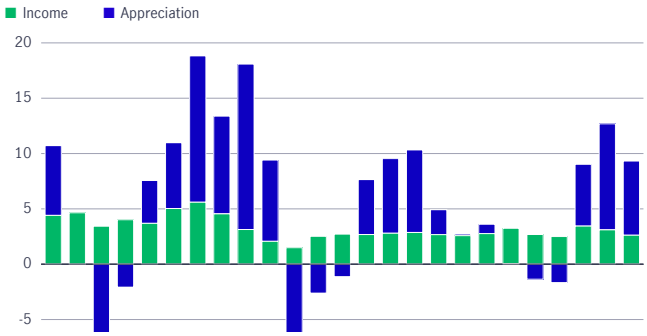
"The growing recognition of natural climate solutions as an important tool for combating climate change is increasingly appreciated by investors and asset managers as potential carbon values are incorporated into valuation and investment strategies."

The other component of timberland and farmland total returns is capital appreciation, which is reflective of gains in land values over the holding period. Rising land values are driven by the increased revenue-producing potential of the underlying land resulting from the application of advances in science and technology, active operational management of the properties, and expanding demand for timber and farm crops from a limited land base. Capital appreciation on a timberland property will also reflect the accumulation of value gained through biological growth and maturation of the trees in a managed forest that result in growth in volume of timber and the shift over time into higher value timber product categories.

Trees develop into higher-value commercial end uses at a young age	**Commercial end use**
Younger, smaller trees	Lower-value end use—Biomass fuel products, pulp, paper/ paperboard, reconstituted wood panels
Larger, more mature trees	Higher-value end use—Utility poles, lumber, plywood, flooring, cabinetry, furniture

Appreciation in farmland values has been particularly resilient. Specifically, during the GFC, while the overall financial market as well as other alternative assets experienced pronounced valuation corrections, farmland generated continued positive capital appreciation. New end-use markets for crops developed over the past three decades, such as corn in ethanol production and expanded soybean trade, have driven up crop prices and therefore the income-generating potential of the underlying assets, leading to higher farmland appreciation. In addition, this appreciation trend has been supported by increasing crop yields – resulting from advancements in science, technology and agronomy - growing global agricultural product demand, and a generally consistently constructive market outlook, preserving investors' investment value. This continued improvement in crop yields isn't only integral to meeting expanding global demand for food, feed, fiber, and fuel but also supports appreciation growth. In 2021 and 2022, both timberland and farmland experienced strong capital appreciation due in part to resilient demand fundamentals and strong prices for forest and agricultural products—as well as increased demand for quality investment-grade land assets—and rising interest in the combination of the environmental and financial benefits offered by investments in natural capital.

U.S. timberland investment income return and capital appreciation, 1999–2023 (%)



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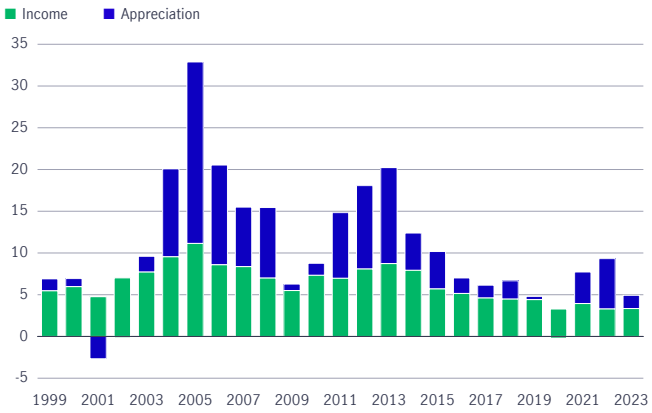
U.S. farmland investment income return and capital appreciation, 1999–2023 (%)



Source: NCREIF, as of December 31, 2023.

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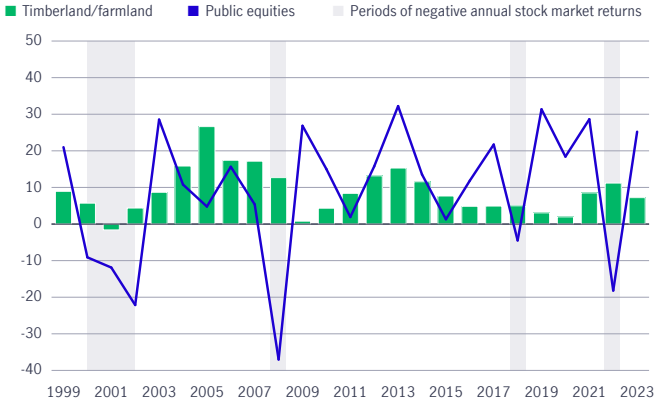
Resilient performance in periods of financial turbulence

Due to the essential nature of the commodities sourced from timberland and farmland, the performance of these asset classes has remained resilient, demonstrating their ability to weather cyclical economic downturns as well as periods of global financial and economic shocks typically associated with pronounced volatility in financial markets. We compared the return performance for combined timberland/farmland investments with equities during periods of major market corrections between 1999 and 2023. Combined in equal proportions, a 50/50 portfolio of timberland and farmland generated positive total return performance in 24 out of the past 25 years, while U.S. public equities, represented by the S&P 500 Index, displayed more marked volatility and multiple instances of negative returns, including the four periods of 2000 through 2002, 2008, 2018, and 2022.

