Factors Impacting Future Farmland Values

ISPFMRA Land Values & Lease Trends Conference
Bloomington, IL
March 22, 2018

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Advancing Farmland Markets through Research and Information

farmdoc DAILY

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Advancing Farmland Markets through Research and Information

Goals: improve accuracy and understanding of asset class, and to provide unbiased research and useful tools for those involved with farmland investments.

Tools and articles at:

http://farmdocdaily.illinois.edu/

http://farmland.illinois.edu/

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Balance Sheet of Ag Sector -- US

Table 1. Selected Balance Sheet Characteristics of US Agricultural Sector

	1970	1980	1990	2000	2010	2013	2015	2017
	($ millions, except ratios - source ERS-USDA)							
Farm Assets	**278,823**	**1,000,422**	**840,609**	**1,203,215**	**2,170,832**	***2,776,110***	***2,909,653***	***3,074,869***
Real Estate	202,418	782,820	619,149	946,428	1,660,114	*2,251,002*	*2,395,363*	*2,556,932*
Non Real Estate	76,405	217,602	221,459	256,787	510,718	*525,108*	*514,290*	*517,937*
Farm Debt	**48,501**	**162,432**	**131,116**	**163,930**	**278,931**	***315,332***	***356,738***	***389,965***
Real Estate	27,238	85,272	67,633	84,724	154,065	*185,161*	*208,769*	*242,418*
Non Real Estate	21,263	77,160	63,483	79,206	124,865	*130,172*	*147,969*	*147,547*
Equity	**230,322**	**837,990**	**709,493**	**1,039,285**	**1,891,902**	***2,460,777***	***2,552,915***	***2,684,904***
Selected Indicators								
Debt/Equity	21.1%	19.4%	18.5%	15.8%	14.7%	*12.8%*	*14.0%*	*14.5%*
Debt/Assets	17.4%	16.2%	15.6%	13.6%	12.8%	*11.4%*	*12.3%*	*12.7%*
Real Estate/Equity	87.9%	93.4%	87.3%	91.1%	87.7%	*91.5%*	*93.8%*	*95.2%*
Real Estate/Assets	72.6%	78.2%	73.7%	78.7%	76.5%	*81.1%*	*82.3%*	*83.2%*
Real Estate D/Total D	56.2%	52.5%	51.6%	51.7%	55.2%	*58.7%*	*58.5%*	*62.2%*

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Ag Sector Balance Sheet -- US

- Farmland represents about 83% of farm assets
- Farm real estate debt only 62% of total farm debt
- Low aggregate leverage (approx. 13% D/A)
- Growth rates 1970-2017, continuous compounding, excluding income:
  - Assets --5%
  - Real Estate -- 5.3%
  - Debt – 5%
  - Equity – 5%
- Absence of active **equity** market with "hedgeable" indices – key in future.
- Ag Balance sheet compared to corporate sector vastly different, especially in financial structure (far less debt, non-uniform distribution)
- Early stage "financialization" critical to improving efficiency of farmland market.

Some major factors –

- Income and expectations for future income and its growth
  - Recent episodes influence expectations of future income in dampened fashion
  - "Real Option" issues (once out of game, cannot re-enter)
  - Stickiness of rental markets, ability to smooth through time
  - Crop insurance, risk management options create floors to some degree
- Cost of capital, opportunity costs, willingness to pay/accept
  - Economy-wide compression of returns
  - Relative advantage of long duration, inflation sensitive assets to institutions
  - Limited tradeability of assets in agricultural sector
- Long-term world thesis around food production remains fairly strong.

Market's view – Dec18 Corn (as of 3/21/18)

At Expiration	
Prob Below	Price
5%	$2.96
15%	$3.28
25%	$3.48
35%	$3.66
45%	$3.82
50%	**$3.91**
55%	$3.99
65%	$4.17
75%	$4.38
85%	$4.66
95%	$5.16

Enter Price to Evaluate: 3.96

The implied distribution indicates that there is a 53.21% probability that the price will be below $3.96 at expiration.

