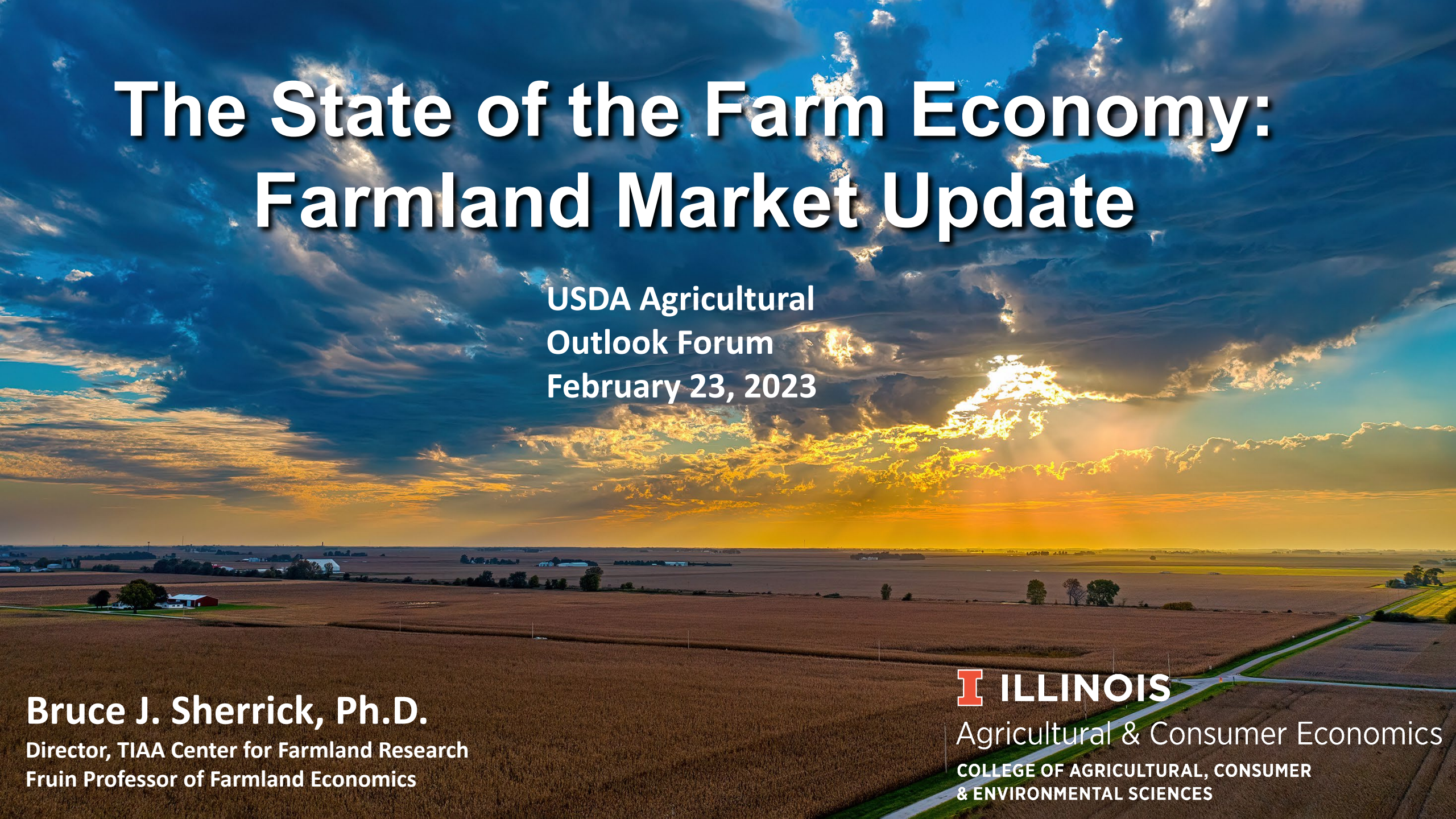
The State of the Farm Economy: Farmland Market Update

USDA Agricultural
Outlook Forum
February 23, 2023



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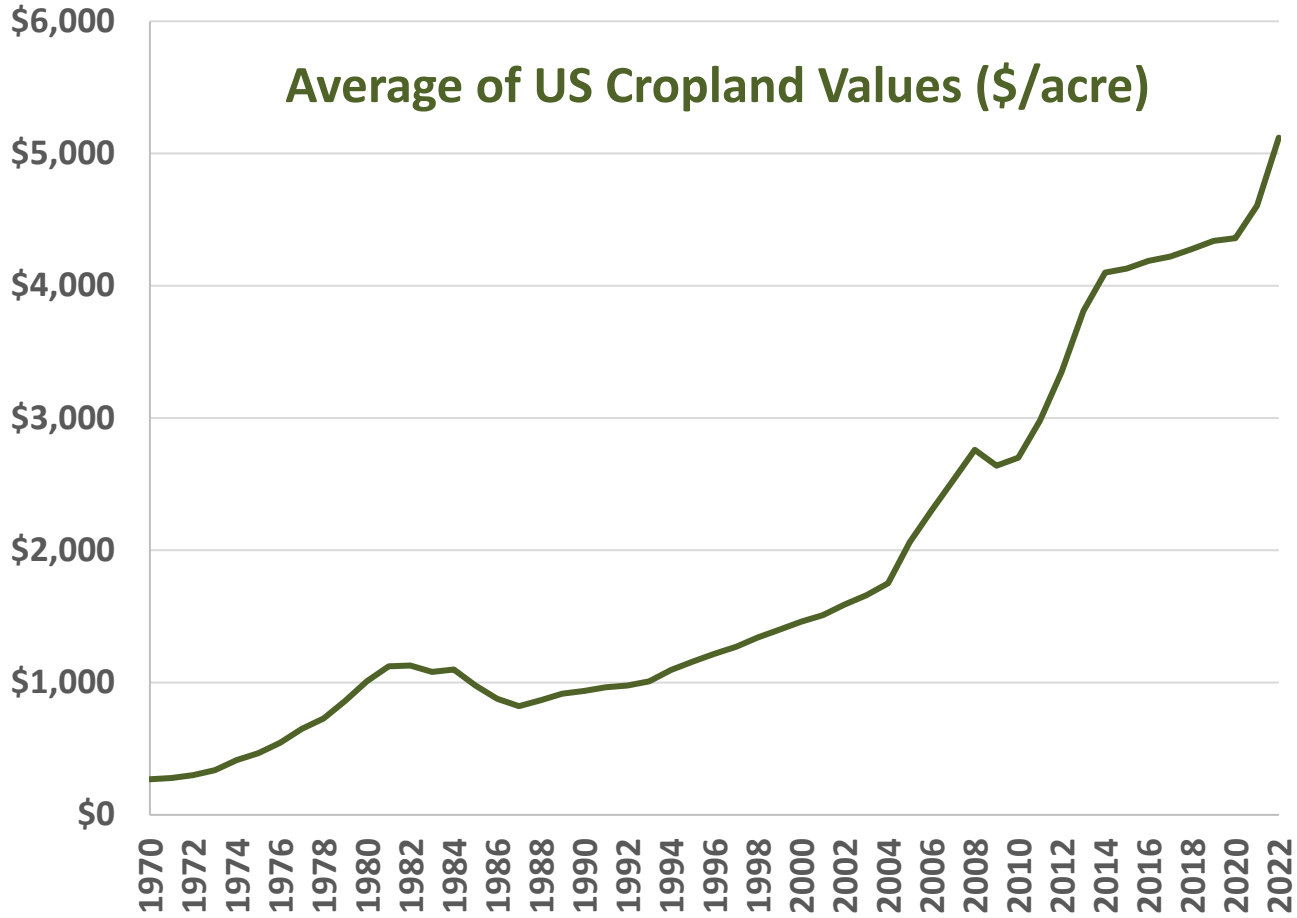
Farmland Asset Markets

Today's Purpose:

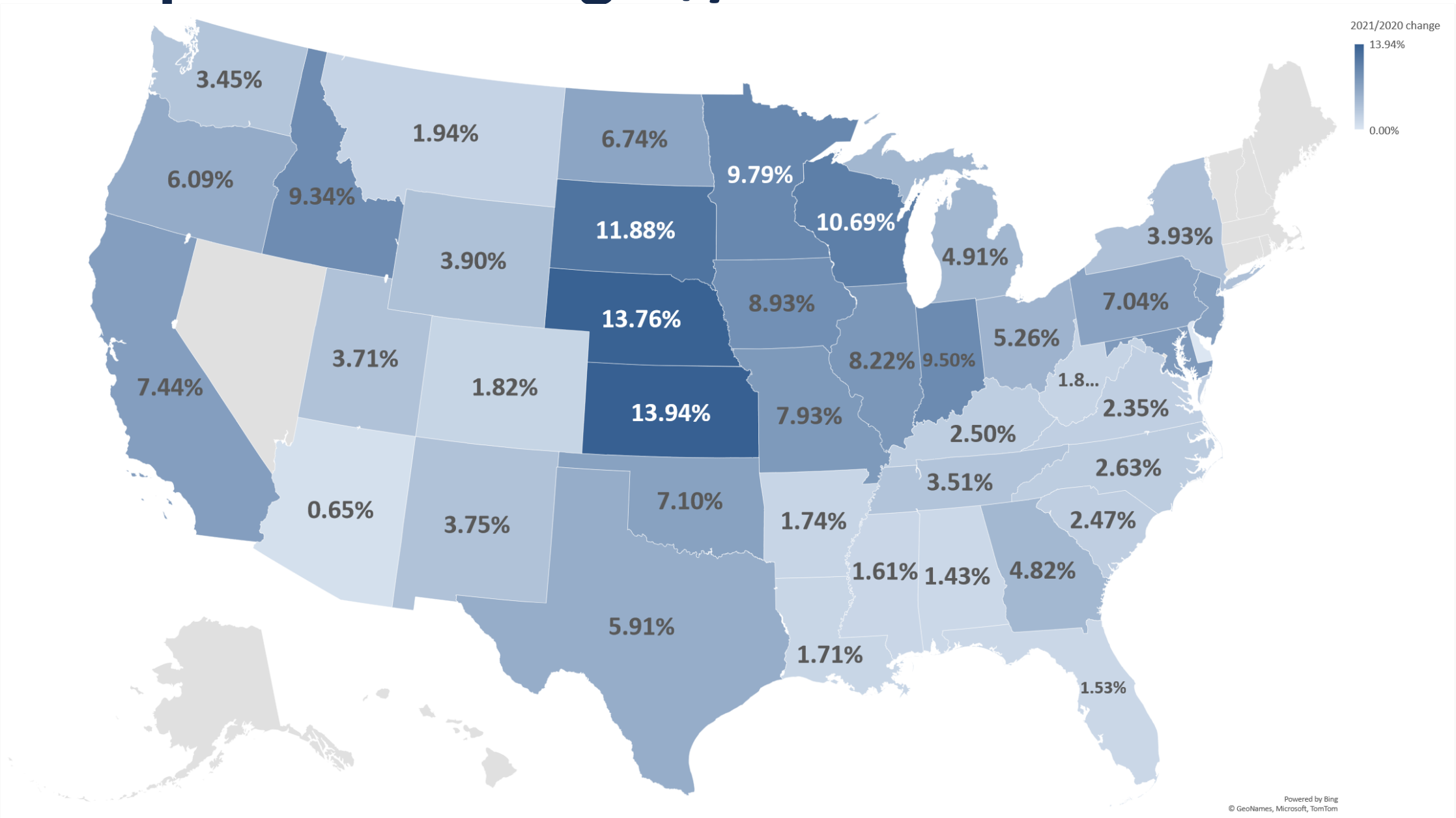
- Identify broad economic and farm-level factors that drive farmland markets with emphasis on future
- Focus on:
  - *Income*
  - *Inflation*
  - *Interest rates*
  - *International/ROW effects*