- 2000–2002: The S&P 500 Index declined 43.0% over a three-year period, responding to the collapse of the dot com bubble in 2000 and the 9/11 terrorist attacks in the United States the following year.
- 2008: The GFC triggered a 37.0% drop in the S&P 500 Index.
- 2018: Stocks in the United States experienced a 4.5% downturn, reacting to uncertainty over Brexit and trade disputes between the country and major trading partners.
- 2022: As both inflation and interest rates reached multidecade highs and weighed on economic growth in the aftermath of the pandemic, the S&P 500 Index sustained an 18.2% loss.

Annual returns for the U.S. public equity market and 50/50 combined timberland/farmland, 1999–2023 (%)



Source: Timberland and farmland returns: NCREIF; public equities' returns: S&P 500, Macrobond, as of December 2023. Timberland/farmland is represented by a constructed index of 50% NCREIF U.S. Timberland Property total annual returns and 50% NCREIF U.S. Farmland Property total annual returns.

Meanwhile, a combined portfolio of timberland and farmland performed much better during these challenging periods for the global economic environment. During the 2000 through 2002 period, a combined timberland/farmland investment generated average annual returns of 2.2%, supported by appreciating farmland values, which compared favorably with an average annual loss of 14.4% on the S&P 500 Index.

In 2008, a combined timberland/farmland investment generated a healthy positive return (12.7%) in a year of economic crisis at the outset of the GFC. Key contributors to its strong performance in 2008 were surging agricultural commodity prices driven by increasing international trade in farm products, heightened appreciation of farmland values following the ethanol mandate's positive effects on row crop markets, and an extension of the trend of robust timberland appreciation due to the lingering effect of the U.S. housing market boom in the middle of the decade.

In 2018, the public equity market experienced turmoil in response to the lack of resolution in Brexit negotiations and rising trade tensions between the United States and multiple trading partners. In addition, returns on long-term U.S. government bonds were pushed into negative territory (–0.1%) due to rising uncertainty and increasing interest rates that resulted in a flattened yield curve. Despite headwinds in the wider financial markets, a combined timberland/farmland investment continued to generate positive returns (5.0%) for investors.

> "While public markets collapsed, demand for forest and agricultural products remained resilient."

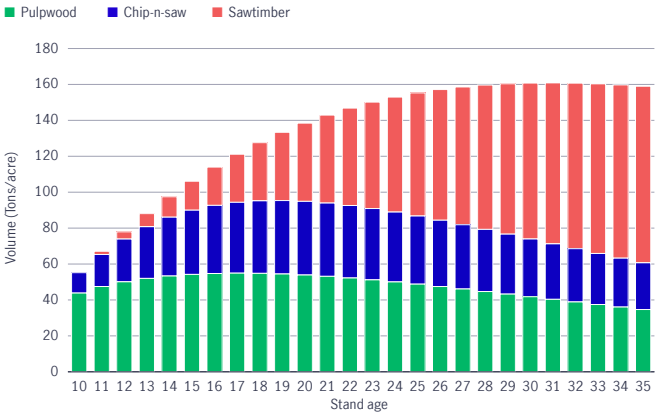
In 2022, as inflation reached a 40-year high of nearly 9%, the U.S. Federal Reserve raised interest rates at the fastest pace in more than 40 years to slow the economy and curb inflation. The uncertainty surrounding the outlook of the global economy coming out of the pandemic and the rising risk of recession with the long and variable lag associated with the central bank interest-rate hikes sent shock waves through the stock market, with the S&P 500 Index shedding nearly $8 trillion in market capitalization. While public markets collapsed, demand for forest and agricultural products remained resilient, supported in part by a robust residential construction sector and altered global trade flows for agriculture products. Additionally, a rising interest in natural capital, including timberland and farmland for their nature-positive benefits, began to create an additional tier of demand for natural resource assets and propelled returns for timberland and farmland investments upward, averaging a total return of 11.3% for investors in 2022.

Timberland and farmland investments have delivered positive returns in the face of a wide range of unanticipated market shocks, demonstrating their ability to help insulate a diversified portfolio from extreme instances of market volatility and bring greater stability and resilience to a portfolio's long-term return profile.

Biological characteristics of timberland and farmland investments

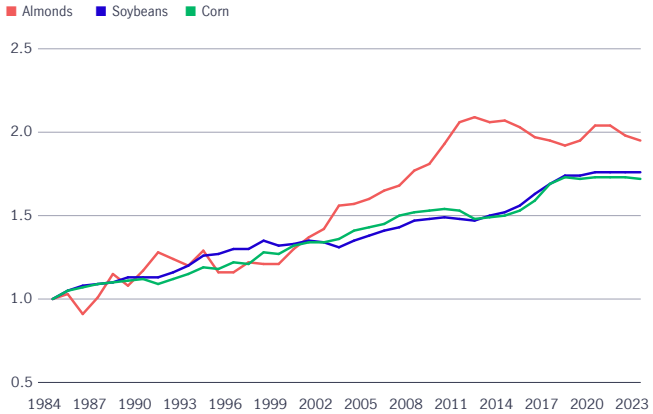
Forestry and agriculture are both land-based asset classes with biological growth potential. Forests are a biological factory of expanding wood volume over time. As trees grow, so too does the value of the underlying asset, with trees developing into higher-value commercial end uses from lower-value premerchantable fiber at young ages, growing into higher-value merchantable logs that can be used to produce structural-grade lumber. This biological growth characteristic occurs naturally and is supportive of timberland investments regardless of economic cycles. Furthermore, advancements in science, including genetics and adaptive species development, coupled with improved silviculture methods, increase the biological value-creation potential for timberland investments alongside enhanced risk management tools.