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http://farmdoc.illinois.edu/cropins/price-distribution.html

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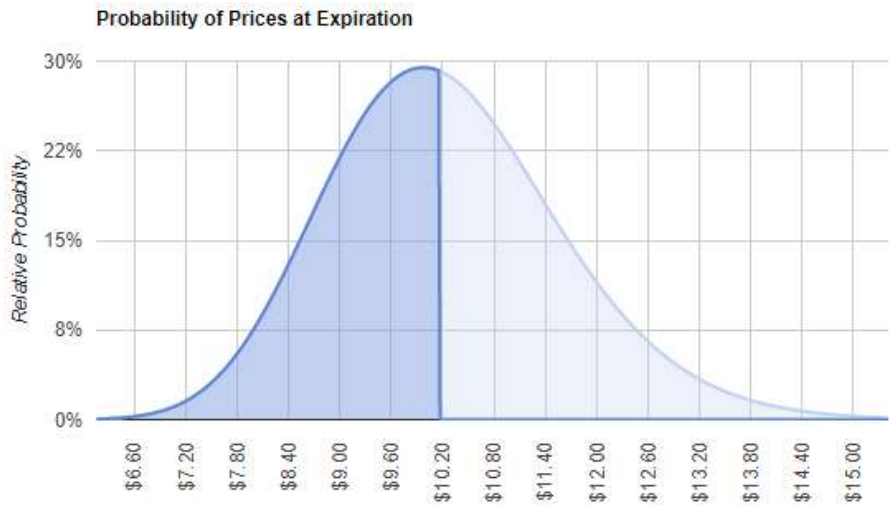
Nov18 Soybeans - (as of 3/21/18)



At Expiration	
Prob Below	Price
5%	$8.14
15%	$8.84
25%	$9.28
35%	$9.65
45%	$9.99
50%	**$10.16**
55%	$10.33
65%	$10.70
75%	$11.13
85%	$11.68
95%	$12.68

Enter Price to Evaluate: 10.16

The implied distribution indicates that there is a 49.99% probability that the price will be below $10.16 at expiration.

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http://farmdoc.illinois.edu/cropins/price-distribution.html

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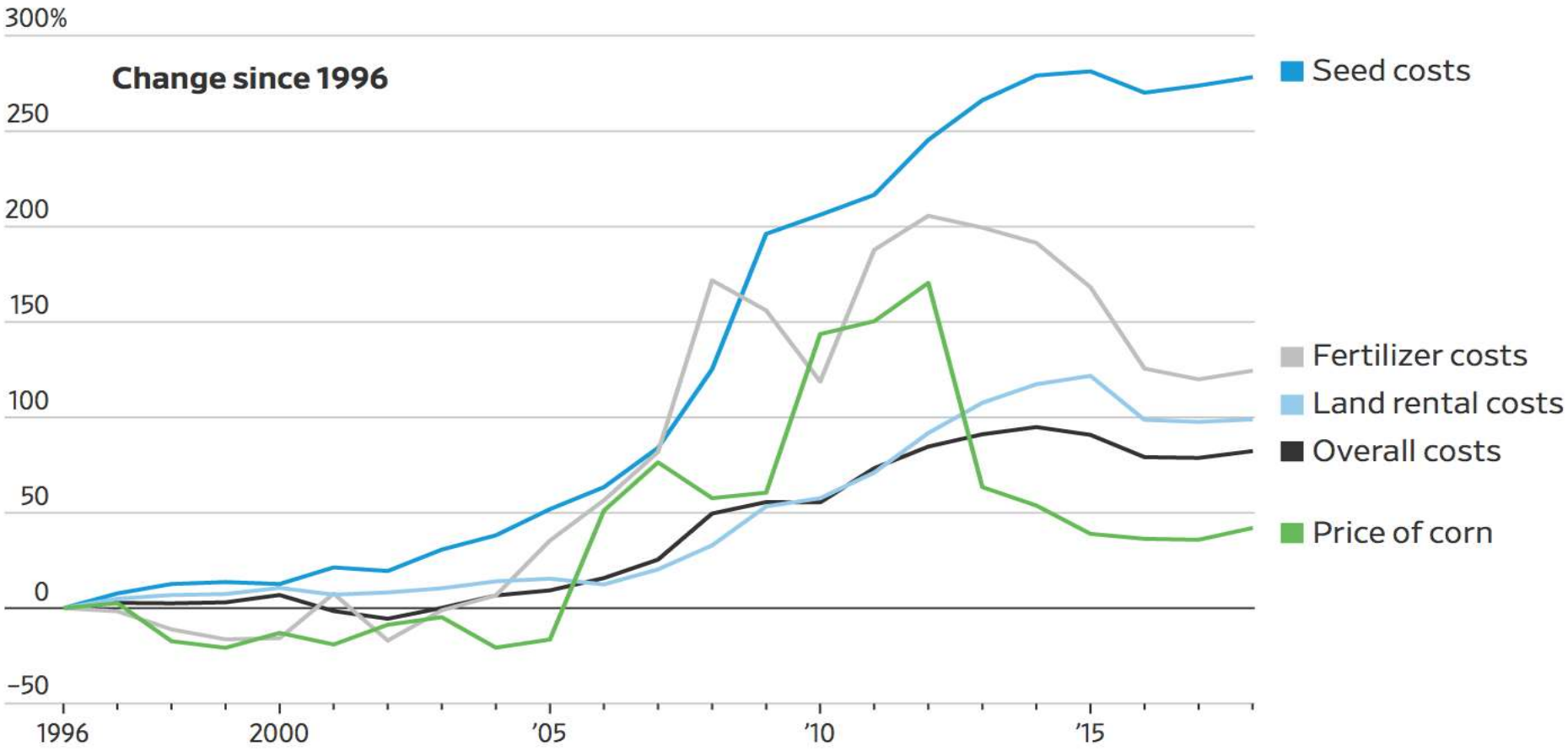
Price Pressure

