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2026 REPORTS

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Farmland Returns vs. Risk

By Matt Erickson and Matt Woolf, Ph.D.

IN THIS ISSUE

- How income and appreciation determine Midwest cropland values
- Which farmland markets are better positioned in a higher-for-longer rate environment, and why
- How assessing a property's future income by utilizing a discounted cash flow approach helps California farmland investors justify a listing price.

The Rural Economist brings forward the trends that will impact agricultural investments tomorrow.

The theme of this issue of "The Rural Economist" is farmland returns. When purchasing cropland, it helps to know what kind of risk you are taking on and whether the investment will depend primarily on income to service debt or on future appreciation to justify the price paid. The first section focuses on the Midwest and Plains. It can help farmland investors whether they are seeking higher-return, more cycle-sensitive exposure or more stable returns over time with less downside risk. The second section focuses on California, where farmland values continue to fluctuate with ever-growing uncertainty around farm income and water, especially for permanent plantings, which require a large upfront investment. In times of such uncertainty, evaluating the income a property can reliably generate is an important exercise.

REPORT SNAPSHOT

Situation: Demand for cropland remains resilient in the Midwest and Plains. As investors and producers reassess their portfolios post-pandemic, a central question emerges: Over the long run, how do income support, appreciation and volatility shape inflation-adjusted cropland returns? Meanwhile, farmland values in California are seeing extended volatility and softening. Purchasing land in this environment requires an approach that will tie land values to a property's ability to generate income.

Finding: Our Midwest and Plains analysis shows markets with stronger real income support tend to navigate down-cycles and tighter credit more smoothly, while appreciation-dependent regions are more sensitive when margins weaken. In California, by using a discounted cash flow approach, buyers can understand the return assumptions required to justify the list prices in their area — an especially useful tool when there's market uncertainty.

How Midwest Cropland Earns Its Return

By Matt Erickson

INCOME, APPRECIATION AND CYCLE RISK

Over the past few years, the Midwest agricultural economy has transitioned from a period of rapid post-pandemic appreciation to a more moderate growth pattern for cropland values. Despite weaker crop prices, demand for cropland remains resilient, supported by scarce, high-quality acreage; persistent global food demand; renewable energy investment; commercial development; and cropland's notable role as a long-term hedge to inflation.

As producers and investors reassess their portfolios now that the pandemic's effects have faded, a central question emerges: Over the long run, how do differences in income support, appreciation and volatility shape inflation-adjusted cropland returns across the Midwest and Plains?

My research finds three observations of the economics of cropland across the Midwest and Plains:

- Cropland returns follow the agricultural cycle, with income moving first and land values adjusting later.

- Markets with stronger real income support tend to navigate down-cycles and tighter credit more smoothly, while appreciation-dependent regions face greater sensitivity when margins weaken.
- Volatility reflects exposure to agricultural cycles, not just average returns.

CURRENT RETURNS TO U.S. CROPLAND

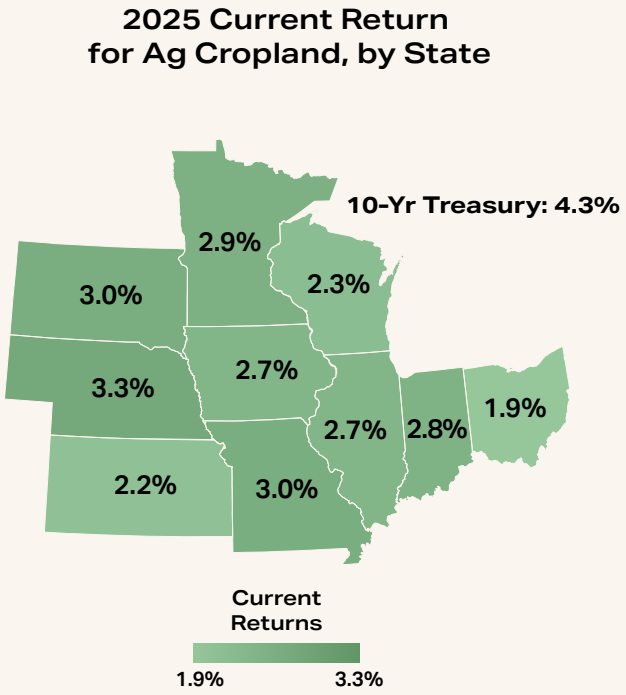
From an economic standpoint, cropland investors receive two sources that equate to their return on investment: 1) the net cash return and 2) the price appreciation measured in real terms.