Biological growth expands timber volume and value over time



Source: Manulife Investment Management Timberland's sample U.S. south timberland property model assumes flat prices of $8/ton for pulpwood, $19/ton for chip-n-saw, and $27/ton for sawtimber.

Crop yield increases over the past four decades
5-year average yield (1984=1)



Source: USDA oil crops and feed grains yearbooks, as of October 2023; USDA tree nuts yearbooks, as of October 2023.

The biological yield of crops represents the cornerstone of value creation for farmland investors. For row crops that are harvested yearly, technological advancements in agronomy, farm operations, and crop management have led to significant growth in farmland productivity. For permanent crops, where improvements in cultivation methods have also led to significant yield increases over time, maturing trees and vines gradually yield higher volumes and improved quality, translating

into increased market value following their preproductive period. This growth in biological yield not only enhances the intrinsic value of the farmland investment but also generates a continuous stream of revenue through harvests. Moreover, sustainable agricultural practices that promote biological growth contribute to soil health and long-term land productivity, ensuring consistent returns over time.

> "Growth in biological yield not only enhances the intrinsic value of the farmland investment but also generates a continuous stream of revenue through harvests."

In essence, biological growth in crops is a dynamic engine of return generation and value preservation, aligning the interests of investors with the natural cycles of agriculture and providing a compelling case for farmland investments.

Aligned with sustainable and responsible investment objectives

In addition to providing competitive risk-adjusted returns and portfolio diversification benefits, the rise in interest and importance of natural capital is illuminating the social and environmental benefits inherent in the sustainable management of timberland and farmland. As these characteristics gain recognition and are assigned value by the investment community, we expect them to become increasingly accretive to returns.

The commercial production of timber and agricultural commodities on sustainably managed properties aligns closely with the United Nation's Sustainable Development Goals (SDGs), particularly the goals of zero hunger, clean water, decent work and economic growth, climate action, and life on land. Timberland and farmland investments are generally located in rural areas, where the commercial operation of forests and farms can deliver rewarding employment opportunities along with significant economic benefits to these more isolated and often less economically resilient communities. Deployment of institutional investment capital can help accelerate the deployment of new science, technology, and management regimes that allows foresters and farmers to achieve higher yields while more efficiently and sustainably using resources, helping to mitigate risks and ensure long-term viability of these natural capital assets. These characteristics allow institutional investment in timberland and farmland properties to deliver financial returns while simultaneously improving environmental and social conditions.

Sustainable Development Goals in focus for timberland and farmland investment management

UN's Sustainable Development Goals	Actions
2. Zero hunger	• Scale allows us to contribute to achieving food security in countries in which we operate and beyond • Deploy and promote sustainable agriculture practices • Maintain and enhance agricultural productivity
6. Clean water	• Use water efficiently to grow healthy crops • Seek out new practices to reduce water usage throughout our operations • Use ground storage to capture rain and floodwaters
8. Decent work and economic growth	• Natural resource investments provide social benefits both locally and globally • Create jobs in rural communities • Promote safe and healthy working and living environments
13. Climate action	• Create carbon sequestration opportunities • Invest in renewables and energy efficiency • Support scientific studies and policy analysis on global change
15. Life on land	• Protect sensitive lands and biodiversity • Third-party certification of timberland and farmland we manage • Conservation easements

Source: United Nations, Department of Economic and Social Affairs, Manulife Investment Management.

Contribute positively to climate change mitigation and adaptation

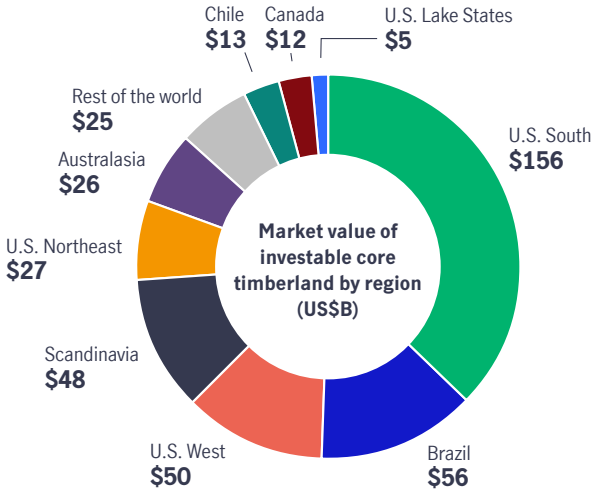
Responsible and sustainable timberland and farmland management is expected to have an increasingly prominent role in mitigating and adapting to climate change. Forests and farmland are capable of capturing and sequestering significant amounts of CO_2 in trees and soils. In the case of timberland, market structures and certification programs are already in place (and rapidly developing) for the sale and trading of forest carbon credits that recognize forests' ability to capture and store CO_2. While the development of markets for soil carbon on farmland is more nascent, farmlands that are sustainably managed also have the potential to help combat climate change through the ability to maintain and enhance the carbon content of the soil with operational regimes such as no-till farming, the use of cover crops, and the incorporation of bio-char as a soil conditioner.