The *Usual Suspects, and some New Actors*

- *Income & commodity prices*
- *Interest rates (and the Fed) vs.*
- *Inflation (and the Fed)*
- *International trade/conflicts*
- *Policy and Farm Bill focus*
- *Stimulus payments and temporary programs + ad hoc*
- *Carbon/Climate/Conservation (IRA+)*
- *Consumer preferences for food attributes*
- *Pandemic impacts/structural response*
- *Crop Insurance changes/conservation tie*
- *Alternative investment characteristics*
- *ROW Demand expansion and demographic patterns through time*

Cropland % change $/Acre 2020-2021 *(mid-year USDA)*



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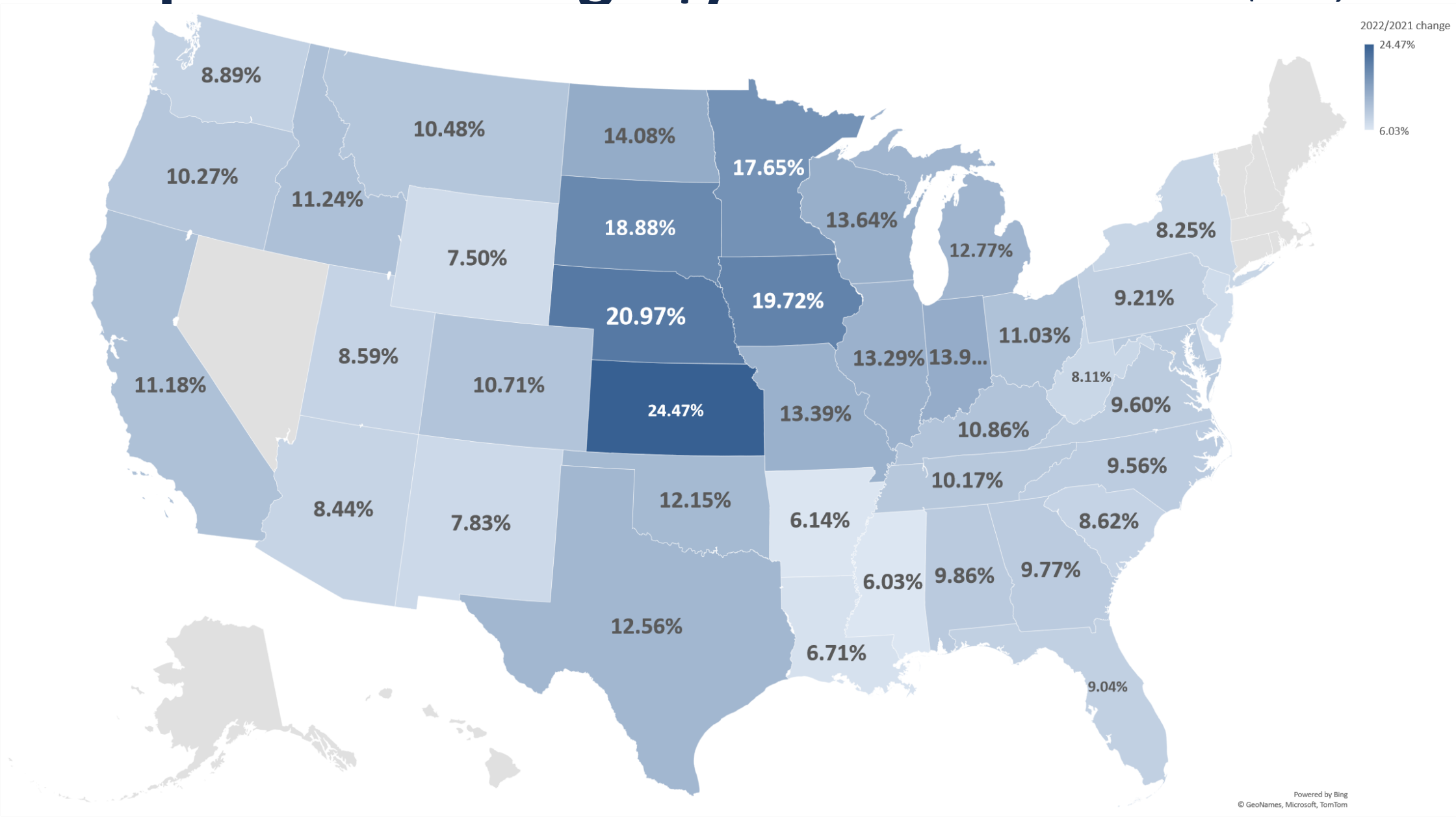

