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NATURAL CAPITAL

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How do rising interest rates affect natural capital investments?

A look at historical performance and rate-sensitive market segments

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INTRODUCTION

To address persistent U.S. inflation, the Federal Reserve initiated a series of rate hikes in March 2022. By May 2023, the key short-term interest rate had increased by 5.0%, reaching its highest level in 16 years. Recognizing that the impact of higher interest rates on portfolios will vary by sector and investment characteristics, many investors are wondering what the current rate environment means for their natural capital portfolios.

Conventional beliefs related to real estate investments are that rising rates tend to be associated with rising cap rates. And as cap rates rise, if rate increases are not offset by rent growth or other factors, there may be downward pressure on valuations and returns. However, for timberland and farmland investments, where valuations are in large part driven by unique supply-demand dynamics and end use markets, the response to rising rates may not be the same as for real estate.

Here we examine the impacts of a rising interest rate environment on natural capital investments: U.S. timberland and U.S. farmland. We begin with a review of past performance through periods of rising rates as proxied by the market yield on 10 Year U.S. Treasury Securities. Next, we dive deeper into the individual asset classes to examine the mechanisms through which higher interest rates are translated most immediately and directly to rate-sensitive market segments. For U.S. timberland, the impact of higher rates is felt most acutely via exposure to the housing sector. And for U.S. farmland, as the cost of capital rises, farms carrying debt are most impacted by changes in interest rates. Finally, we conclude with a summary of what this means for natural capital investors.

OPINION PIECE. PLEASE SEE IMPORTANT DISCLOSURES IN THE ENDNOTES.

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DATA

Historical interest rate and return data for private equity U.S. timberland and farmland investments are the primary inputs to the analysis. For comparison, we also consider U.S. stock and bond benchmark indexes. As a proxy for interest rates, we use the 10 Year Treasury rate, which is the yield received for investing in a U.S. government issued treasury security with a 10-year maturity.[1] These yield data are at the longer end of the yield curve and are a commonly used reference for interest rates.

Private equity timberland and farmland return data are from the National Council of Real Estate Investment Fiduciaries (NCREIF) Timberland and Farmland Indexes. Both indexes report a quarterly time series composite return of institutionally managed properties in the U.S. private market for investment purposes only. Private timberland and farmland data are available starting in 1987 and 1991, respectively. The NCREIF Timberland Index represents a market value of about $25 billion and the NCREIF Farmland Index represents a market value of about $16 billion (both as of 4Q 2022).

Additionally, a second source of historical return data is used for farmland: the U.S. Ag 32 State Index, produced by the TIAA Center for Farmland Research at the University of Illinois, which goes back to 1970. These annual return data provide insight into the relationship between interest rates and farmland investments before 1991, prior to the inception of the NCREIF Farmland Index. The USDA-based performance record is a representative measure of diversified farmland returns of the top 32 states as ranked by agricultural activity and converted into an aggregate return series.

Figure 1: Summary of variables

Variable	Description	Time period	Source
Interest rate	Market yield on U.S. Treasury Securities at 10 Year Constant Maturity	1970–2022	Board of Governors of the Federal Reserve System
Timberland	NCREIF U.S. Timberland Index Return	1987–2022	NCREIF
Farmland	NCREIF U.S. Farmland Index Return	1991–2022	NCREIF
U.S. Ag 32	U.S. Ag 32 State Return	1970–2022	TIAA Center for Farmland Research at the University of Illinois
Stocks	Russell 3000 Index	1979–2022	Bloomberg
Bonds	Bloomberg Barclays U.S. Aggregate Index	1977–2022	Bloomberg