How an integrated timberland and farmland investment strategy expands the investable universe

Combining timberland and farmland in a multi-asset portfolio allows for expansion of the investable universe along with the potential benefits of economies of scale in overlapping regions and exposure to varied geographic and end-use markets

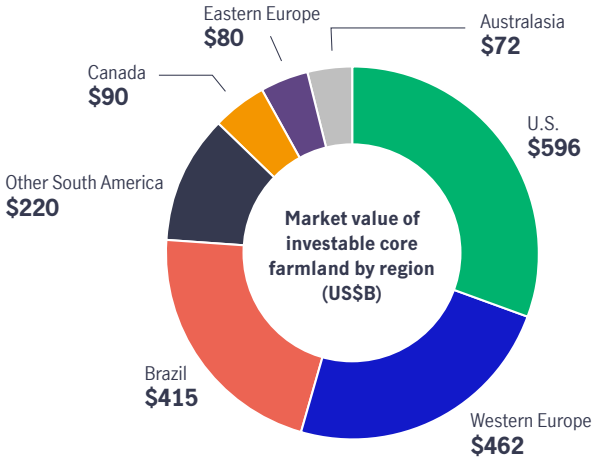
Building a globally diversified portfolio of timberland and farmland assets requires an understanding of the total scope of the investable universe available to institutional investors. Constructing an inventory of the global investable timberland and farmland universe provides a map of the geographic distribution of properties and values, as well as an indicator of the direction of future investment activity. This analysis focuses on core investment geographies, concentrating on ownership categories and forest and crop types that present the greatest opportunities for large-scale investments suitable for institutional ownership and large-scale forest and farm management. The current estimated values of this universe of investable timberland and farmland are US$417 billion and US$1,462 billion, respectively. Combining timberland and farmland in a multi-asset portfolio allows for expansion of the investable universe along with the potential benefits of economies of scale in overlapping regions and exposure to varied geographic and end-use markets.

Market value of investable core timberland by region (US$B)



Source: Manulife Investment Management research, as of September 2022. Rest of Europe includes the Baltics, England, Ireland, and Poland; South America includes Brazil, Chile, and Uruguay; Scandinavia includes Finland, Sweden, and Norway; U.S. West includes U.S. West Coast, West Inland, and California; U.S. North includes U.S. Northeast and U.S. Lake States.

Market value of investable core farmland by region (US$B)



Source: Manulife Investment Management Research, as of March 2021, Australasia includes Australia, New Zealand; other South America includes Argentina, Chile, and Uruguay; Western Europe includes Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, and the United Kingdom; Eastern Europe includes Bulgaria, Czech Republic, Poland, and Romania. The United States: Agriculture Census 2017, USDA Land Values 2020, NCREIF 2020; Canada: Agriculture Census 2016, 2018 Statistics Canada; Australia: ABARES, Manulife Investment Management 2018; Western and Eastern Europe: Agriculture Census 2017, Eurostat 2019; Brazil: Agriculture Census 2017, Secretary of Agriculture and Supply 2020, Argentina Agriculture Census 2018, Savills Global Farmland Index; Uruguay: Agriculture Statistics 2020; New Zealand: Agriculture Census 2017, Reinz January 2021, Stats NZ 2017; Chile: Annual Statistics 2019/2020, GPS Property 2019, Manulife Investment Management2020, ODEPA 2019/2020

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Regional considerations for timberland and farmland investments

Institutional investment in timberland and farmland is heavily concentrated in the United States, but sizable investments have been made in Australia, New Zealand, South America, Europe, and Southeast Asia. The U.S. market for timberland, farmland, and other real assets is the deepest and most active market worldwide, providing the most consistent historical tracking and reporting of investment trends and performance for these asset classes.

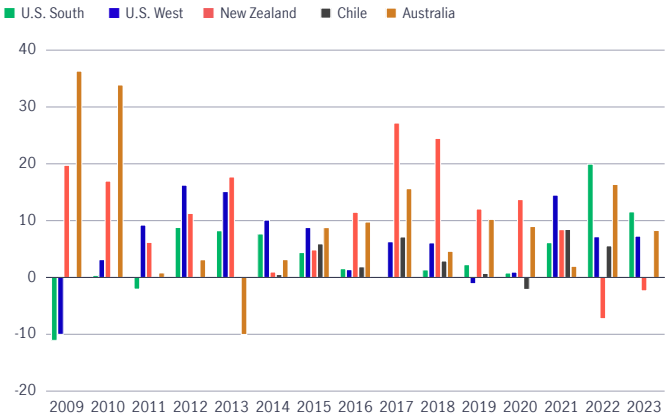
> "The U.S. market for timberland, farmland, and other real assets is the deepest and most active market worldwide."

Since 1982, the National Council of Real Estate Investment Fiduciaries (NCREIF) has maintained and tracked real asset indexes, beginning with real estate and subsequently adding timberland and farmland, providing the most consistent historical performance record for each respective class. (Indexes similar to NCREIF's tracking of timberland and farmland investment performance and property values outside of the U.S. aren't currently available.) Institutional investors of U.S. timberland and farmland who participate in NCREIF indexes owned approximately US$27 billion of prime U.S. timberland and US$16 billion of U.S. farmland real estate as of August 2023.