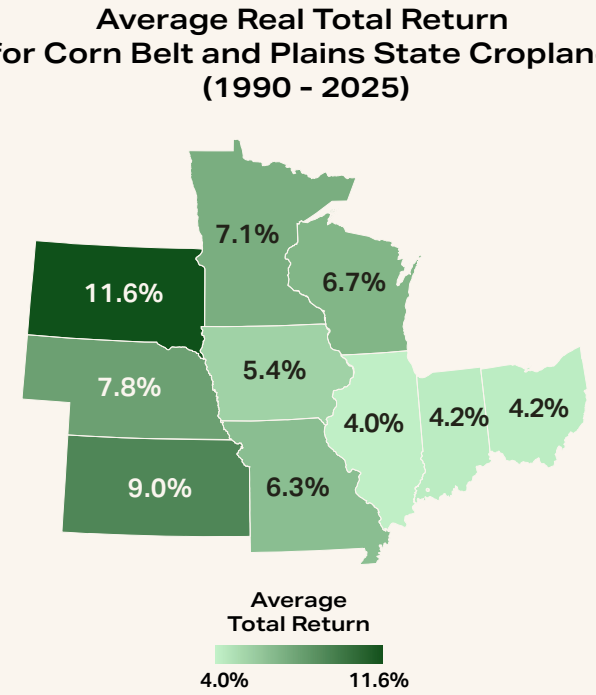
Current returns to agricultural cropland in 2025 vary widely across the country but generally fall between 1.9% and 3.3% across the Midwest, reflecting strong underlying land values and moderating cash rents. These returns remain below alternative safe-asset benchmarks, including a 4.3% 10-year Treasury, suggesting cropland continues to be priced at a premium relative to its current income yield.

For producers, these return levels signal a market still supported by long-term confidence in cropland as an investment but also constrained by weaker commodity price trends and cautious rent growth. Many operators continue to face compressed margins, and rental negotiations have leaned toward stability rather than sharp increases, particularly in the corn belt. Looking ahead to 2027, if crop prices remain under pressure, rents may adjust slowly downward, providing some cost relief for tenants.

From 1990 to 2025, cropland delivered strong nominal performance across much of the Midwest and Plains.

Cropland Returns by State: Current Income and Long-Term Performance





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Sources: USDA, BLS, Federal Reserve Board, Terrain

Additionally, if interest rates ease, farmland values may stabilize or strengthen, which would support balance sheets. Overall, the 2027 outlook points to steady but subdued cropland returns, with profitability hinging more on operational efficiency and market conditions than on significant appreciation in land income.

LONG-TERM RETURNS ON INVESTMENT: MIDWEST AND PLAINS CROPLAND

From 1990 to 2025, cropland delivered strong nominal performance across much of the Midwest and Plains, with average annual total returns ranging from about 9% to 17% by state. South Dakota led with an average nominal total return of 17.3%, followed by Kansas at 14.6% and Nebraska at 13.4%. Eastern corn belt states Indiana (9.7%), Ohio (9.6%) and Illinois (9.5%) clustered at the lower end of the range.

Real total returns compress meaningfully, falling into a tighter range of approximately 4% to 12%. The highest real returns were still led by South Dakota (11.6%) and Kansas (9%), with Iowa (5.4%), Indiana and Ohio (near 4.2%), and Illinois (4%) trailing behind.

The consistent gap between nominal and real performance — approximately 5.5 percentage points per year — underscores that a substantial portion of long-run nominal land returns reflected inflation flowing through rents, revenue expectations and land values rather than outright real wealth creation.

RETURN COMPOSITION MATTERS

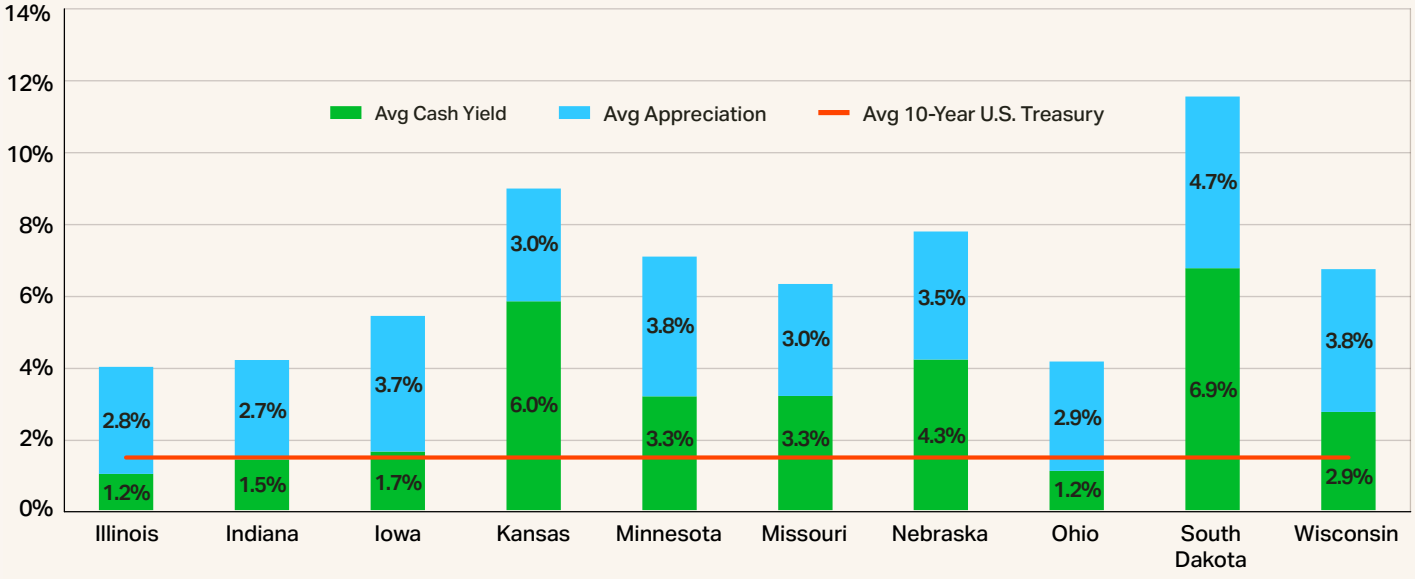
The return composition further clarifies why land markets behave so differently across regions.