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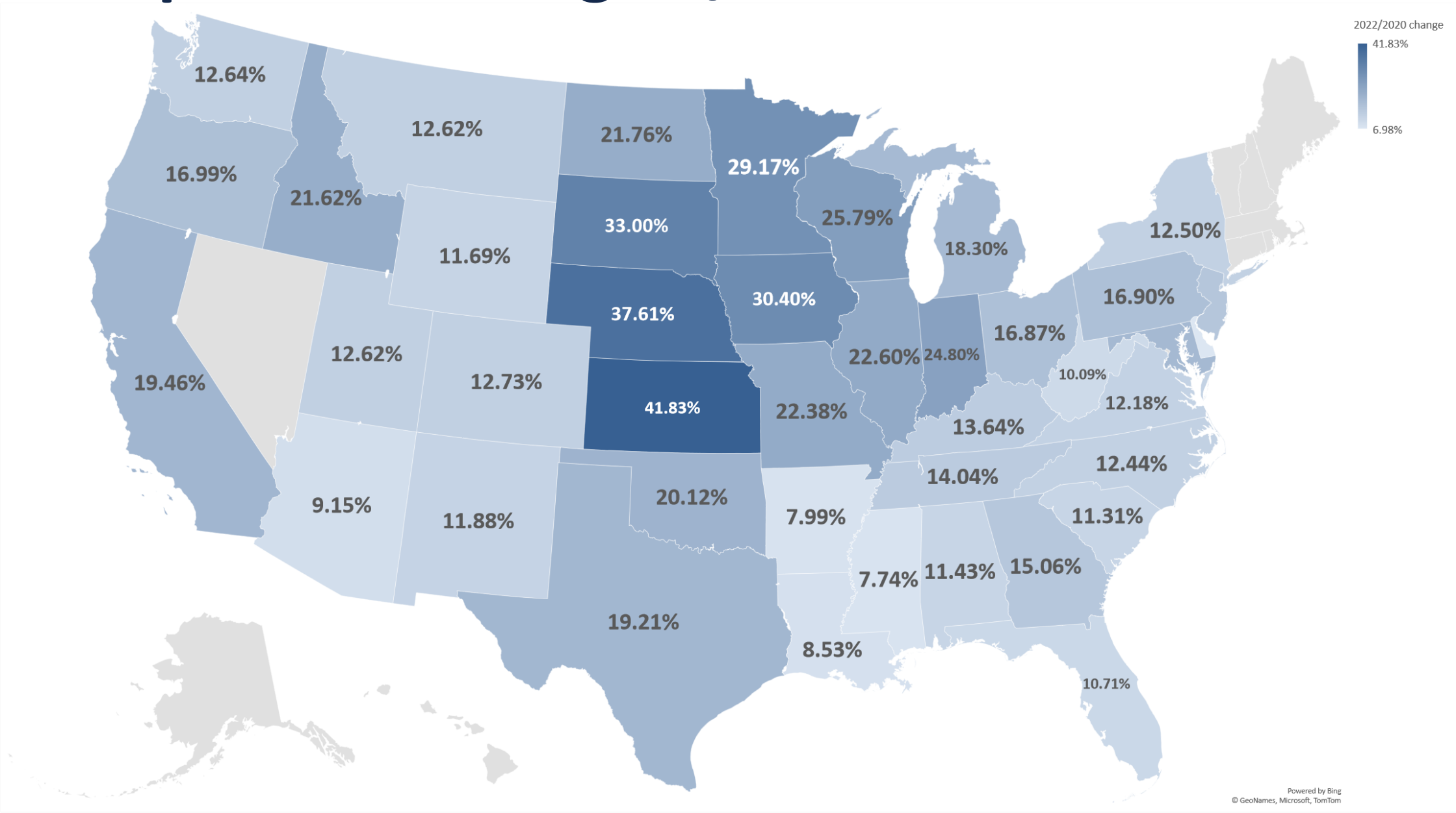
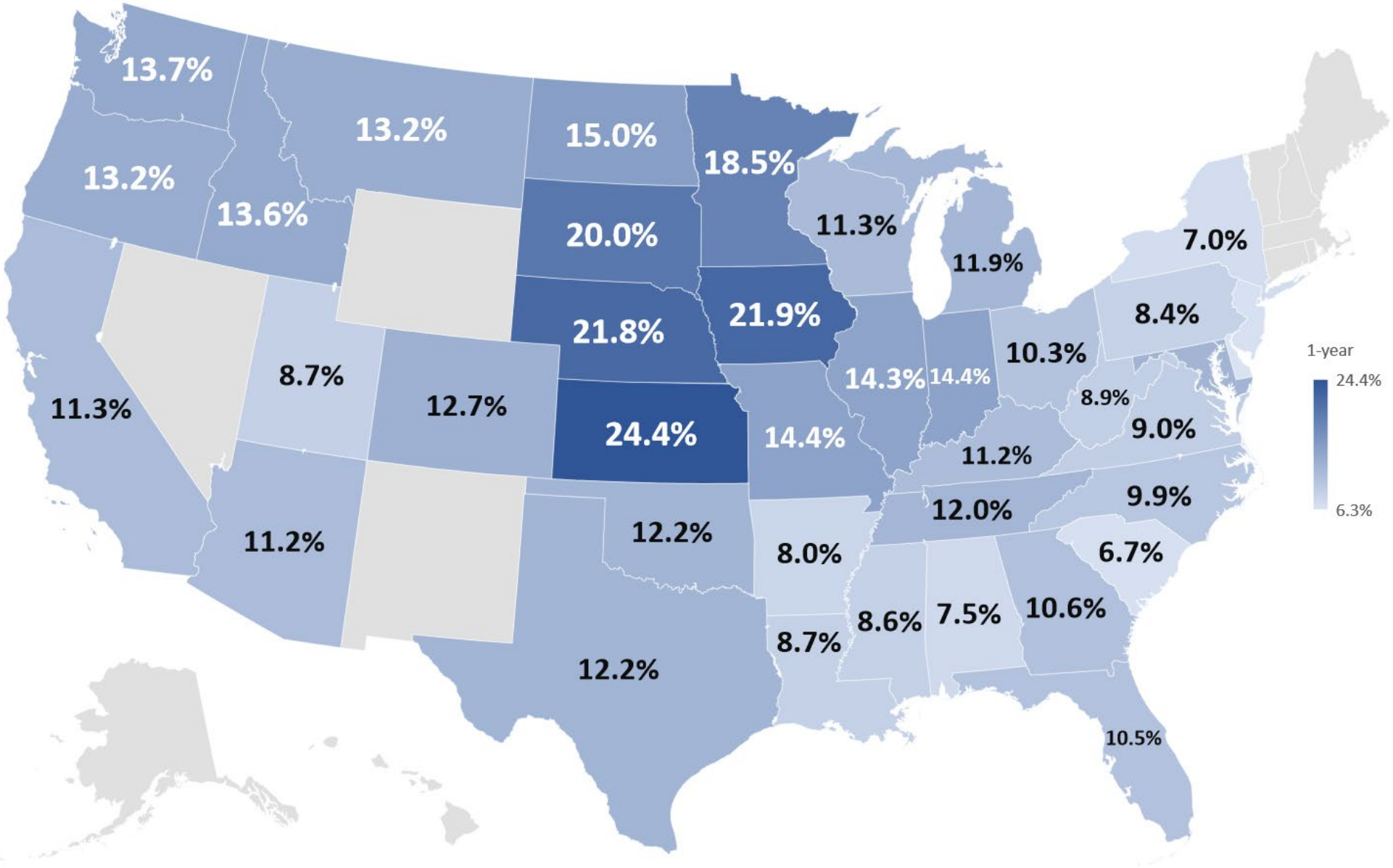
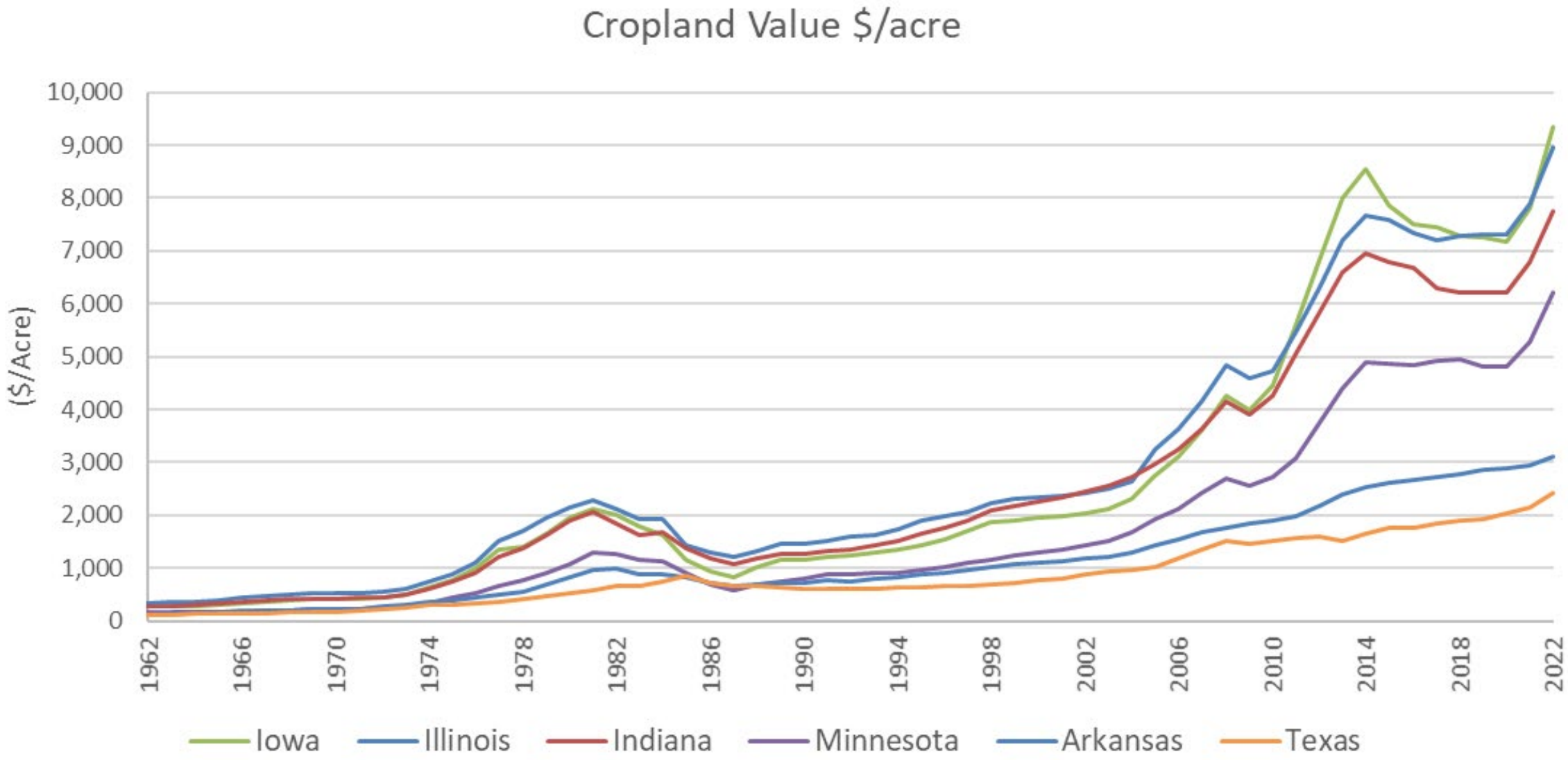
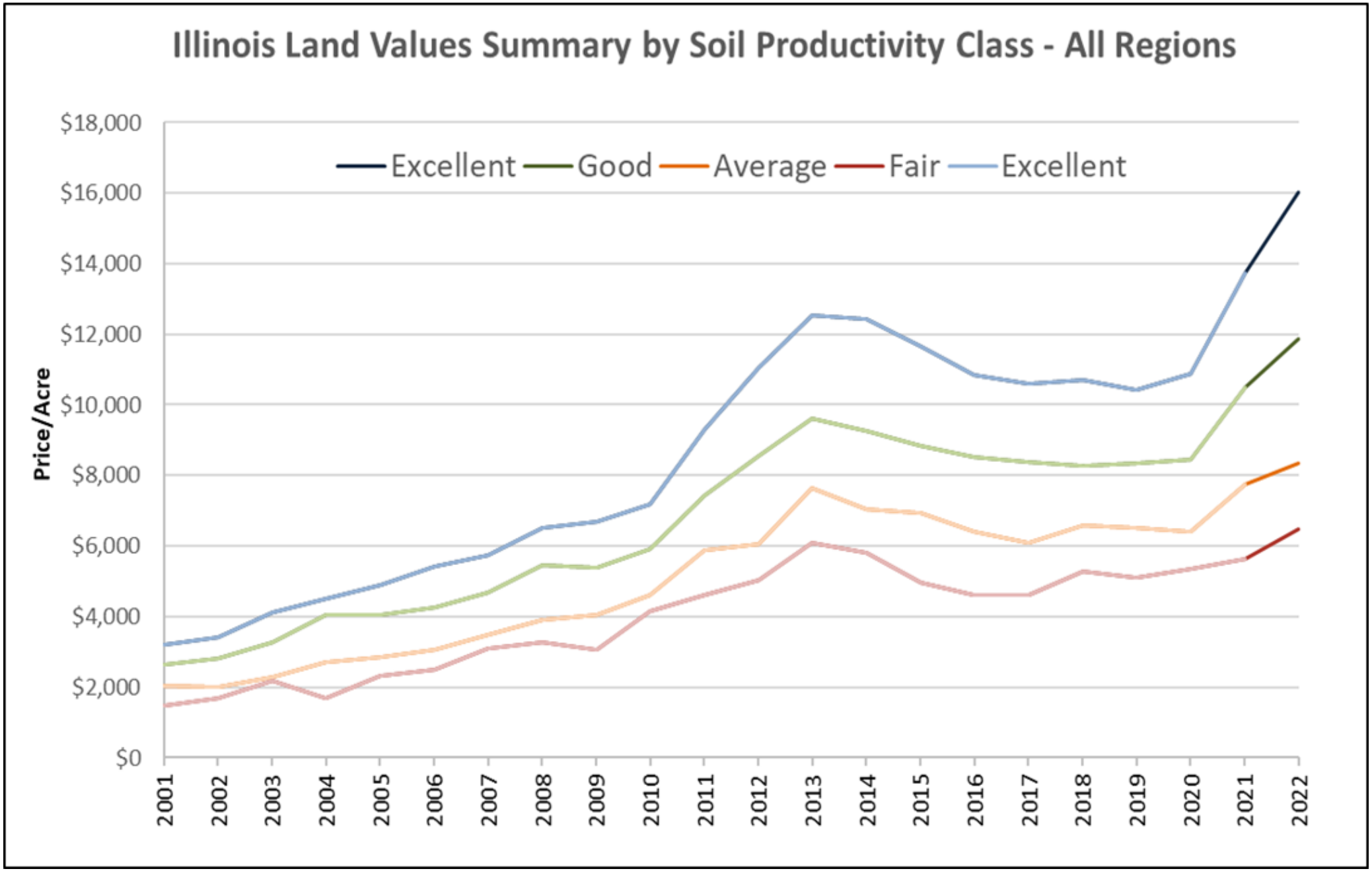


Cropland total return – 2022 (USDA, Center est.)