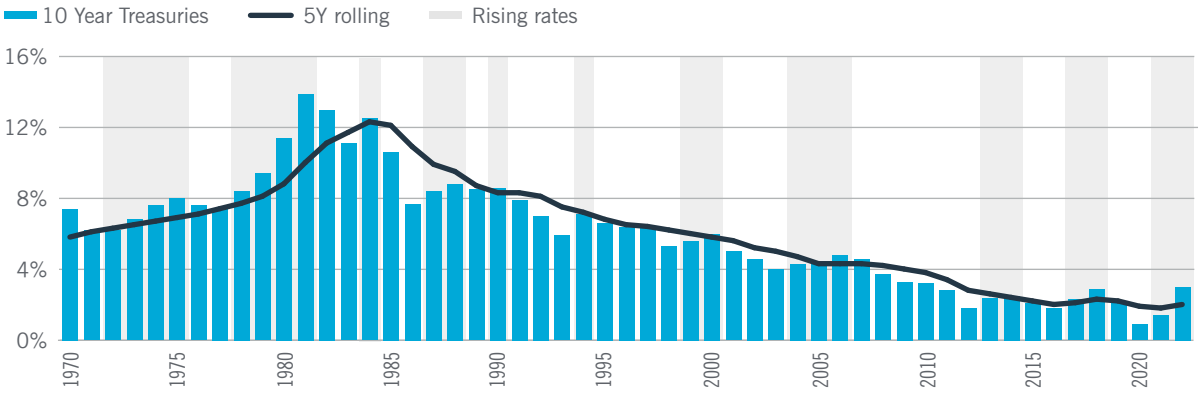
Note: Performance data for all variables are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec for the time periods specified above.

ANALYSIS I: NATURAL CAPITAL PERFORMANCE IN RISING RATE ENVIRONMENTS

Looking back at the past five decades of data, we observe the yield on 10 Year Treasuries peaked in the early 1980s and has gradually trended down since then (Figure 2). Over this span, we identify eleven periods of increasing rates, each lasting

Figure 2. Average rates have gradually trended down since the 1980s

Annual and 5-year rolling average rates, 1970–2022



Source: Board of Governors of the Federal Reserve System; NNC Research.

between 2 and 5 years. The most recent period of rate increases saw Treasury yields rise by 2.1% — from 0.9% in 2020 to 3.0% in 2022 — making it the second biggest increase over the past five decades.

Comparing these eleven periods of rate increases to timberland and farmland performance over the same periods provides historical perspective on the relationship between the two. First, however, we must emphasize that there are many factors influencing timberland and farmland performance and that the rate environment is just one of many. That said, we find timberland and farmland performance consistently increased in years when rates were rising (Figures 3 and 4).

Figure 3. Natural capital performance consistently up in rising rate environments

Cumulative change in interest rates and performance for natural capital through periods of rising rates

	Cumulative rate change	Timberland	Farmland	U.S. Ag 32
1972–1975	+1.8%	N/A	N/A	+
1978–1981	+6.5%	N/A	N/A	+
1984	+1.4%	N/A	N/A	+
1987–1988	+1.2%	N/A	N/A	+
1990	+0.1%	N/A	N/A	+
1994	+1.2%	+	+	+
1999–2000	+0.8%	+	+	+
2004–2006	+0.8%	+	+	+
2013–2014	+0.7%	+	+	+
2017–2018	+1.1%	+	+	+
2021–2022	+2.1%	+	+	+

Source: Board of Governors of the Federal Reserve System; TIAA Center for Farmland Research at the University of Illinois; NNC Research.

Note: For the periods specified above, "+" / "-" reflect a cumulative positive/negative return.

Natural capital spreads to interest rates

A positive relationship between rising interest rates and natural capital performance provides evidence of timberland and farmland's resiliency to rate increases and associated contractionary economic environments. However, it is possible that natural capital returns could be rising but still fall below 10 Year Treasury yields or be rising but not keep pace with rate increases. To address this possibility, we extend the analysis by calculating the spread between farmland and timberland returns and interest rates over time and through the eleven periods of rising rates. For comparison, we also calculate the spread between 10 Year Treasuries and U.S. stock and bond index returns.