Diverse product types, geographic regions, and end-product markets create value for investors

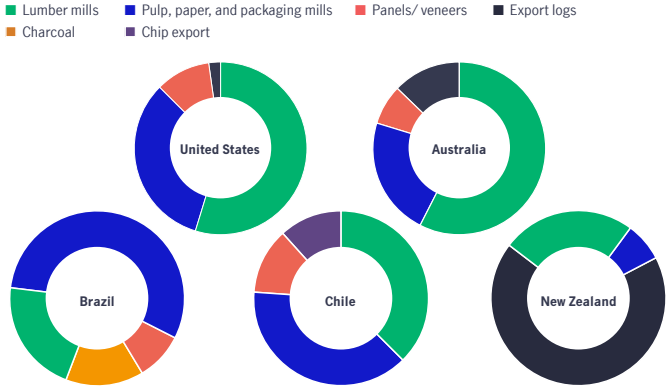
The global footprint of the investable universe for timberland and farmland provides opportunities to diversify investments. Diversification is paramount in timberland investments, encompassing geography, timber species, and end-product markets to mitigate risks and maximize returns. Geographical diversification across regions such as the United States (and within the U.S.), Australia, Brazil, and New Zealand safeguards against regional economic downturns, product market risk for predominate species, climatic events, or policy changes affecting a single area, and this protection is demonstrated by the lack of correlation between regional returns. Moreover, the strategic selection of diverse timber species ensures adaptability to changing market demands and minimizes susceptibility to diseases or pests affecting a specific species. Finally, a well-balanced allocation across end-product markets, including lumber, pulp, wood products, and exports, offers optionality for landowners and hedges against fluctuations in market demand and supports the resilience of timberland investments.

Timberland investment returns by region, internal net of fees, 2009–2023 (%)



Source: Manulife Investment Management Research, as of 2023. U.S. dollar calendar year total returns. U.S. returns: NCREIF All Managers Total Returns; Australia and New Zealand returns: Manulife Investment Management timberland investments.

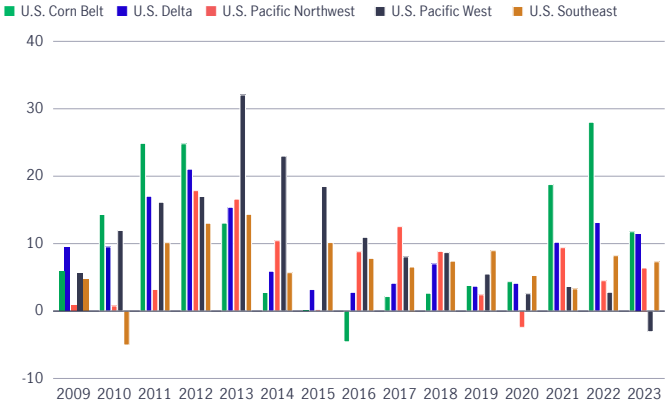
Sources of timber product demand by region



Source: New Zealand: NZ MPI December 2021; Brazil: Poyry 2018; Chile: INFOR 2020; United States: RISI 2021; Australia ABARES 2019/2020. Most current available data is shown.

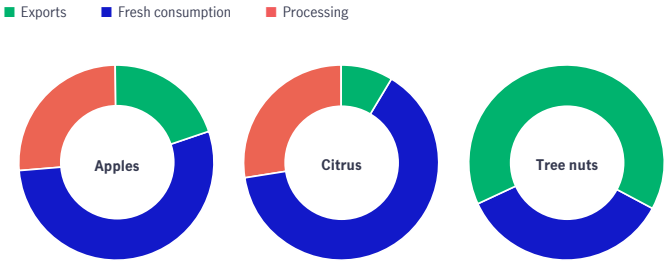
Diversification also plays a pivotal role in agricultural investments, spanning geography, crop types, and end-product markets. When we compare the varied returns by farmland investment regions over the last 24 years, a strategic mix of crop types, including row crops such as corn and soybeans, which in the United States are typically managed through lease agreements with operating tenants, provide investors with stable cash flows and potential for appreciation. In contrast, permanent crops, such as tree nuts and fruit, are typically directly operated on the Manulife Investment Management platform and offer an opportunity to tap into consumers' dietary evolution and capture upside potential as global incomes rise. A good balance between row crops and permanent crops minimizes exposure to the volatility of any single commodity market. This balance allows both exposure to stable demand for basic needs for food and feed through row crops, and evolving dietary habits with increased volume and quality of caloric intakethrough permanent crops including fruits and tree nuts. Finally, diversifying into various end-product markets ranging from exports to domestic consumption to feed markets and fresh products provides resilience in the face of shifting consumer preferences and market dynamics.

Farmland investment returns by region, NCREIF before fee, 2009–2023 (%)



Source: U.S. returns: NCREIF All Managers Total Returns. Most current data is shown. No investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. Past performance does not guarantee future results. U.S. dollar calendar year total returns.

Sources of demand for select U.S. crops



Source: USDA Production, Supply and Distribution and U.S. Apple Association, as of November 30, 2023. Citrus includes oranges, lemons, limes, grapefruits, and tangerines. Tree nuts include pistachios, almonds, and walnuts.