The Plains and western corn belt feature a return profile that is more income-driven even after inflation, with wider distributions, reflecting variability that shows up primarily through operating results versus sharp value swings. From 1990-2025, South Dakota generated a real cash yield of 6.9%, accounting for nearly 60% of its 11.6% real total return, while Kansas posted a 6% real cash yield, supporting a 9% real total return.

In the box and whisker chart showing the distribution and volatility of cropland returns,

Income Drives Cropland Returns for Plains, Western Corn Belt

Average Inflation-Adjusted Total Return for Cropland, by State (1990-2025)



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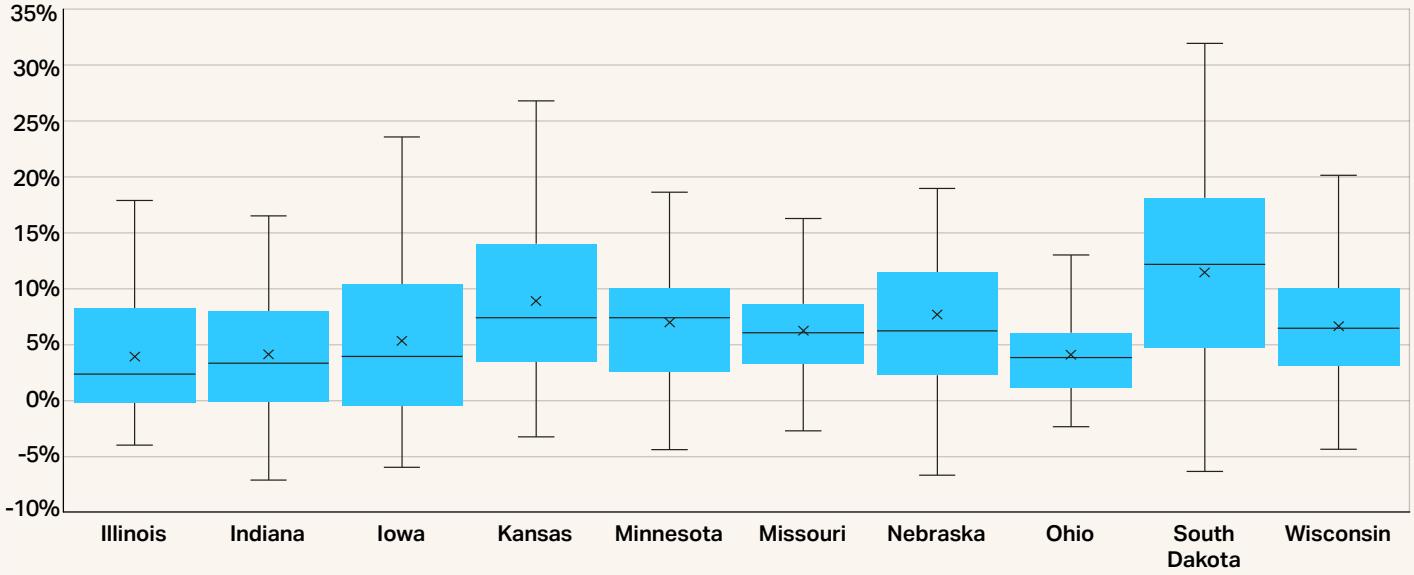
Sources: USDA, Federal Reserve Board, BLS, Terrain

Plains States Show High Variability in Returns

Real Cropland Returns: Distribution and Volatility Since 1990



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Sources: USDA, BLS, Terrain

these states exhibit higher medians and broader ranges. This is consistent with markets where strong carry supports returns over the long run but introduces greater year-to-year dispersion tied to income and production conditions. Nebraska shares several of these characteristics, with a 4.3% real cash yield and 7.8% real total return, though its wider whiskers and larger spread underscore materially higher variability.

By contrast, eastern corn belt states show tighter distributions around lower medians, reflecting substantial compression in real cash yields, often averaging 1% to 2%, leaving performance more dependent on appreciation.

Illinois, for example, generated a 1.2% real cash yield, with 2.8% real appreciation accounting for most of its 4% real total return. Meanwhile, Iowa's 5.4% real return was driven largely by 3.7% real appreciation. These markets function more like longer-duration assets, where outcomes are increasingly sensitive to valuation assumptions, buyer liquidity and interest rate dynamics.