We find that on average, timberland and farmland have maintained a positive spread to yields on 10 Year Treasuries (Figure 5). Further, we observe average spread increasing through periods of rising rates. For timberland, between 1991 and 2022, the average spread to yields on 10 Year Treasuries is 5.2% overall and 6.5% including only periods of rising rates. Similarly, for farmland, the average spread is 6.7% overall and 9.7% in periods of rising rates. We see a similar pattern for U.S. Ag 32 as the measure of farmland return.

Like natural capital, on average, U.S. stocks and bonds have maintained a positive spread to yields on 10 Year Treasuries. But in contrast to natural capital, the spread has tended to shrink in periods of rising rates. Through the most recent rate hike (2021–2022), average spreads for both stocks and bonds were even negative.

ANALYSIS II: RATE-SENSITIVE MARKET SEGMENTS

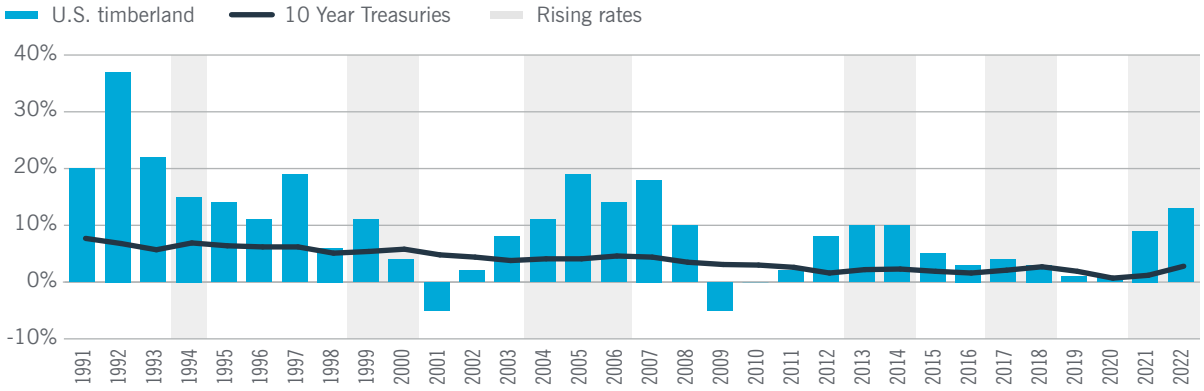
Timberland: U.S. housing market

The residential construction sector is a major source of demand for timber in the U.S. but also highly sensitive to changes in interest rates. Together, new home starts and repair and remodel (R&R) activity account for over two-thirds of all wood products consumption in the U.S. (FEA, 2023). Rising interest rates effectively increase the cost to finance home purchases and have a dampening effect on both new home starts and R&R activity.

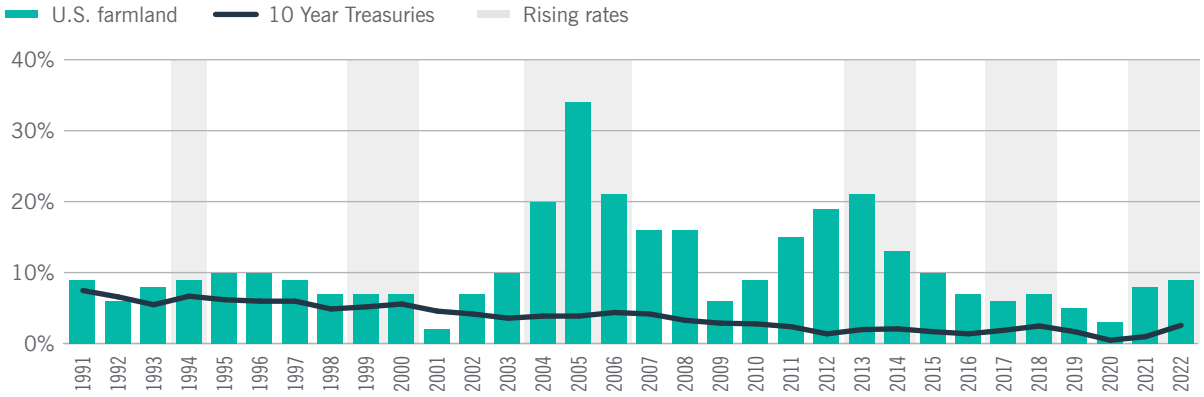
The Fed's first interest rate hike in the current series (of ten totaling 500 bps as of May 2023), signaled an inflection point in new home starts. After reaching 1.8 million SAAR in the spring of 2022, their highest level since the GFC (Global Financial Crisis), new home starts began to slide