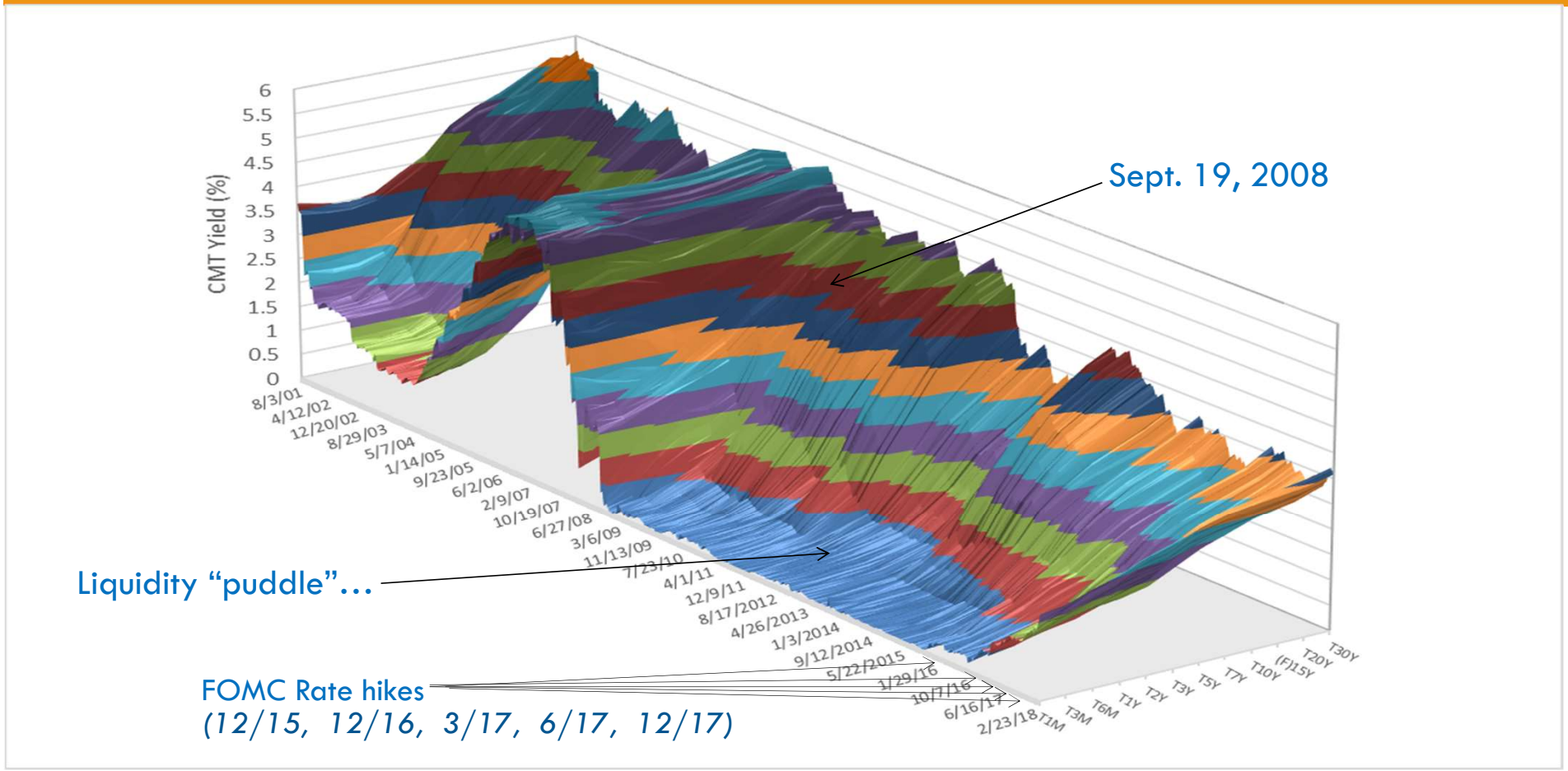
The costs of growing corn have risen more sharply than the sale price, cutting into profits.