Volatility reinforces the structural differences between states and helps explain why cropland outcomes can feel different depending on location.

Volatility reinforces the structural differences between states and helps explain why cropland outcomes can feel different depending on location. States such as South Dakota (8.9% real volatility), Nebraska (8.7%), Iowa (7.5%) and Kansas (7.2%) show wider boxes and long whiskers, reflecting greater exposure to production variability, income swings and land price cycles.

Nebraska illustrates this tradeoff clearly: While real returns averaged 7.8% over the time series, outcomes varied widely from year to year, increasing sensitivity to timing and leverage. In contrast, Missouri (4.2% real volatility) and Ohio (4.1%) display tighter distributions with fewer extreme outcomes. Missouri, in particular, paired a 6.3% real total return

with comparatively low variability, making it one of the most stable long-run investments in the group.

From a market perspective, appreciation-heavy regions tend to experience more intermittent price discovery, particularly around rate inflection points. Income-oriented markets tend to work through good and bad years by adjusting rents and cash flow, rather than experiencing sudden, sharp swings in land prices when conditions change.

For producers and investors, the box and whisker chart makes clear that land decisions are not about chasing the highest average return but understanding how a market can behave over the long run and even during weaker years.

Return structure and downside behavior over the long run are what ultimately determine resilience when conditions tighten.

The chart shows that some states have higher typical returns but much wider ranges and deeper downside tails, meaning returns can swing sharply when margins tighten or interest rates rise. Other states show tighter groupings and shallower downside, indicating more consistent performance and fewer extreme outcomes when conditions change.

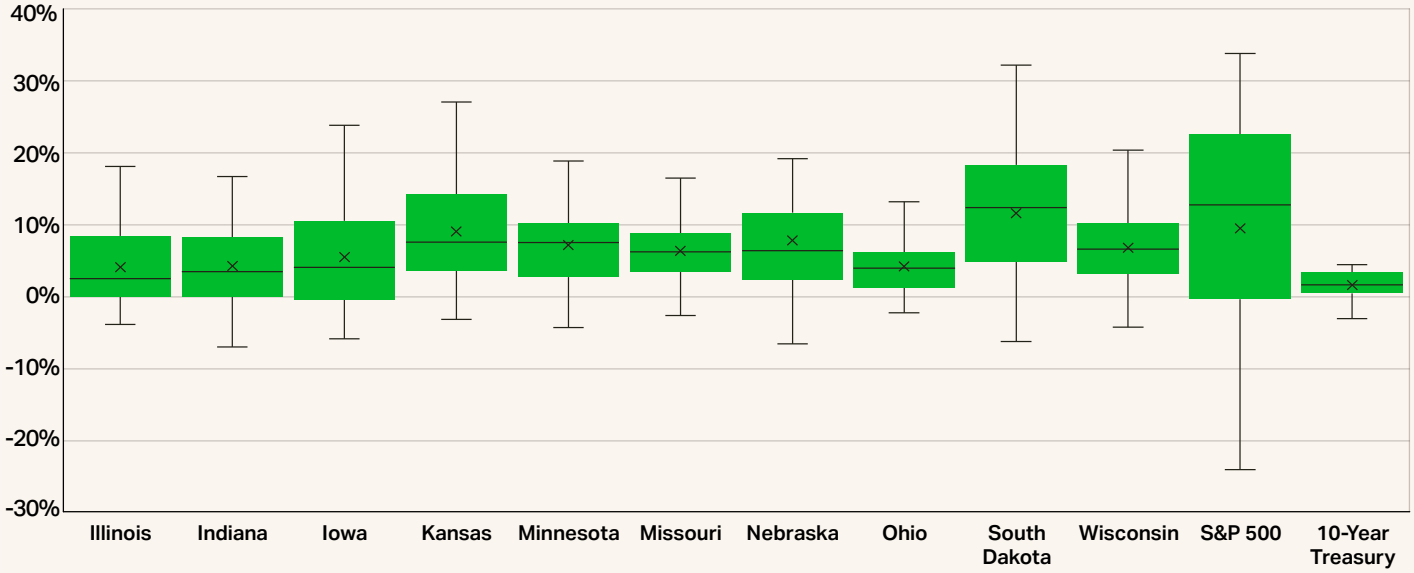
This difference matters because it determines how forgiving a market is at purchase: Wider downside ranges often require more equity and balance sheet capacity to absorb volatility, while steadier markets tend to be easier to hold through over the long run even if they don't lead during peak years.

In that sense, the chart highlights why headline averages alone (for example, what the piece of cropland returned on paper) can be misleading. Return structure and downside behavior over the long run are what ultimately determine resilience when conditions tighten.

(Note: For this analysis, cash returns were calculated as the

Cropland Serves As a Real Asset Diversifier

Average Real Cropland and Equity Returns Since 1990



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Sources: USDA, Federal Reserve Board, S&P 500, BLS, Terrain

annual net operating income generated by cropland expressed as a percentage of land value and adjusted for inflation to reflect real purchasing power. Each state's average revenue was determined by a corn and soybean mix, while wheat was included in this mix for Kansas. Appreciation returns were calculated as the year-over-year change in cropland values, also adjusted for inflation, capturing real gains or losses in land prices over time.)