Cropland Values – selected states

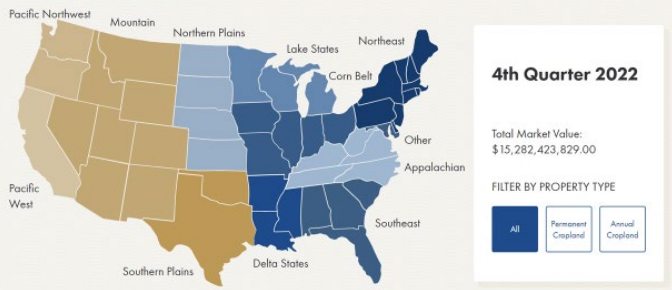



Illinois Land Values Summary by Soil Productivity Class - All Regions
Excellent
Good
Average
Fair
Excellent
Price/Acre
$18,000
$16,000
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

Farmland Returns by region Q4-2022 (NCREIF 4Q rolling)

(1,300+ properties, $15.3 Billion)

NCREIF Farmland Property Index — All Farmland



4th Quarter 2022

Total Market Value: $15,282,423,829.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
2.63%	1.45%	1.98%	3.26%	9.64%

NCREIF Farmland Property Index — Permanent Cropland

4th Quarter 2022

Total Market Value: $5,876,853,777.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
0.07%	0.53%	0.90%	1.08%	2.61%

NCREIF Farmland Property Index — Annual Cropland

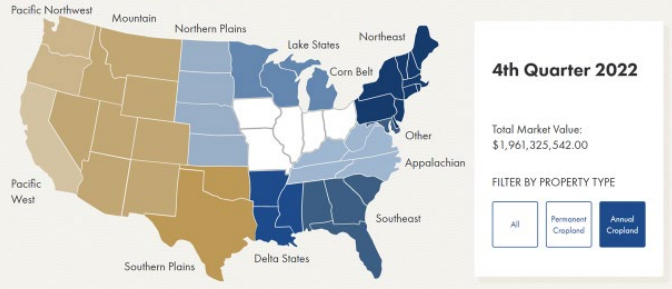
4th Quarter 2022

Total Market Value: $9,405,570,052.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
4.36%	2.05%	2.67%	4.65%	14.43%

NCREIF Farmland Property Index — Corn Belt – Annual (All)



4th Quarter 2022

Total Market Value: $1,961,325,542.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
9.26%	3.06%	3.80%	9.51%	27.99%

NCREIF Farmland Property Index — Lake States – Annual Cropland

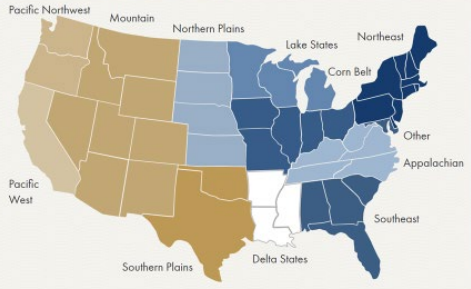
4th Quarter 2022

Total Market Value: $518,575,252.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
3.98%	1.46%	1.71%	8.88%	16.82%

NCREIF Farmland Property Index — Delta States – Annual (All)