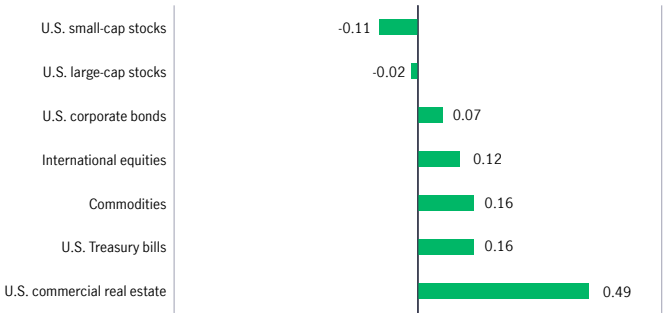
The role of timberland and farmland in mixed asset institutional portfolios

Timberland and farmland can enhance the resilience of a typical institutional portfolio based on their low to negative correlation with the returns of other financial assets and allow for the expansion of the efficient frontier, as determined by traditional mean-variance portfolio optimization

Following the 2008 GFC, the relatively underwhelming performance of traditional financial assets motivated institutional investors to focus their attention on alternative investments, including timberland and farmland. The average historical returns

for both timberland and farmland have proven to be relatively stable, ranging from mid-single-digit to mid-teens.2 Moreover, timberland and farmland can add to the resilience of a typical institutional portfolio based on the low to negative correlation of their returns with other financial assets. These factors allow for the expansion of the risk-efficient frontier as determined by traditional mean-variance portfolio optimization when timberland and farmland are added to an institutional portfolio.

Correlation between combined timberland/farmland portfolio returns and equity and bond returns, 1999–2023

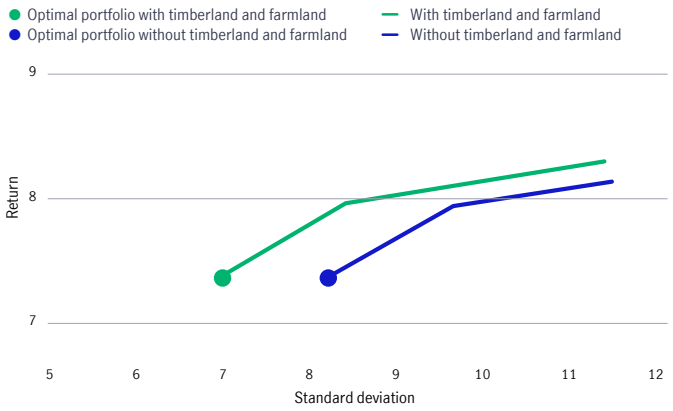


Source: All data is as of December 31, 2023. Data for U.S. timberland refers to the NCREIF Timberland Property Index. Data for U.S. farmland refers to the NCREIF Farmland Property Index. Data for U.S. commercial real estate refers to the NCREIF Property Index. Data for U.S. small-cap stocks refers to the Ibbotson series IA SBBI U.S. Small Stock TR USD. Data for international equities refers to the MSCI/EAFE International Equities Index. Data for U.S. corporate bonds refers to the MSCI USD HY Corporate Bond Index. Data for U.S. Treasury bills refers to the Ibbotson series IA SBBI U.S. 30 Day Tbill TR USD. The U.S. large cap refers to the S&P 500 series of Standard & Poor's Financial Services LLC. Data for Commodities refers to the Goldman Sachs Commodity Index.

To illustrate the low to negative correlation of timberland and farmland returns to those of other financial assets, a pro forma U.S. timberland/farmland portfolio was constructed by mixing timberland and farmland in equal proportions, which was compared with other, more traditional, U.S. and international financial assets. The combined timberland/farmland portfolio returns' correlation to U.S. stock and bond returns, as well as to those of international equities, ranges between –0.28 and 0.15. This low or negative correlation to equity and bond markets can therefore decrease the systematic risk of a portfolio compared against one without such an addition.

In order to demonstrate the potential impact of adding a combined timberland and farmland vehicle to mixed asset portfolios, we constructed a hypothetical mixed asset portfolio with a composition similar to one held by a typical U.S. institutional investor. The asset allocations of multiple public pension funds were analyzed to create a model portfolio with an asset allocation reflective of the current market environment, setting minimum lower bounds and maximum upper bounds for portfolio weights in major asset classes. The expected return and standard deviation of each asset class were informed by third-party research provided by investment banks and asset allocation strategy firms. An efficient frontier was generated for this portfolio without an allocation to U.S. timberland and farmland investments, followed by a second efficient frontier allowing for an allocation of up to 7% in a 50/50 timberland and farmland investment.

Comparison of efficient frontiers and optimal portfolios with and without U.S. timberland/farmland (%)



Source: Manulife Investment Management research, NCREIF, S&P, Macrobond, MSCI, as of December 31, 2023. Average return and standard deviation of asset classes and their correlations are calculated using historical annual return data from 2001 to 2022.

We can demonstrate that the optimal portfolio, including timberland and farmland investments, had a return of 7.4% and a standard deviation of 7.0%, while the optimal portfolio without timberland and farmland investments had a slightly lower return of 7.3% and a higher standard deviation of 8.1%. Comparing risk-adjusted return performance, as measured by Sharpe ratios, the optimal portfolios with and without timberland and farmland investments generated Sharpe ratios of 0.81 and 0.69, respectively, with a much stronger risk-adjusted return for the portfolio, including timberland and farmland—a difference of 28% in risk efficiency.