Figure 4: Timberland and farmland performance through changing rates

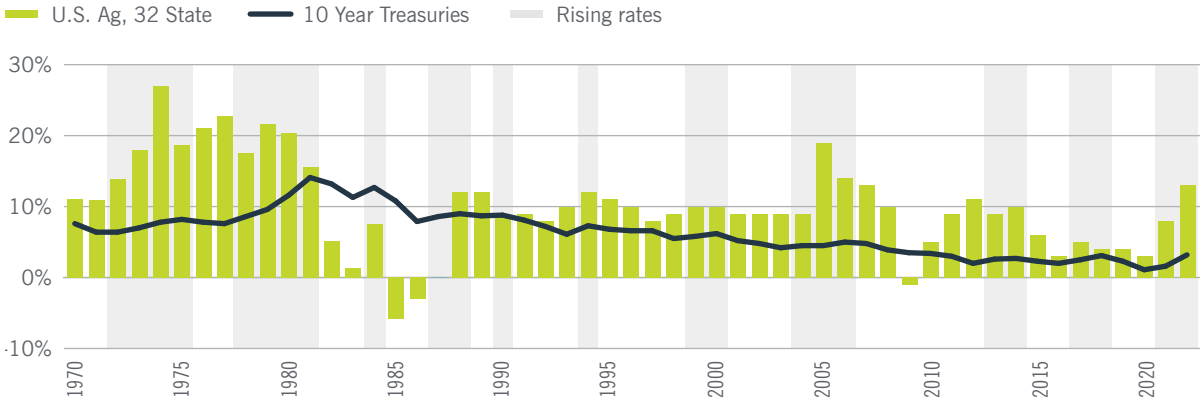
4a. Average annual returns and rates, 1991–2022



4b. Average annual returns and rates, 1991–2022



4c. Average annual returns and rates, 1970–2022



Source: Board of Governors of the Federal Reserve System; TIAA Center for Farmland Research at the University of Illinois; NCREIF; NNC Research.

as mortgage rates rose. The 30-year fixed rate mortgage went from 3.5% at the start of 2022 to nearly 7% by October. At the same time, new home starts slid from spring highs of 1.8 million down to the 1.4–1.5 million range. As rate hikes have slowed in recent months, the latest housing data (as of April 2023) suggests starts are holding steady within this long-term average range.