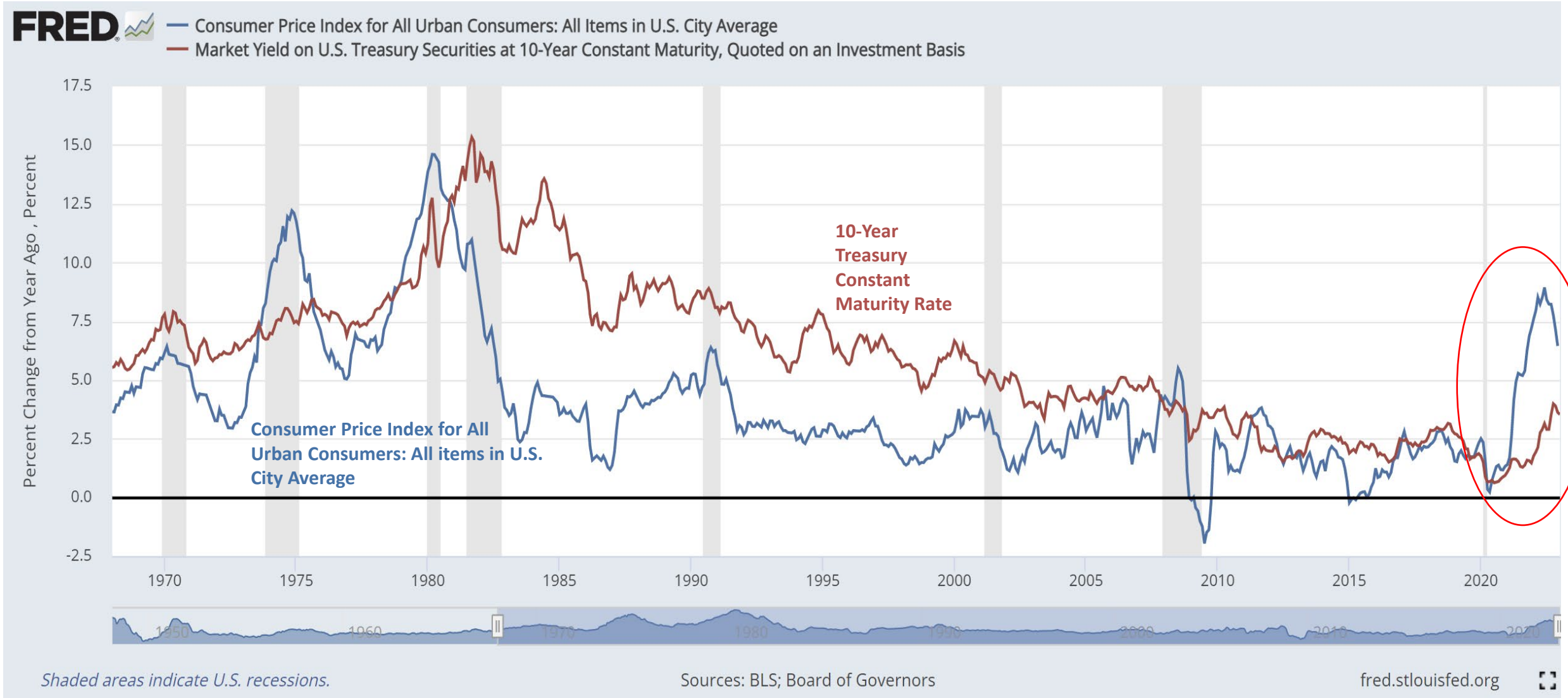
4th Quarter 2022

Total Market Value: $2,898,141,461.00

FILTER BY PROPERTY TYPE: All | Permanent Cropland | Annual Cropland

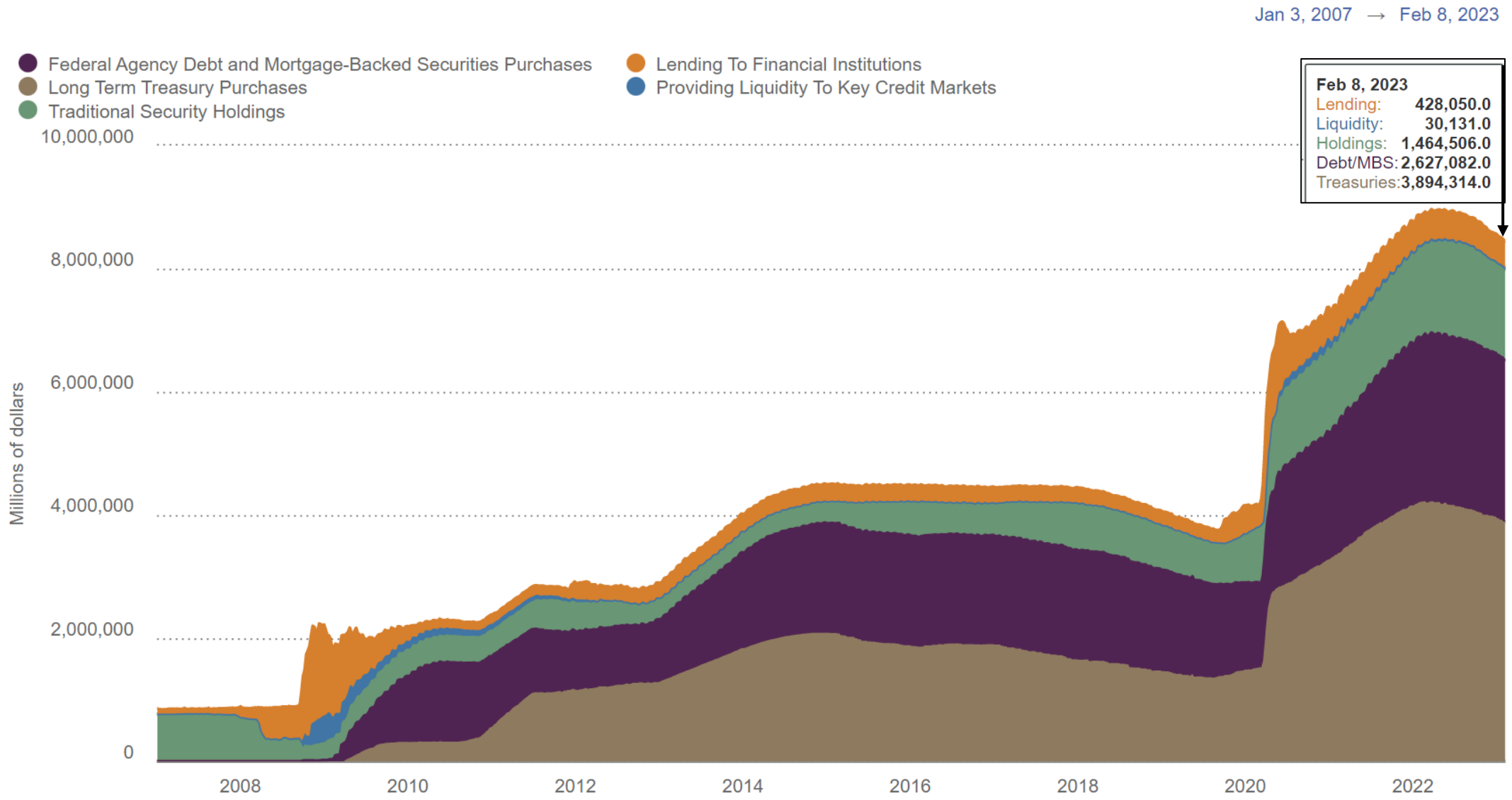
1Q2022	2Q2022	3Q2022	4Q2022	2022 ANNUAL TOTAL
3.95%	2.23%	2.47%	3.89%	13.13%

Inflation and Interest Rate Relationships *(to 1/30/2023)*



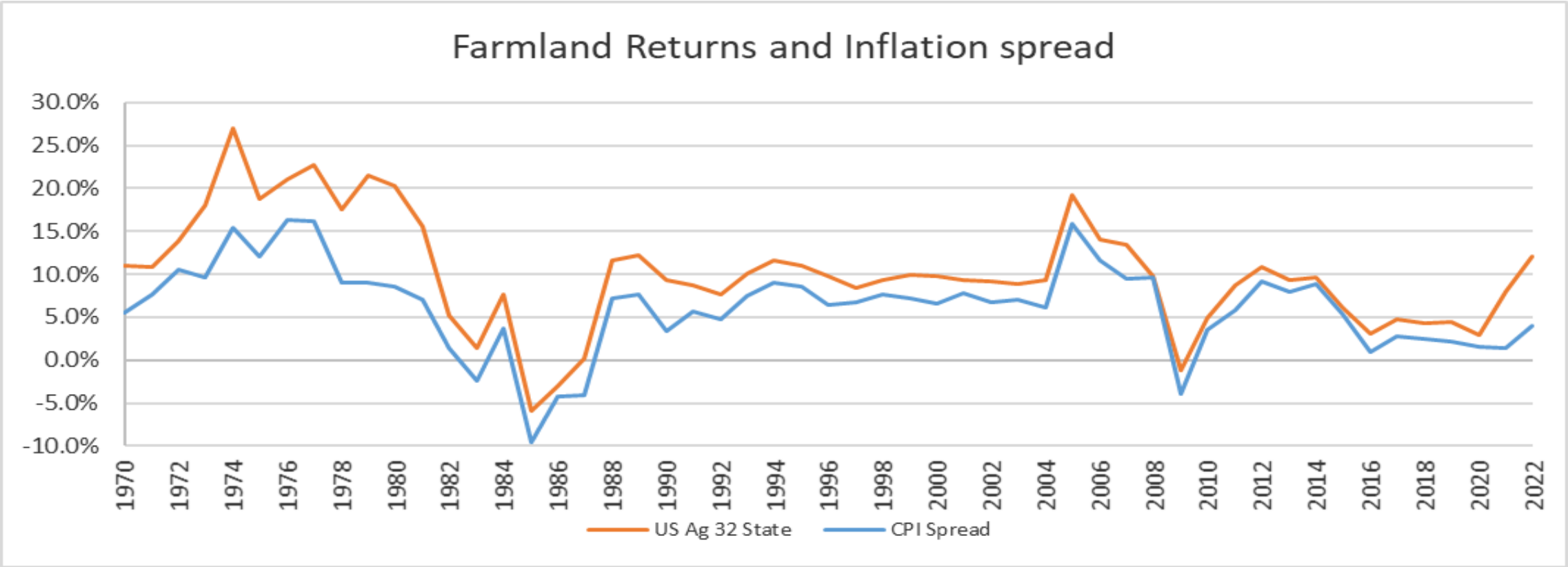
Inflation and the Fed Balance Sheet – the unwinding effect to come

("Shrinking by $2.5 Trillion over a few years has roughly same impact as raising rates by 1/2 percent." Economist Feb. 11, 2023)



Source: Federal Reserve Bank of Cleveland calculations based on data from Federal Reserve Board and Haver Analytics.

Farmland Returns and farmland returns minus inflation (spread)



Decade	Farmland to CPI Spread
1970 to 1979	11.1%
1980 to 1989	1.5%
1990 to 1999	6.7%
2000 to 2009	7.7%
2010 to 2019	4.9%
1970 to 2022f	***6.2%***

- **Farmland returns have been remarkably stable with positive alpha**
- **Perfect Storm in 1980s – still relatively good performance**
- **Low volatility annual returns, appreciation positive except 1980s**
- **Positive Inflation effect has been incredibly reliable – new forms?**

Balance Sheet of Ag Sector -- US

Table 1. Selected Balance Sheet Characteristics of US Agricultural Sector

	1970	1980	1990	2000	2010	2018	2020	2022
	($ millions, except ratios - source ERS-USDA)							
Farm Assets	**278,823**	**1,000,422**	**840,609**	**1,203,215**	**2,170,832**	**3,026,679**	**3,174,623**	**3,835,151**
Real Estate	202,418	782,820	619,149	946,428	1,660,114	2,510,163	2,640,942	3,188,219
Non Real Estate	76,405	217,602	221,459	256,787	510,718	516,515	533,681	646,931
Farm Debt	**48,501**	**162,432**	**131,116**	**163,930**	**278,931**	**402,606**	**441,254**	**496,025**
Real Estate	27,238	85,272	67,633	84,724	154,065	245,774	288,645	341,914
Non Real Estate	21,263	77,160	63,483	79,206	124,865	156,832	152,608	154,111
Equity	**230,322**	**837,990**	**709,493**	**1,039,285**	**1,891,902**	**2,624,073**	**2,733,369**	**3,339,125**
Selected Indicators								
Debt/Equity	21.1%	19.4%	18.5%	15.8%	14.7%	15.3%	16.1%	14.9%
Debt/Assets	17.4%	16.2%	15.6%	13.6%	12.8%	13.3%	13.9%	12.9%
Real Estate/Equity	87.9%	93.4%	87.3%	91.1%	87.7%	95.7%	96.6%	95.5%
Real Estate/Assets	72.6%	78.2%	73.7%	78.7%	76.5%	82.9%	83.2%	83.1%
Real Estate D/Total D	56.2%	52.5%	51.6%	51.7%	55.2%	61.0%	65.4%	68.9%