PORTFOLIO PERFORMANCE: CROPLAND VS. TRADITIONAL FINANCIAL ASSETS

Placing cropland alongside traditional financial assets further highlights its role in investment portfolios.

Cropland consistently exceeded Treasuries on a real return basis while exhibiting volatility far closer to fixed income than equities.

Over the same period (1990-2025), the S&P 500 delivered an average 12.3% nominal total return and 9.4% real total return, driven primarily by price appreciation (10% nominal, 7.2% real) but with significantly higher volatility. Equity total return variability averaged 17.3%, more than double that observed in most cropland markets, underscoring the broader dispersion and drawdown risk associated with public equities.

At the opposite end of the spectrum, the 10-year U.S. Treasury produced an average 4.3% nominal yield and 1.5% real yield, with yield volatility near 2%, offering stability but limited real wealth creation over time. Against these benchmarks, cropland consistently exceeded Treasuries on a real return basis while exhibiting volatility far closer to fixed income than equities, reinforcing its position as a real asset diversifier rather than a direct equity substitute.

STATE-LEVEL REAL CROPLAND PERFORMANCE: RISK, REWARD AND CYCLE EXPOSURE

Across the Midwest and Plains, returns vary meaningfully based on the balance between income carry and land appreciation, with important implications for volatility, interest rate sensitivity and purchasing discipline.

llinois, Indiana and Ohio

Illinois, Indiana and Ohio represent valuation-led markets with modest real total returns (4%-4.2%) driven primarily by appreciation rather than income. Real cash yields range from just 1.2% to 1.5%, leaving outcomes highly sensitive to entry pricing, discount rates and buyer affordability. Volatility is moderate (4%-6%), but thin carry provides limited downside cushion during periods of margin compression or elevated borrowing costs.

These states tend to perform best during agricultural margin upcycles when optimism and liquidity accelerate land values, but they are more exposed to repricing risk when financing tightens.

Iowa

Iowa delivers stronger performance (5.4% real total return), led by robust appreciation (3.7%) and supported by modest income (1.7%). However, volatility is elevated (7.5%), reflecting pronounced exposure to land price cycles. Iowa functions as a high-quality but timing-sensitive market: Returns can accelerate meaningfully in agricultural margin upcycles but can also retrace sharply when margins weaken or interest rates rise, making leverage and entry discipline critical.

Minnesota and Missouri

Minnesota and Missouri occupy the most balanced and risk-efficient segment of the spectrum. Minnesota generated a 7.1% real total return, split almost evenly between income (3.3%) and appreciation (3.8%), with moderate volatility (5.9%). Missouri delivered a 6.3% real return with one of the lowest volatility readings (4.2%), supported by a similar balance between yield and appreciation.

These states provide durable compounding across cycles and function as portfolio stabilizers, particularly valuable for lenders

and diversified investors seeking steadier collateral behavior.

Wisconsin

Wisconsin exhibits a moderately appreciation-tilted but still-balanced profile, producing a 6.7% real total return with mid-level volatility (5.4%). Returns are resilient across most cycles, though somewhat more exposed to tighter credit conditions than income-forward states.

Nebraska

Nebraska offers strong long-run performance (7.8% real total return), supported by solid carry (4.3%) and appreciation (3.5%) but with significant variability. Volatility is among the highest (8.7%), driven largely by valuation swings. While income support improves through cycle performance, the wide dispersion requires conservative leverage, stress-testing and pricing discipline at cycle turning points.

Kansas and South Dakota stand out as income-forward return leaders.