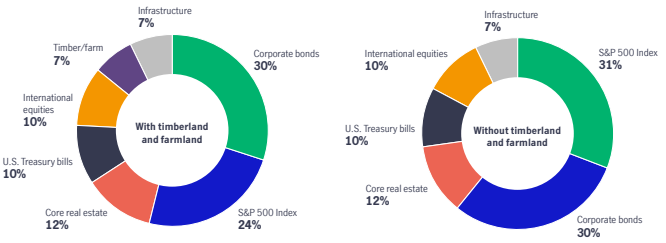
Optimal portfolios under scenarios with and without U.S. timberland/farmland

Optimal portfolios	Annual return (%)	Standard deviation (%)	Sharpe ratio
With timberland/ farmland	7.4	7.0	0.81
Without timberland/ farmland	7.3	8.1	0.69

Source: Manulife Investment Management research, NCREIF, S&P, Macrobond, MSCI, as of December 31, 2022. Average return and standard deviation of asset classes and their correlations are calculated using historical annual return data from 2001 to 2022.The Sharpe ratio assumes a risk-free rate of 1.75%.

The augmented risk-efficient frontier resulting from the addition of timberland and farmland therefore provides a strong argument for its consideration within a well-diversified portfolio.

Optimal portfolios with and without timberland and farmland allocation



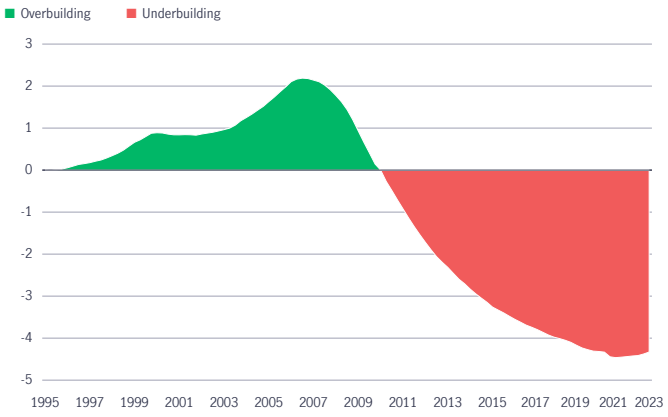
Source: Manulife Investment Management research, NCREIF, S&P, Macrobond, MSCI, as of December 31, 2022. Average return and standard deviation of asset classes and their correlations are calculated using historical annual return data from 2001 to 2022.

Solid forward-looking demand fundamentals

The rationale for investing in timberland and farmland is further supported by the strong underlying market fundamentals and expectations for continued growth in demand for timber and agricultural commodities. The outputs from timberlands and farmlands directly address basic human needs for food, shelter, fiber, and energy, and these needs, and the demand for timber. and agricultural products that help meet them, continue to rise alongside a rising population and growth in per capita income.

Going forward, markets for timber products and agricultural commodities are likely to evolve as the composition of demand and sources of supply change. Timber demand is expected to continue to be supported by the growing need for shelter (housing market fundamentals) and, increasingly, by the environmental benefits offered by timberland and associated forest products. The U.S. housing market is underbuilt by an estimated four to six million units, as the residential construction sector was decimated during the GFC and many would-be homebuyers were forced to delay purchasing their first home due to the weak economic environment. This resulted in pent-up demand, and combined with robust current demographics, underpins a positive outlook for housing demand growth. The U.S. housing market isn't only underbuilt but old, and its aging existing housing stock is supportive of continued growth in repair and remodeling activities that should drive additional consumption of timber. Additionally, timber demand is expected to be bolstered by rising demand for products produced with renewable resources. These include paper packaging as a substitute for single-use plastics; tissue, as continued economic development and income growth support increased use of hygiene products that are largely wood-fiber based; and new products such as mass timber panels that allow wood products to more directly compete with higher greenhouse gas-emitting concrete and steel in multistory construction.

U.S. housing starts relative to underlying housing demand, 1995–2022 (million units)



Source: Forest Economic Advisors, as of November 2023. Major agricultural crops included in this chart are corn, soybeans, and wheat.

1 United Nations Food and Agriculture Organization, Supply Utilization Accounts, as of November 30, 2023. **2** Historical average returns are nominal and U.S. dollar based.

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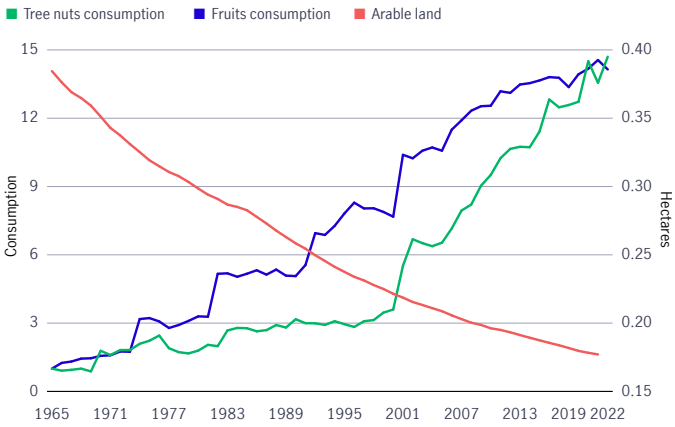
Meanwhile, demand for farm products continues to grow with overall population and per capita income levels. People with rising incomes are increasing their caloric intake and moving toward more sophisticated diet patterns, which is a positive for higher-value crops as well as crops used for animal feed. Global caloric intake has continued to increase steadily over the last decade, rising at an average annual rate of 1.5% and generating increased demand for agricultural products used for food and feed.1 This growth in demand is juxtaposed with a long-term decline in the availability of arable land and is expected to continue to exert upward pressure on demand and valuations for farmland.