Farmland Returns in Context

Table 1. Asset Return Characteristics

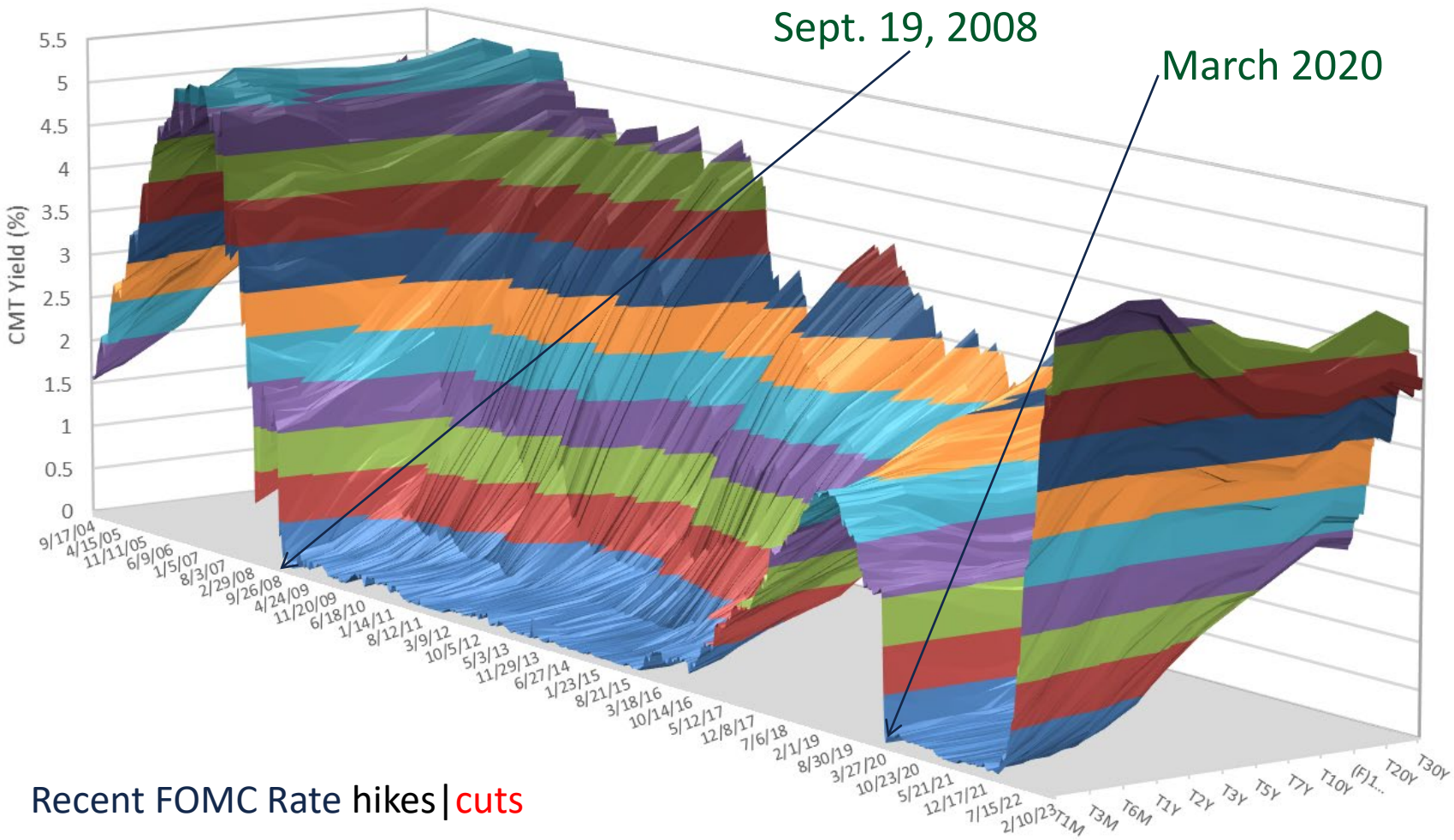
Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	US Ag 32 States Correlation	Minimum Return	Maximum Return
			1991 - 2022			
US Ag 32 States	8.5%	3.7%	0.43	1.00	-1.2%	19.0%
NCRIEF Ann Crop	10.1%	4.8%	0.47	0.68	4.2%	23.6%
NCREIF Cornbelt Ann	10.9%	8.0%	0.74	0.50	-4.6%	28.0%
Illinois	9.4%	5.6%	0.59	0.81	0.8%	26.0%
Iowa	11.1%	7.4%	0.67	0.65	-5.3%	24.9%
Indiana	9.2%	5.0%	0.54	0.65	-1.0%	22.0%
Minnesota	10.6%	5.5%	0.52	0.78	-1.8%	20.3%
California	8.2%	5.0%	0.61	0.55	2.5%	30.7%
Washington	11.9%	3.5%	0.29	0.46	5.4%	24.1%
Oregon	10.9%	4.8%	0.44	0.57	-1.6%	23.5%
CompositeREITS	9.6%	18.9%	1.96	-0.13	-47.5%	33.7%
TCM10Y	4.1%	1.9%	0.45	0.30	0.9%	7.9%
S&P500	7.7%	17.3%	2.26	-0.13	-48.6%	29.3%
Gold	4.8%	13.8%	2.86	0.06	-31.9%	27.7%
CPI	2.5%	1.3%	0.54	0.27	0.1%	6.8%

Source: USDA, TIAA Center for Farmland Research MSCI, FRED, NAREIT, London Bullion Market Association/GoldHub, U.S. Bureau of Labor Statistics (BLS).

Yield Curve through Feb 10, 2023 (weekly)

- Credit easing events *since 2008, and start of pandemic*
- Natural Multiple expansion/contraction
- Massive stimulus on top is a somewhat different effect
- Fed Purchases from Treas. to manage interest rates (new)
- Massive reversal in 2022
- Fed B/S debate settling on managed chaos

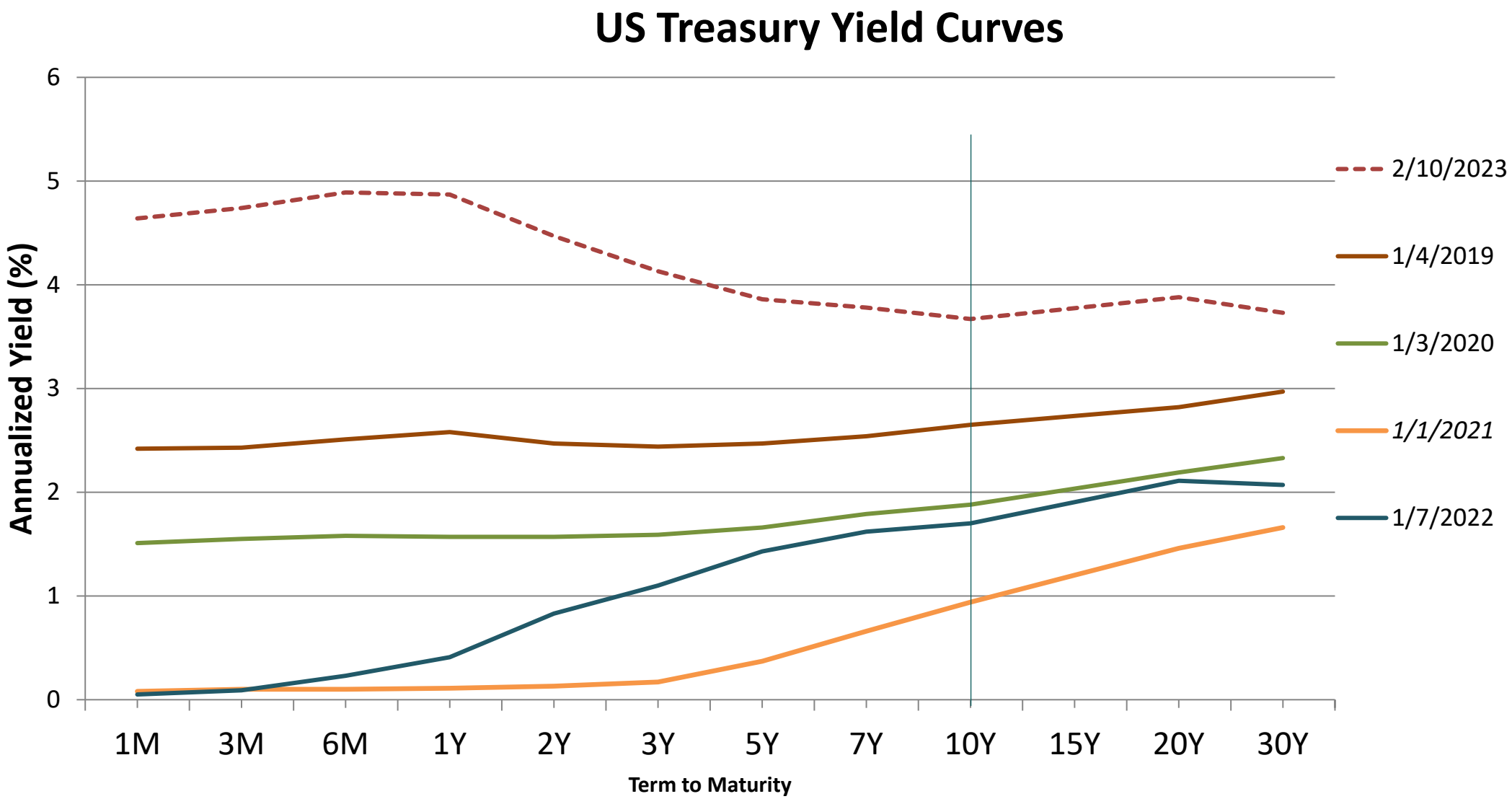
IMPACT ON REAL ESTATE via Inflation vs. Cap Rate effect?



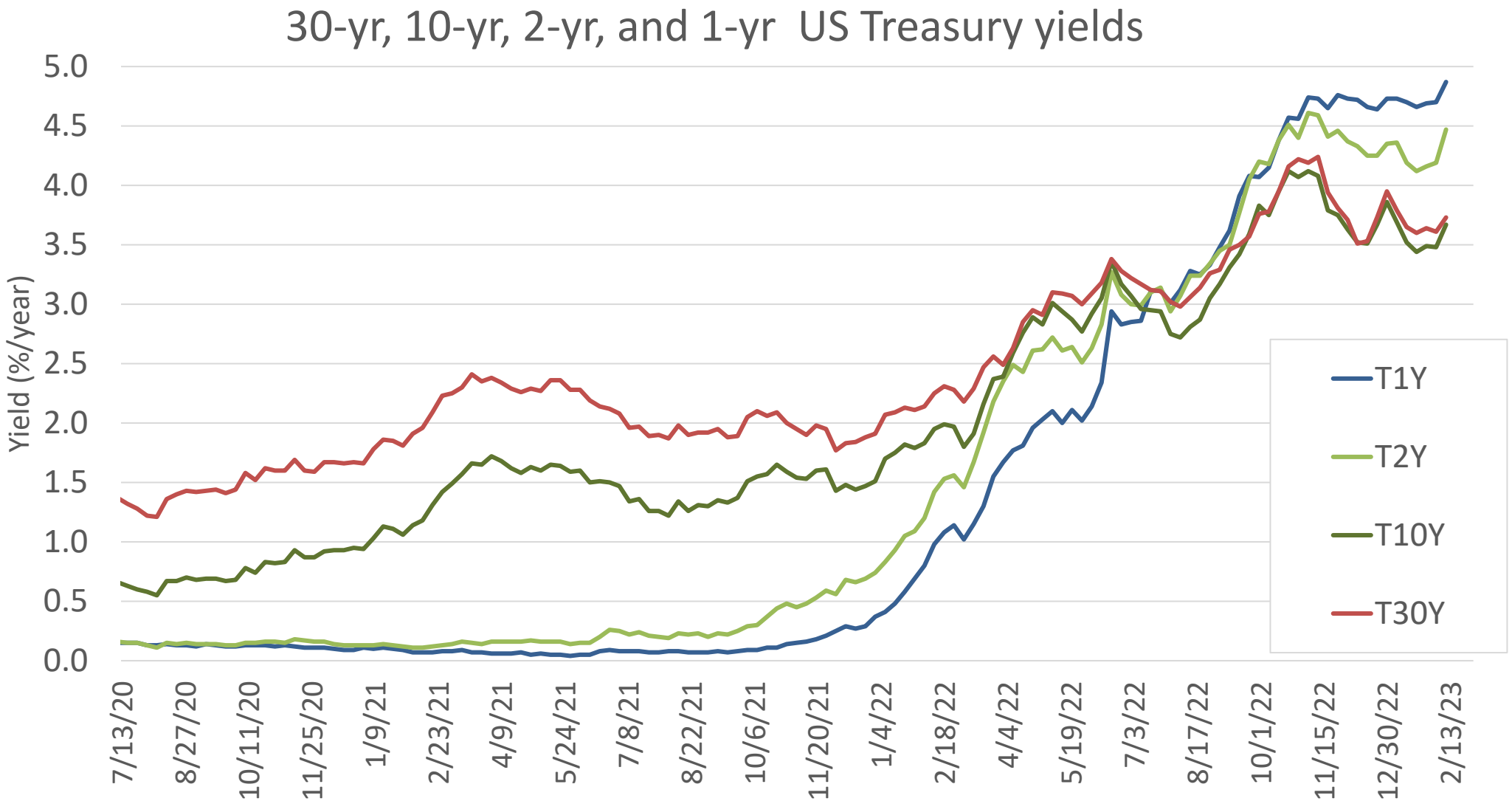
Recent FOMC Rate hikes | cuts

*(12/15, 12/16, 3/17, 6/17, 12/17, 3/18, 6/18, 9/18, 12/18, 7/19, 9/19, 10/19, 3/20, 3/20, **3/20,** 3/22, 4/22,6/22, 7/22, 9/22, 11/22, 12/22, 2/23 ..)*