Kansas and South Dakota

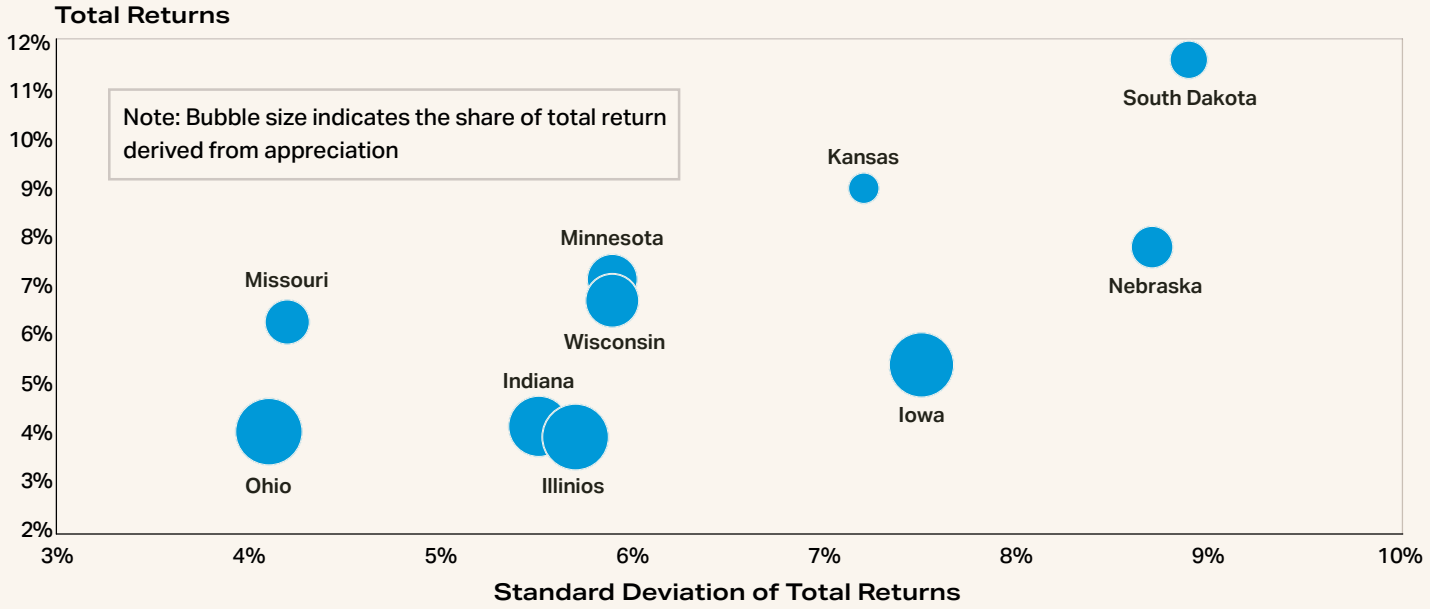
Kansas and South Dakota stand out as income-forward return leaders. Kansas produced a 9% real total return, with roughly two-thirds derived from income, enhancing resilience in higher-rate environments. South Dakota led all states with an 11.6% real total return, supported by a 6.9% real cash yield and 4.7% appreciation, though with high volatility (8.9%).

In both states, historical returns were boosted by elevated pre-2012 cash yields, underscoring the importance of recognizing structural yield shifts over time. These markets provide strong self-carry but require tolerance for operating- and weather-driven income variability.

CROPLAND MARKETS WILL FUNCTION DIFFERENTLY MOVING FORWARD

Cropland is inherently a long-duration asset, and shifts in discount rates tend to influence land values more quickly

Average State-Level Return Differences Since 1990



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Sources: USDA, BLS, Terrain

than they alter operating fundamentals. In a higher-for-longer rate environment, markets that rely more heavily on appreciation are likely to feel greater pressure as capitalization assumptions adjust and buyer affordability tightens. Income-oriented markets are better positioned to absorb higher borrowing costs because ongoing carry offsets some valuation risk.

As rates eventually stabilize or move lower, appreciation-driven markets may regain momentum, but the experience of the past cycle reinforces a key takeaway: Cropland markets with durable income support tend to navigate rate transitions more smoothly than those dependent on appreciation.

Cropland markets with durable income support tend to navigate rate transitions more smoothly than those dependent on appreciation.

Bottom line: For farmers and investors, the balance of the primary source of returns (income versus appreciation) and volatility influences how forgiving purchase prices are under differing macro and agricultural cycles. Cropland owners, and future purchasers, should understand the influence of each cycle on the land that they own to balance risks and rewards. The current interest rate and agricultural profit cycles are likely to reward disciplined pricing, strong balance sheets, and portfolios that balance income resilience with long-term appreciation potential rather than leaning exclusively on either return engine.

Connecting Farm Returns to Farmland Value in California

By Matt Woolf, Ph.D.

During a period of volatile land values, an assessment of the income a property can reliably generate is just as important.

California farmland value trends of volatility and softening from the past few years are persisting, although where they are happening and to what degree are slightly changing. In the Central Valley, where volatility has been most pronounced, values have continued to decline in some regions while stabilizing in others (though those values are well off their peaks). Along the coast, row crop ground, which has historically been more stable, has softened in most counties after holding up relatively well the year prior.