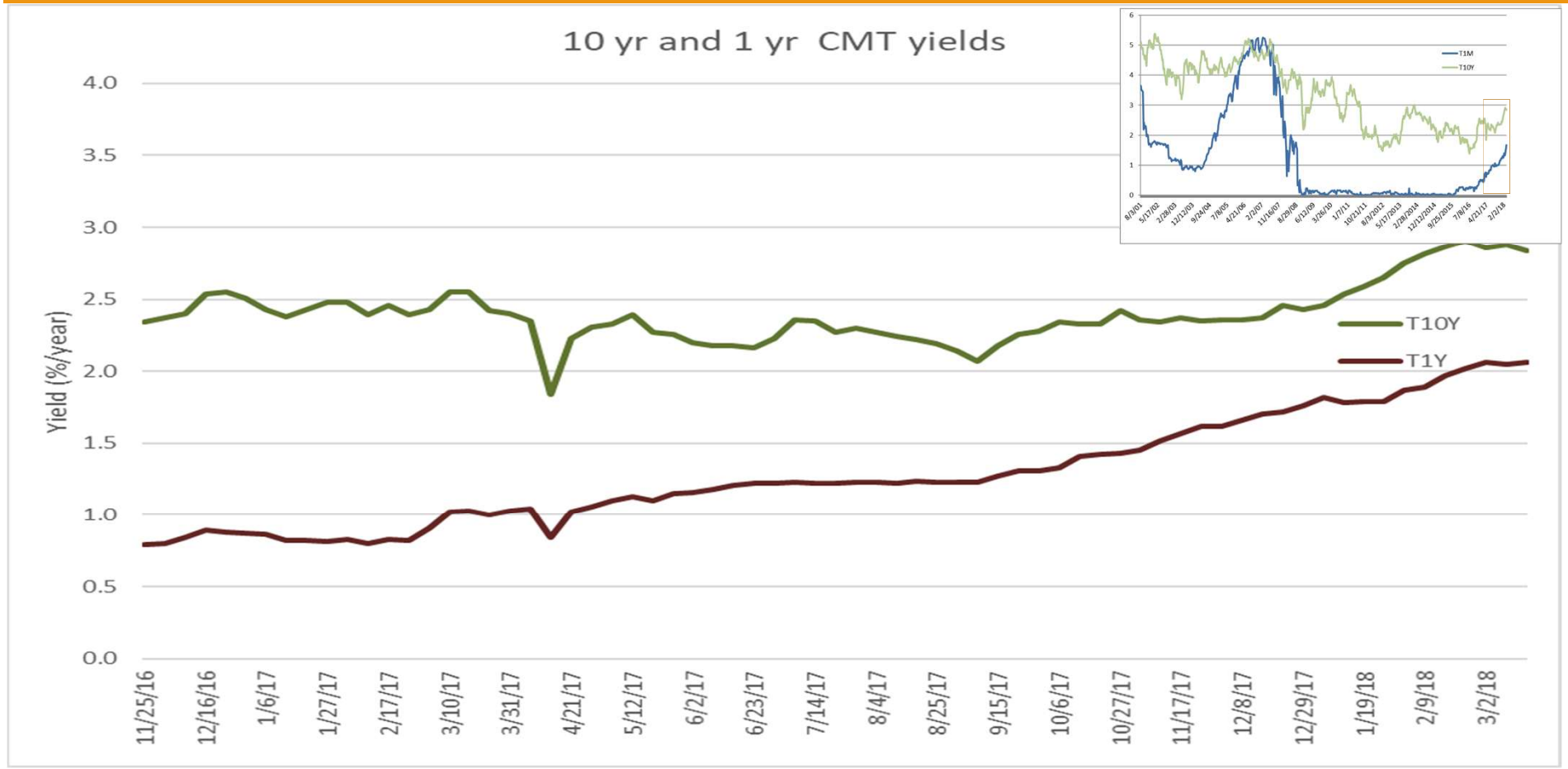
Note: 2017 and 2018 costs are projections. The price of corn is for the most-active futures contract.