Expected future rates, and the discount rate for Ag



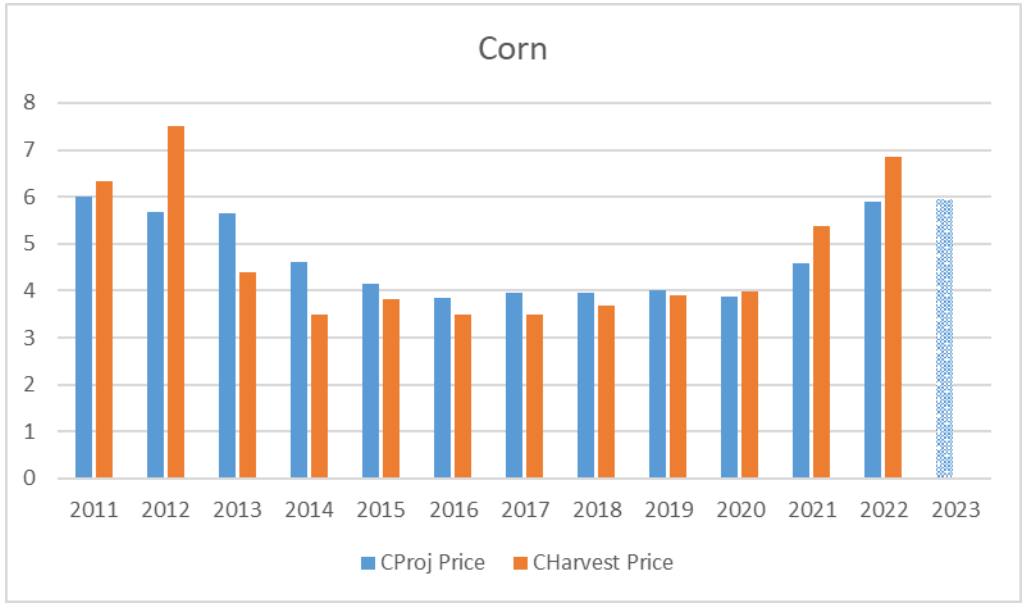
Significant inversion signals market beliefs in reversal

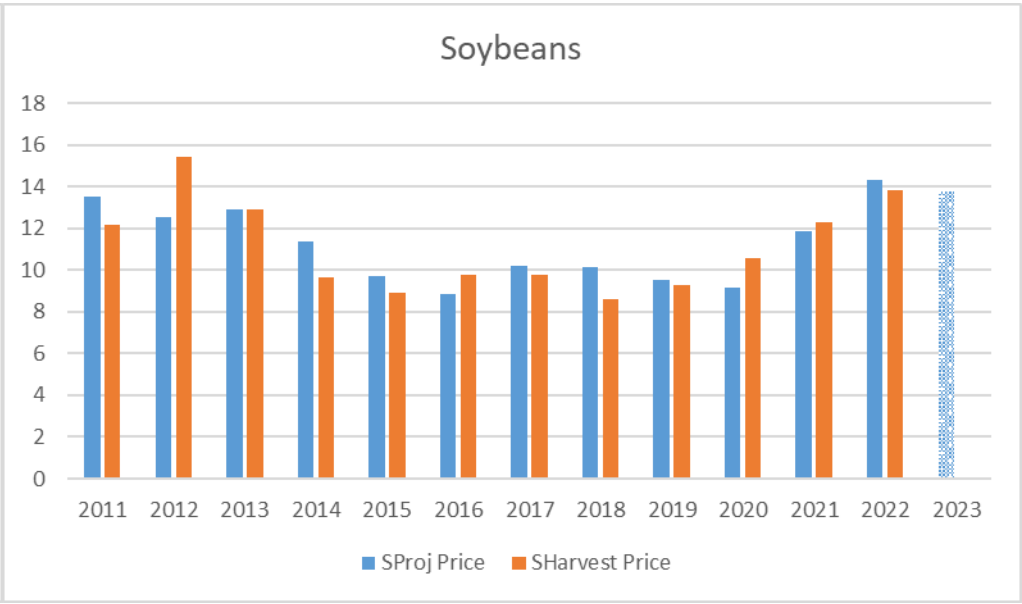


Historic insurance prices and 2023 prospects

Projected Prices, Harvest Prices, and Volatilies, Corn and Soybeans, SCD 3/15 (RMA, and forecasted)

Corn	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	***2022***	***2023 (f)***
Proj Price	6.01	5.68	**5.65**	**4.62**	**4.15**	**3.86**	**3.96**	**3.96**	**4.00**	3.88	4.58	5.90	*5.95*
Harvest Price	**6.32**	**7.50**	4.39	3.49	3.83	3.49	3.49	3.68	3.90	**3.99**	**5.37**	**6.86**	
Volatility	0.29	0.22	0.20	0.19	0.21	0.17	0.19	0.15	0.15	0.15	0.23	0.23	*0.18*
Soybeans													
Proj Price	**13.49**	12.55	12.87	**11.36**	**9.73**	8.85	**10.19**	**10.16**	**9.54**	9.17	11.87	**14.33**	*13.80*
Harvest Price	12.14	**15.39**	12.87	9.65	8.91	**9.75**	9.75	8.60	9.25	**10.55**	**12.30**	13.81	
Volatility	0.23	0.18	0.17	0.13	0.16	0.12	0.16	0.14	0.12	0.12	0.19	0.19	*0.14*





Inflation Reduction Act spending – as stated

Economic Sector Spending

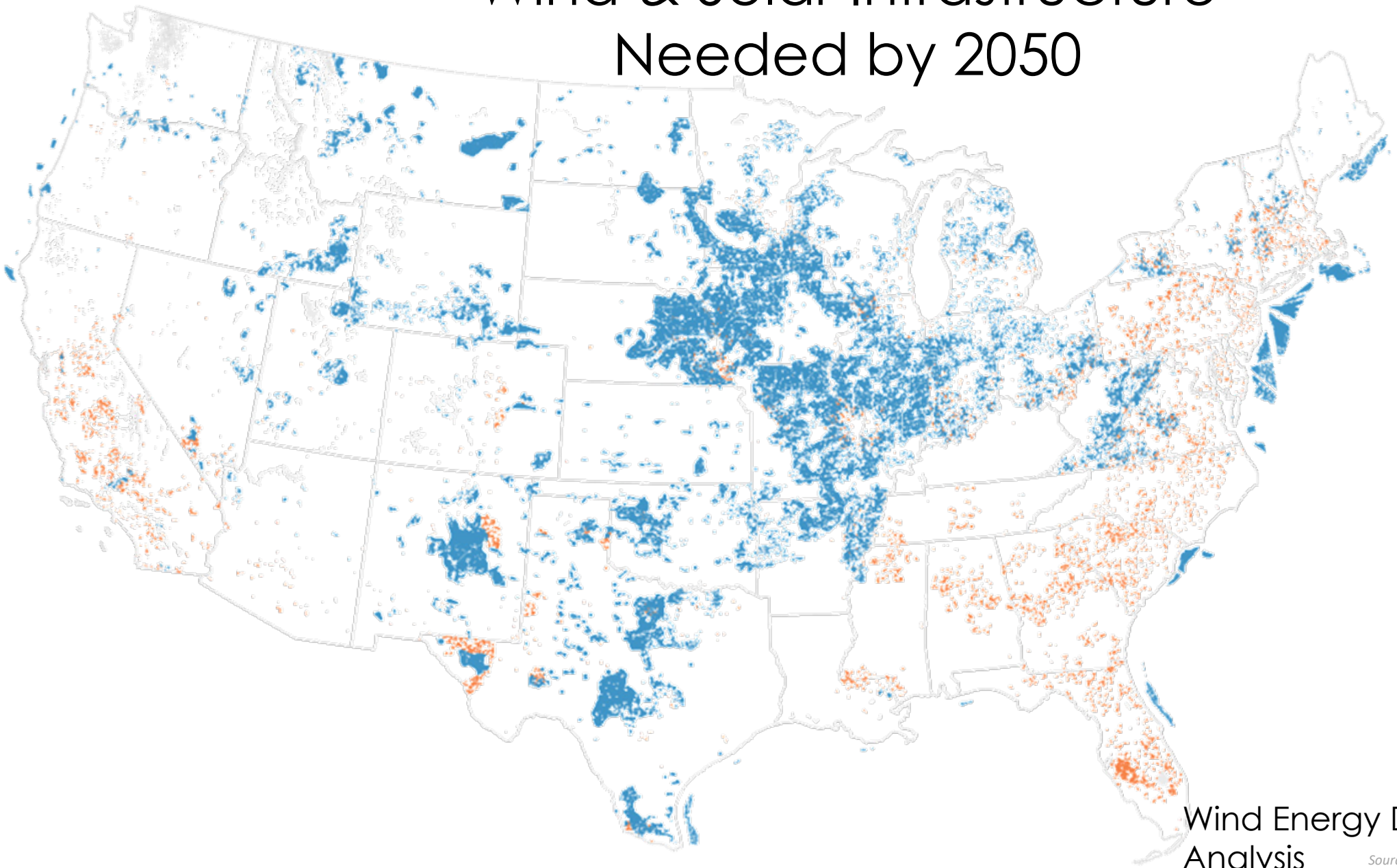
Energy	$250.6 Billion
Manufacturing	$47.7 Billion
Environment	$46.4 Billion
Transportation & Electric Vehicles	$23.4 Billion
Agriculture (direct)	$20.9 Billion
Water	$4.7 Billion
TOTAL	**$393.7 Billion**