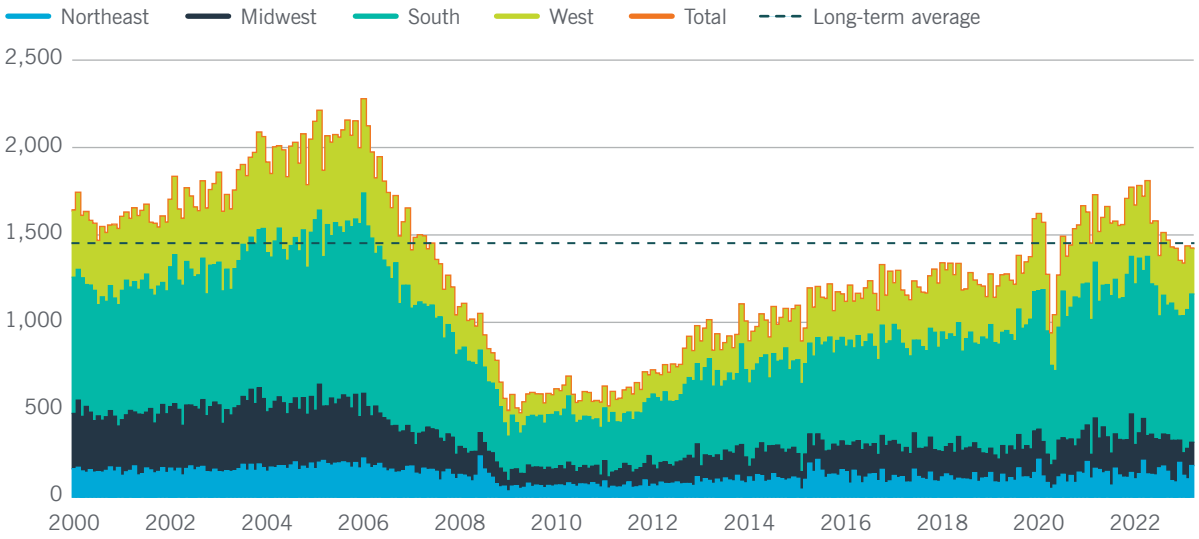
Figure 5. Consistently positive spreads to interest rates, increasing in periods of rising rates

Average spread between natural capital, stock and bond returns compared to yields on 10 Year Treasuries

	Timberland	Farmland	U.S. Ag 32	U.S. stocks	U.S. bonds
Avg. Spread 1970–2022	N/A	N/A	4.0%	5.8%	0.8%
Avg. Spread 1991–2022	5.2%	6.7%	4.6%	7.5%	1.0%
Avg. Spread in periods of rising rates 1991–2022	6.5%	9.7%	6.4%	5.5%	-2.9%
Avg. Spread in period of rising rates 2021–2022	8.8%	6.5%	8.2%	-0.4%	-9.5%

Source: Board of Governors of the Federal Reserve System; TIAA Center for Farmland Research at the University of Illinois; NCREIF; NNC Research. Note: The cost of obtaining timberland and farmland returns may be greater than the cost of obtaining Treasuries, making the absolute spread smaller than indicated.

Figure 6. U.S. housing starts by region, January 2000–March 2023 (million units SAAR)



Source: U.S. Census Bureau

Though mortgage rates remain at their highest level in over two decades, the resilience in housing starts reflects the fundamental strength in the market. In particular, underbuilding in the decade plus following the global financial crisis (2007–2019) contributed to housing shortages in many areas. According to FEA and Freddie Mac, the U.S. housing stock is underbuilt by about 3.8 to 4 million units relative to underlying demand.

Higher rates have had mixed effects on R&R activity. For existing homeowners seeking more indoor and outdoor living space, built-up equity and sub-four percent mortgage rates have made it more economic to renovate than re-finance a new home purchase at current, higher rates. At the same time, fewer existing home sales can also mean less R&R activity as transactions often trigger home buyers to undertake renovations.

As interest and mortgage rates moderate, affordability issues will lessen in many markets but may persist in others. There is some evidence that an absence of productivity growth in the construction sector may be contributing to high construction costs as well as the slow pace of building relative to demographic demand.[2] The underlying drivers of affordability issues are multifaceted, and we leave this topic for future NNC research.

Farmland: Exposure to debt markets

Farmers and farm businesses often employ debt for capital investments and operating lines of credit to help pay for expenses incurred at the beginning of the growing season. These facilities give agricultural producers the capital needed to finance land, equipment, or crop related expenses. Although rising interest rates are not generally associated with declining farmland returns (see above), at the farm-level, rising rates make the cost of borrowing higher, potentially constraining liquidity and the ability to reinvest in the enterprise. Rising rates have implications for both the cost of working capital and the farm balance sheet.