Successful investments in timberland and farmland reflect and leverage key trends shaping future markets for timber and agricultural commodities, focusing on specific products that have the most compelling demand potential and identifying the most cost-competitive producing regions for those products in global markets.

> "Global caloric intake has continued to increase steadily over the last decade, rising at an average annual rate of 1.5% and generating increased demand for agricultural products used for food and feed."

Increasing food consumption trend coupled with secular decline in arable land



Source: United Nations and USDA Production Supply and Distribution, as of September 2023.

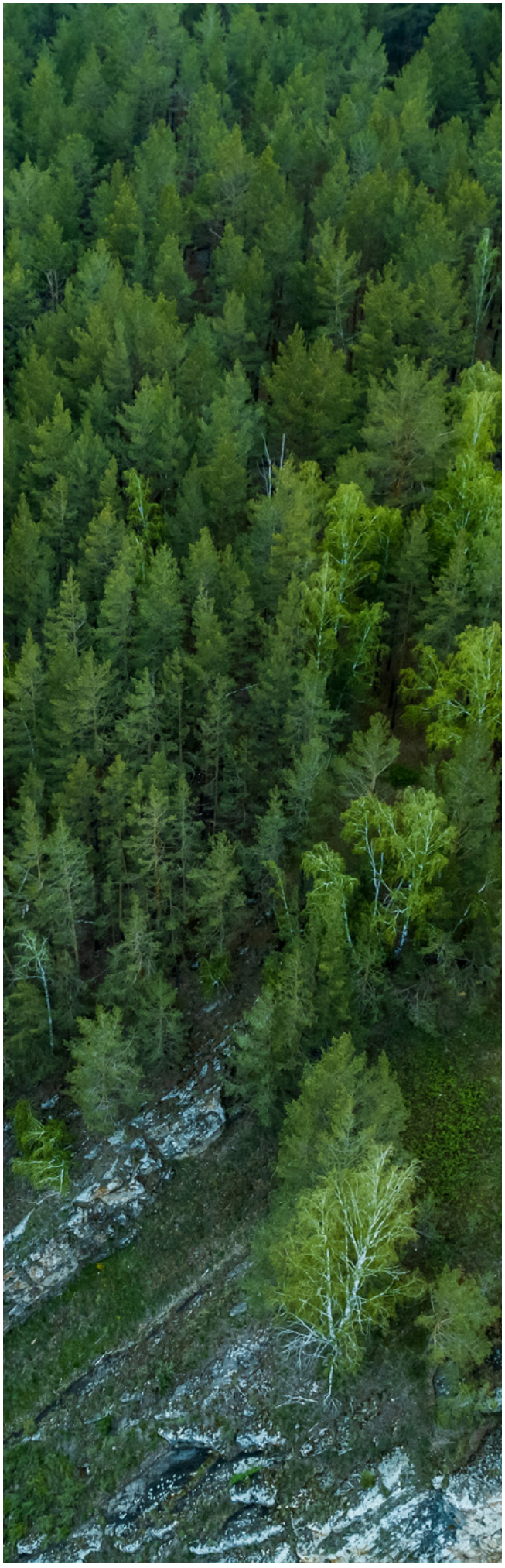
Forward-looking prospects for timberland and farmland investments

Timberland's and farmland's potential to play a significant role in mitigating and adapting to climate change augments their ability to deliver competitive risk-adjusted returns

Looking forward, continued expansion of institutional investment into timberland and farmland will be supported by a few key developing trends in the investment landscape. First, the risk/return characteristics of timberland and farmland are expected to attract continued interest from the investment community as it seeks real assets that can deliver competitive risk-adjusted returns. The long-term nature of timberland and farmland investments, coupled with the fundamental demand for agricultural commodities and timber products, aligns well with many institutional investors' risk profiles, especially given their historical performance that highlights the capability of both asset classes to weather periods of economic, social, and political changes and deliver long-term stable returns.

In addition, institutional investors increasingly ask how their investment portfolios can provide a positive impact beyond financial returns by directly contributing to goals that seek to combat climate change, avoid nature loss, and address rising inequality, leading to increased focus and interest in nature-positive investing. The sustainable management of farmland and timberland is well aligned with these impact-related objectives, and individual properties and portfolios can be objectively tracked and measured for their contribution to a number of SDGs, specifically focusing on zero hunger, clean water and sanitation, decent work and economic growth, climate action, and life on land.

Both timberland and farmland have the potential to play significant roles in mitigating and adapting to climate change. Timberland and farmland can actively remove CO_2 from the atmosphere in various forms. Sustainably managed timberlands can sequester carbon in the standing forest and soils and store sequestered carbon in wood products for extended periods of time. Farmland can also be managed to maintain and boost the concentration of sequestered carbon in soil with efficient and sustainable practices, including no-till farming. The application of technological and genetic advances and changes in planted crops, along with evolving cultivation and silvicultural practices and operational advances, will allow timberland and farmland operations to adapt to changing climate conditions, more efficiently use energy and other resources, reduce production-related greenhouse gas emissions, and offset potential negative impacts and risks associated with climate change on crop and forest productivity.



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