Wind Energy Demand Impacts - example

Installed wind generation capacity (TW)	3.07
MW produced per wind turbine	2.75
Total turbines installed	1,116,364
Percentage of turbines installed on farmland	80%
Total turbines installed on farmland	893,091
Average annual lease rate per farmland turbine	$10,000
Total farmland turbine revenue generated	$8.9 billion
Cap rate for turbine revenue	6.0%
Total U.S. Farmland Value Impact	**$150 billion**

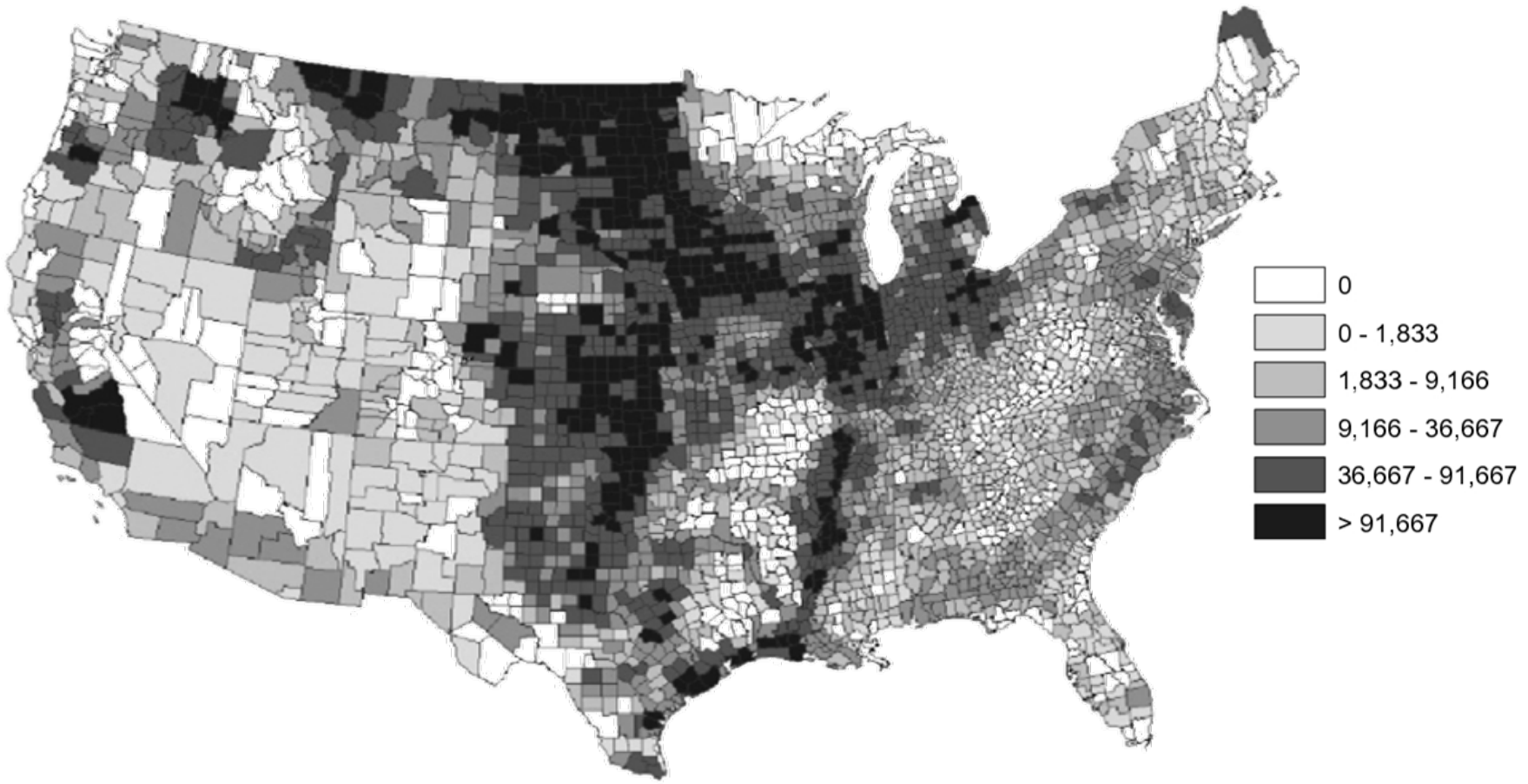
Source: Net Zero America

Wind & Solar Infrastructure Needed by 2050



Wind Energy Demand Analysis

Source: Net Zero America



SOC Sequestration from **No Till** *(MTeq CO_2 /yr)*

Price/ton of carbon credit	$60/ton
Annual CO_2 Sequestration (MT)	200,000,000
Total Annual Value	$12,000,000,000
U.S. Farmland Cap Rate	3.50%
U.S. Farmland Value Impact	**$342,857,142,857**

Source: Carbon Balance & Management Journal

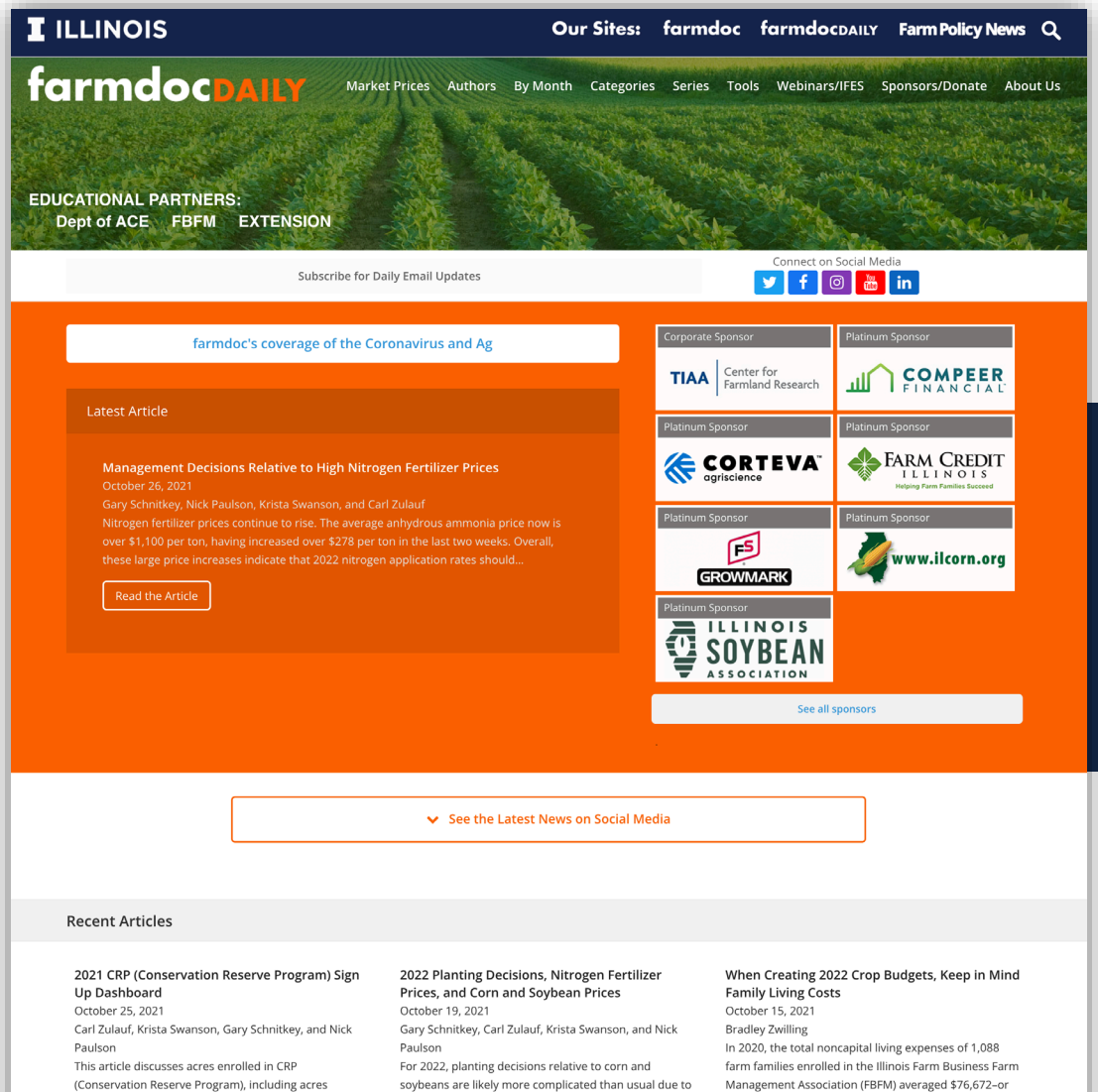
Key Value Drivers (and brakes) for Farmland

- Ag Policy impacts and changing emphasis of US Federal policy
- Additional spending in non-traditional titles and direct interventions
- “Climate” as proxy for payment linkages in ag
  - Ex., IRA spending both directly on ag and through energy programs
- Crop Insurance features and extensions to guarantee increasingly higher coverage levels
- ROW Demand expansion via population and standards of living

Key Drivers ... *(continued)*

- Low debt usage and lower relative credit spreads compared to other real assets, but increasing rates still pressure prices
  - Likely favors farmer buyers
  - Blended financing impact still fairly low compared to housing for example
- Input prices (somewhat more responsive to farm conditions)
- Low turnover, thin market support
- Recent high incomes, strong balance sheets
  - 2023 sector level likely to exceed $4 trillion for first time

Thank You!
Please send any questions/comments to:
sherrick@illinois.edu



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