Operating leverage and margins

Any increase in the cost of production—whether it be fuel, fertilizer or seed—will have a negative effect on a farm's profitability, all else equal. The same applies to interest charged on an operating loan to finance inputs to production. As interest expense increases, the net margin on every unit of production decreases. Interest rates on operating loans can be floating or fixed and the loan is repaid within a year, usually after crops are sold. Whether interest on an operating loan is fixed or variable, it has the potential to fluctuate one year to the next or within the growing season along with other input costs, as represented by Tenth District Federal Reserve rates in Figure 7 below. Nevertheless, interest rates on operating loans have gradually trended down since the late 1980s, following other benchmarks like 10 Year Treasuries. Even with the recent rise in operating loan rates, up from 4.5% in 1Q21 to 7.5% in 1Q23, rates remain relatively low compared to the long-term average. Further, rising commodity prices between 2021 and 2022 have helped offset the impact of rising rates, evidenced by spot corn prices increasing 14.4% over calendar year 2022.

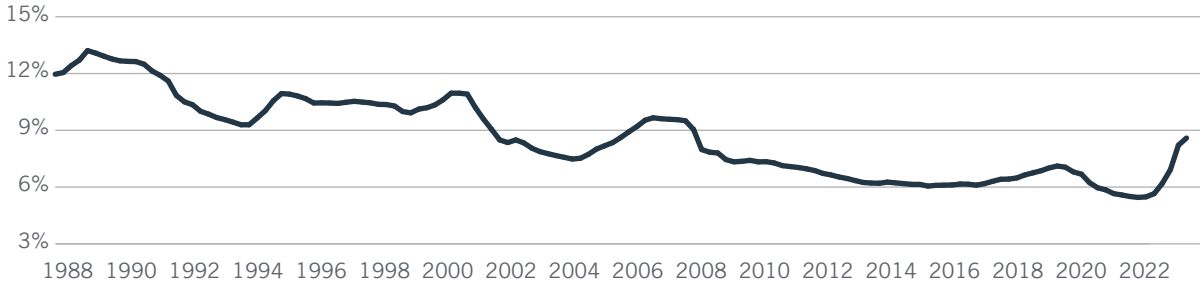
Farmer debt-to-equity[3]

From a balance sheet perspective, rising interest rates make asset purchases using medium- and long-term debt more costly. However, interest rate hikes to combat inflation are usually in response to high prices for commodities like natural gas, wheat, or steel. Since farmers produce agricultural commodities, they stand to benefit during inflationary periods, especially if inputs were purchased prior to an increase in output prices. When this occurs, farmers are able to pay down debt and increase equity in their business. Additionally, if land is on their balance sheet, it will likely increase in value if the profitability of crops grown on that land increases, giving them more equity and collateral to finance large purchases and invest in their business.

Farm enterprises are unique in that they maintain low debt-to-equity ratios. This could be explained in part by many farms being family businesses where assets are built upon and passed down from one generation to the next. While some type of debt financing is present in most farm businesses, farmers are conservative when it comes to leverage, and this has helped to cushion the industry from asset bubbles and subsequent deflation. Despite swings in interest rates, farmer debt-to-equity has remained relatively stable since the late 1980s, averaging 15.7% between 1990 and 2023 according to the USDA.