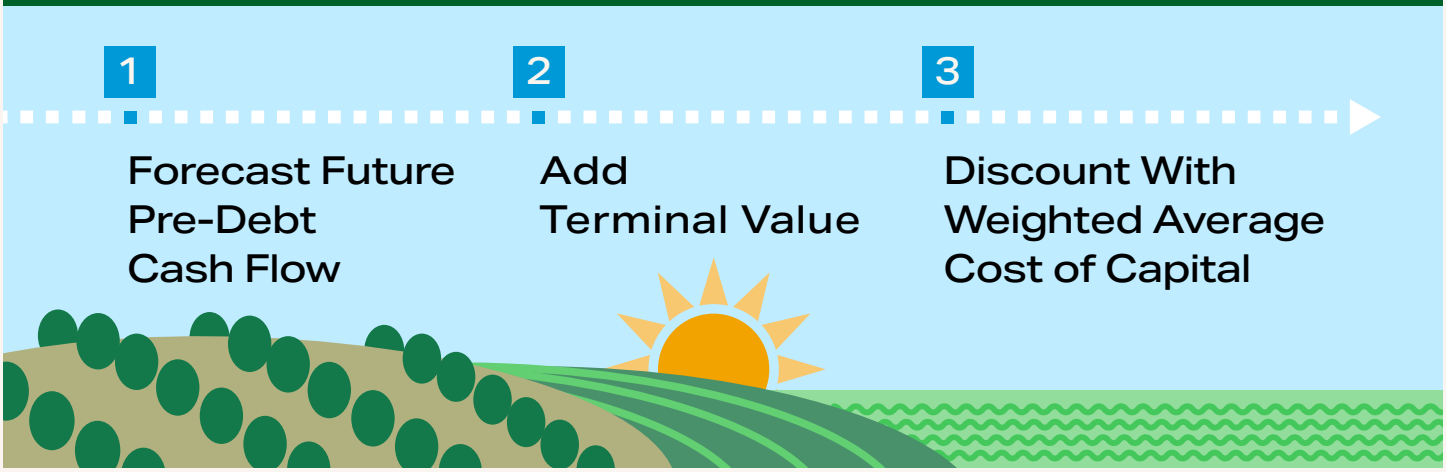
The extended period of volatility in California land values can be attributed to a variety of forces:

- Though crop prices aren't as low as they were in 2022, they are by no means high. This, combined with elevated input costs and interest rates, has continued to squeeze margins.
- The onset of groundwater legislation continues to play a role in this complex story, with better water areas demonstrating resilience and worse ones showing downward pressure.

Against this backdrop, producers I meet with often ask how to approach land purchases. Looking to comparable sales in an area can provide a useful base of actual market activity. However, during a period of volatile land values, an assessment of the income a property can reliably generate is just as important.

One way of linking California land values to crop income is a discounted cash flow (DCF) ap-

Determining Land Value via Discounted Cash Flow



proach. This can provide a way of thinking about what price a likely income stream can support given assumptions about risk and growth. Though I use an example of an almond orchard development, the approach can apply broadly across California agriculture.

GETTING FROM INCOME TO VALUE

The main purpose of a DCF is to take a stream of income over time and translate it into a value today. It provides a way to derive what an asset is worth based on the income it is expected to generate. In the context of farming, it links future farm income to a present-day value.

While the concept is straightforward, arriving at that value requires a series of assumptions and judgments about how that income will evolve and how it should be discounted — a useful thought exercise for producers even if land is not purchased.

Step 1

The initial step is forecasting future pre-debt cash flow on an annual basis. This is done pre-debt because it allows us to put a value on an asset independent of how it might be financed. While there is no fixed rule for how many years projections should extend, the key is to balance near-term cash flow detail with long-term uncertainty. It is in this step where experience and judgment regarding the trajectory of agricultural commodity markets can really make a difference.

Step 2

Because farmland is a long-lived asset, however, a high proportion of its value will lie beyond the chosen income forecast period. To account for the rest of the asset's lifespan, the next step is to estimate a property's terminal value — the value of all cash flows beyond the chosen forecast period expressed as a single value which, in turn, is itself discounted back to the present.

Prospective buyers can estimate a property's terminal value using the Gordon Growth Model or assume an exit price through resale after the chosen forecast. For example, assume a set annual appreciation and sale of the asset at the appreciated value in the final year.

Step 3

Once the income stream is defined, the next step is discounting the income into today's dollars. Discounting, a way to determine the present value of future cash flows, is critical since:

- A dollar today is worth more than a dollar tomorrow due to inflation
- There is opportunity cost of investing in farmland as opposed to other investments
- There is uncertainty surrounding future cash flows

A property that is expected to be riskier due to its water availability or yield variability, for example,

will require a higher discount rate. Discounting also allows income earned at different points in time and across different opportunities to be comparable.

In practice, estimating a discount rate is one of the more challenging aspects of the analysis. While market-based approaches may rely on implied rates of return from existing sales or benchmark rates adjusted for risk, a more decision-relevant measure for individual operators is their weighted average cost of capital (WACC), which reflects their blended cost of debt and equity.[1] Using WACC allows the model to estimate what price is supported by the income stream given the investor's required return.

While looking to recent transactions should still inform decision-making, they do not reveal the income and returns that support those prices.

A SOPHISTICATED DECISION-MAKING FRAMEWORK

Taken together, these steps incorporate variables that are most important to the success of the farm (such as price, yield, production cost and risk) into a sophisticated decision-making framework for a large purchase.

While looking to recent transactions should still inform decision-making, they do not reveal the income and returns that support those prices.

By using this framework, a prospective buyer can see what land is selling for and understand the return assumptions required to justify the list prices in their area. This is especially useful in periods of farmland market uncertainty.

PUTTING THE MODEL TO WORK

Let's consider an example of open land for an almond development with an assumed orchard life of 25 years. Almonds, like other permanent plantings, present an especially interesting case since cash flows are highly negative in the years of establishment and don't become positive until the trees mature.