Sources: U.S. Department of Agriculture (costs); FactSet (corn price)

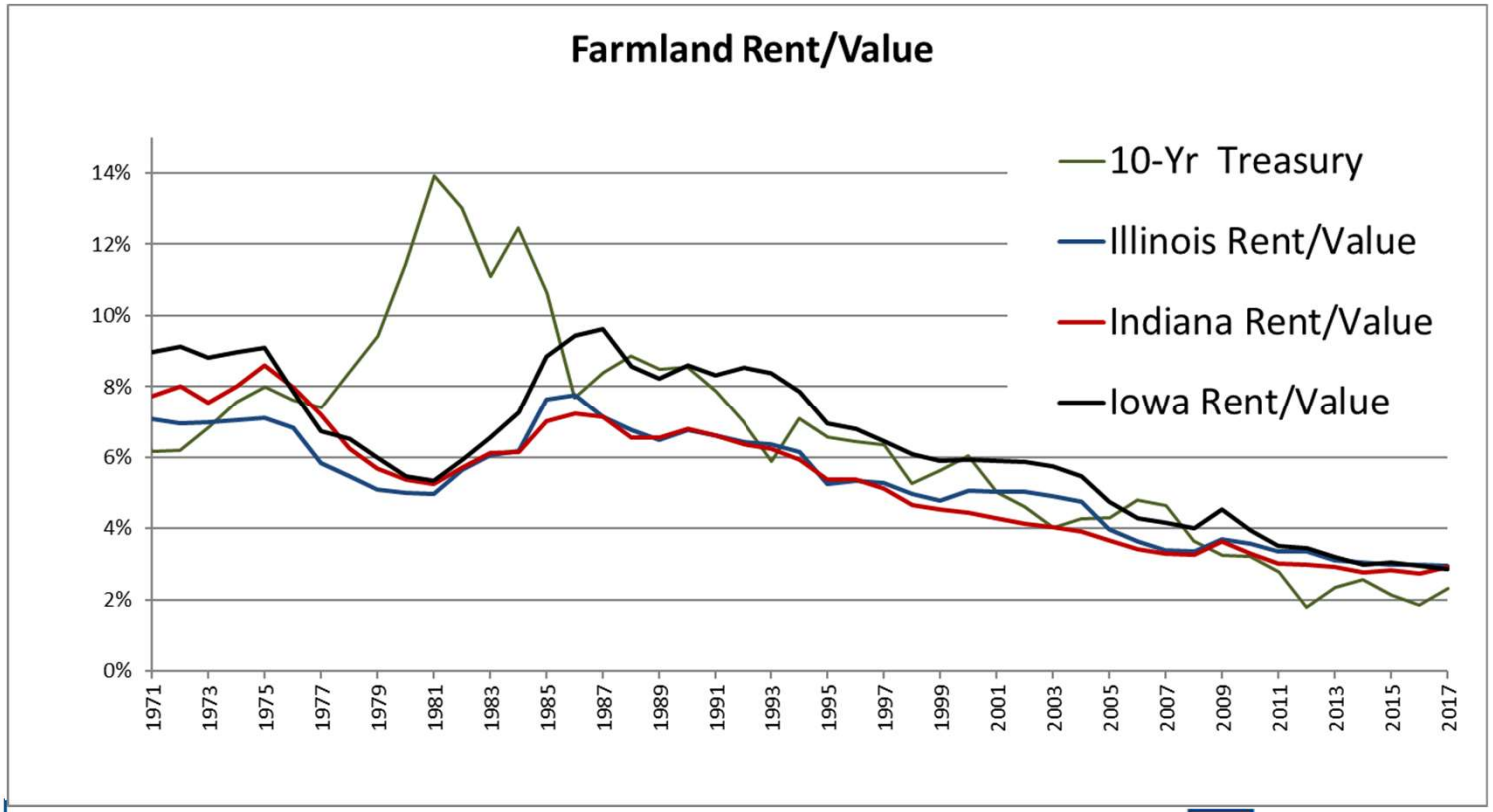
Yield Curve August 2001-March 16, 2018 (weekly)



What rates did 'they' raise…
and likely impacts of Fed Balance Sheet changes (shrink and Powell)



Does the Farmland Market Make Sense?