Figure 7. Operating loan interest rates have gradually trended down since the late 1980s

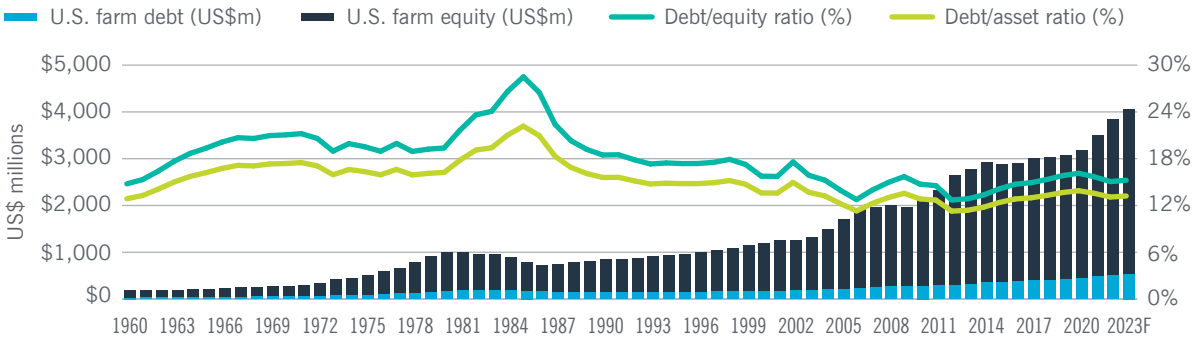
Quarterly fixed interest rates: operating loans (Tenth District), 1988–2023



Source: Federal Reserve Bank of Kansas City

Figure 8. Farmer debt-to-equity has remained relatively stable since the late 1980s

Farm sector balance sheet, 1960–2023F



Source: USDA Economic Research Service

CONCLUDING REMARKS: WHAT DOES THIS MEAN FOR NATURAL CAPITAL INVESTORS?

Our analysis provides evidence of timberland and farmland's resiliency through rising interest rate environments. We find that over the past several decades, on average, U.S. timberland and farmland have maintained consistently positive performance through every period of increasing interest rates. And not only that, but the average spread between yields on 10 Year Treasuries compared to timberland and farmland returns actually increased through periods of rising rates. This strength is in stark contrast to stock and bond performance through these same periods, which show average spreads falling and even turning negative in higher rate environments. Because other asset classes may be negatively impacted by rising interest rates, allocations to timberland and farmland provide portfolio diversification benefits.

There are however rate-sensitive segments within timberland and farmland where the contractionary effects of rising rates are felt. In timberland, residential construction activity is sensitive to rising interest rates and as home financing costs increase, both new home starts and R&R activity tends to slow. But after more than a decade of underbuilding relative to demand and demographic tailwinds, current housing market fundaments support continued resiliency in the sector even in the face of rising rates.

For farmland investments, rising rates have increased the cost capital for seasonal operational expenses as well for longer-term debt for asset purchases. However, we expect impacts of rising rates to be limited for two reasons. First, generally low debt-to-equity ratios among farmers limit the impact of rising rates on farmers' balance sheets. And second, increasing commodity prices, which have in part contributed to inflationary environment the Fed is confronting, lift income and total return and have more than offset increases in borrowing costs.

At the June 2023 meeting of the Federal Reserve Open Market Committee, for the first time in a year, interest rates were not pushed higher. However, this "pause" came with signals that more interest rate hikes may be needed later this year to address continued inflationary pressures. If rates do go higher, our findings suggest timberland and farmland investors are well positioned.

For more information, please visit our website, nuveen.com/naturalcapital.

Endnotes

1 Board of Governors of the Federal Reserve System (US), Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity, Quoted on an Investment Basis [DGS10], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DGS10, May 15, 2023.

2 See for example Goolsbee and Syverson, 2023 (https://www.nber.org/papers/w30845). Modular mass timber construction may offer some relief to productivity challenges in the construction sector, and climate benefits in addition (https://www.nuveen.com/global/insights/alternatives/mass-timber).

3 Debt-to-equity ratios for 2022 and 2023 are forecasts.

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A word on risk

As an asset class, agricultural investments are less developed, more illiquid, and less transparent compared to traditional asset classes. Agricultural investments will be subject to risks generally associated with the ownership of real estate-related assets, including changes in economic conditions, environmental risks, the cost of and ability to obtain insurance, and risks related to leasing of properties.

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