On the revenue side of the cash flow, the average almond price is held constant throughout the life of the orchard. Yields, on the other hand, vary according to a typical pattern where production is zero in the first two years; rising to 500 pounds in third leaf; 1,000 pounds in fourth leaf; 1,900 pounds in fifth leaf; and stabilizing at 2,500 pounds in sixth through 15th leaf. Thereafter, yields decline 1% per year to reflect aging. Terminal value assumes unlevered free cash flow growth at 2% in perpetuity off of median cash flow. Note that this is equivalent to assuming a 7% annual appreciation on land purchased for $10,000 per acre for the development.

On the cost side of the cash flow, we use cash costs for orchard establishment and production from the 2024 UC Davis Cost Studies for Northern SJV as a rough guide. From Year 1 to Year 3, the cumulative cost of establishment is just over $18,000 per acre. By Year 4, cash costs for production are $3,500 per acre and increase by 2% thereafter, matching typical long-term inflation.[2] Because tax treatment will vary by operator, it's not considered here.

The model evaluates outcomes across a range of almond prices and WACC rates, illustrating how land values respond to changes in key assumptions. As higher interest rates increase a buyer's cost of capital, for example, WACC rises and reduces the value the income stream can support. Conversely, higher expected almond prices increase projected cash flows and, in turn, the value supported by those returns.

The model evaluates outcomes across a range of almond prices and WACC rates, illustrating how land values respond to changes in key assumptions.

[1] If you're borrowing at 60% of the property's purchase price at 7% and the next best opportunity for the equity you put into the property is 10%, your WACC would be 8.2%, assuming away tax.

[2] We assume the prospective buyer has some scale and therefore use lower cash costs than the UC Davis Cost Study as a reasonable approximation, rather than as a precise estimate.

Supported* Open Land Value ($/Acre) For Almond Development

Average Almond Price Across Orchard Lifetime (Price Per Pound)

Weighted Average Cost of Capital (%)	$2.50	$3.00	$3.50	$4.00	$4.50	$5.00	$5.50	$6.00	$6.50	$7.00
5.5%	$12,530	$34,364	$56,199	$78,033	$99,868	$121,702	$143,536	$165,371	$187,205	$209,039
6.0%	$9,241	$28,289	$47,337	$66,386	$85,434	$104,483	$123,531	$142,579	$161,628	$180,676
6.5%	$6,669	$23,536	$40,403	$57,270	$74,137	$91,004	$107,871	$124,738	$141,605	$158,472
7.0%	$4,601	$19,711	$34,821	$49,932	$65,042	$80,152	$95,263	$110,373	$125,483	$140,594
7.5%	$2,900	$16,564	$30,228	$43,891	$57,555	$71,219	$84,882	$98,546	$112,210	$125,873
8.0%	$1,477	$13,927	$26,378	$38,828	$51,279	$63,729	$76,180	$88,631	$101,081	$113,532
8.5%	$268	$11,685	$23,103	$34,521	$45,939	$57,357	$68,774	$80,192	$91,610	$103,028
9.0%	$0	$9,755	$20,283	$30,810	$41,338	$51,865	$62,393	$72,920	$83,448	$93,976
9.5%	$0	$8,076	$17,828	$27,579	$37,331	$47,083	$56,835	$66,587	$76,339	$86,090
10.0%	$0	$6,601	$15,671	$24,741	$33,811	$42,880	$51,950	$61,020	$70,089	$79,159

*These values are supported only under the assumptions outlined in the text and should not be interpreted as market values.

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Source: Terrain

As higher interest rates increase a buyer's cost of capital, for example, WACC rises and reduces the value the income stream can support. Conversely, higher expected almond prices increase projected cash flows and, in turn, the value supported by those returns.

The model shows how the value supported by income might compare with an actual opportunity. Rather than relying solely on recent transactions, it allows potential buyers to evaluate whether those prices are consistent with their own assumptions about the almond market. Though the example here considers almonds, the framework is relevant to all California commodities.

THE GOOD AND THE BAD

While the DCF is a powerful tool, it also has limitations. First, results are highly sensitive to underlying assumptions, as the table shows. A slight change in the almond price or WACC can shift values dramatically. Given the difficulty of precisely estimating inputs, distinguishing between what can be measured and what must be assumed is critical.

Second, DCF analysis does not fully capture strategic considerations that often influence real-world transactions. For example, buyers utilizing a 1031 exchange to defer capital gains may be less price-sensitive due to timing constraints. Similarly, operators may be willing to pay a premium for a property that has sentimental value or is adjacent to their existing operation.

Nevertheless, stress-testing your assumptions is an important part of evaluating a major investment. Understanding the expectations built into the price you're willing to pay can help you make a more informed purchase decision and provide some clarity to a very uncertain market.

ABOUT THE AUTHORS

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Matt Woolf, Ph.D., is Terrain's specialty crop analyst, focusing on tree nuts, fruits and vegetables. He is a native of California's Central Valley, where his family grows almonds, pistachios and a variety of row crops. Matt has an extensive academic, teaching and research background, including a Ph.D. in economics from the Australian National University.

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