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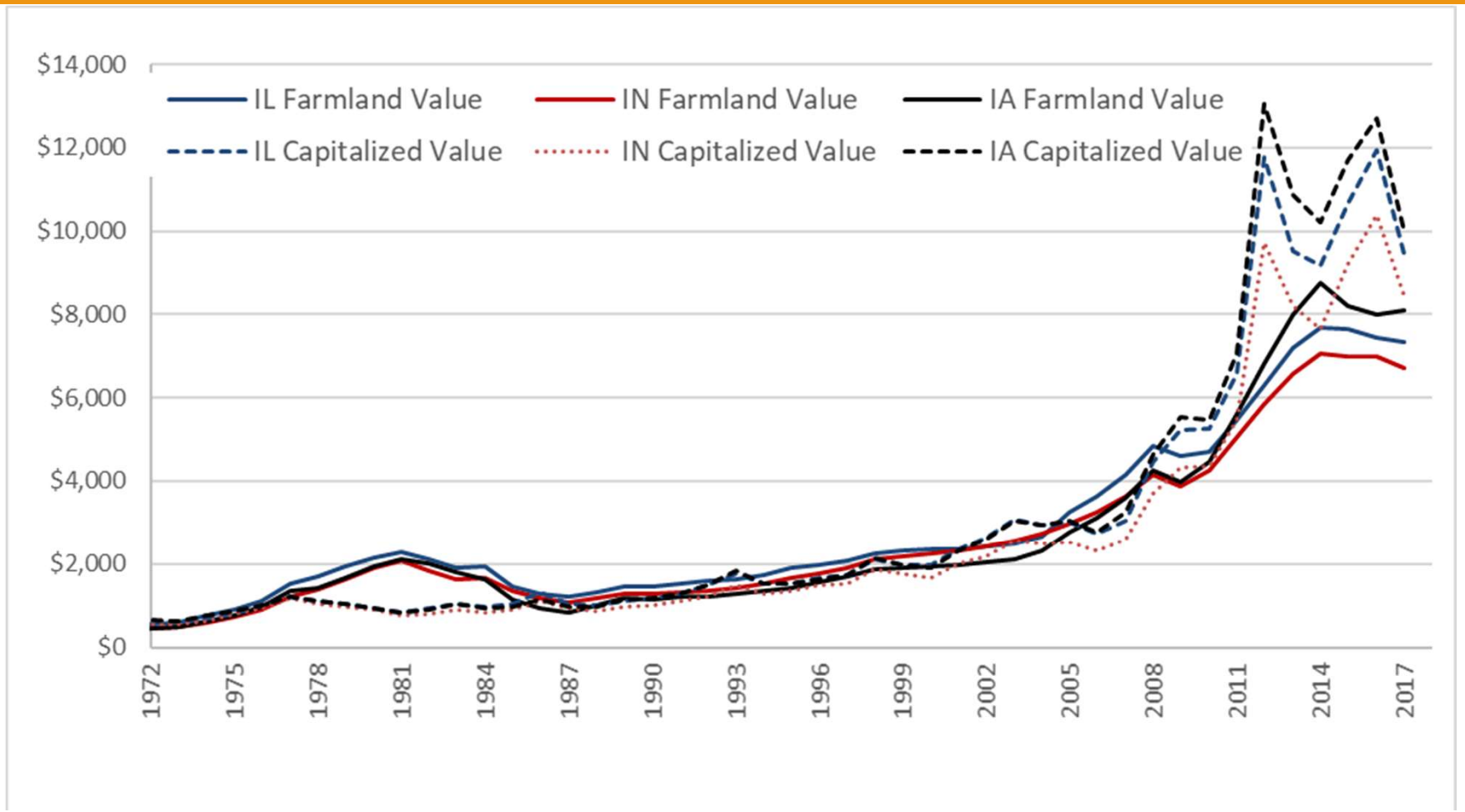
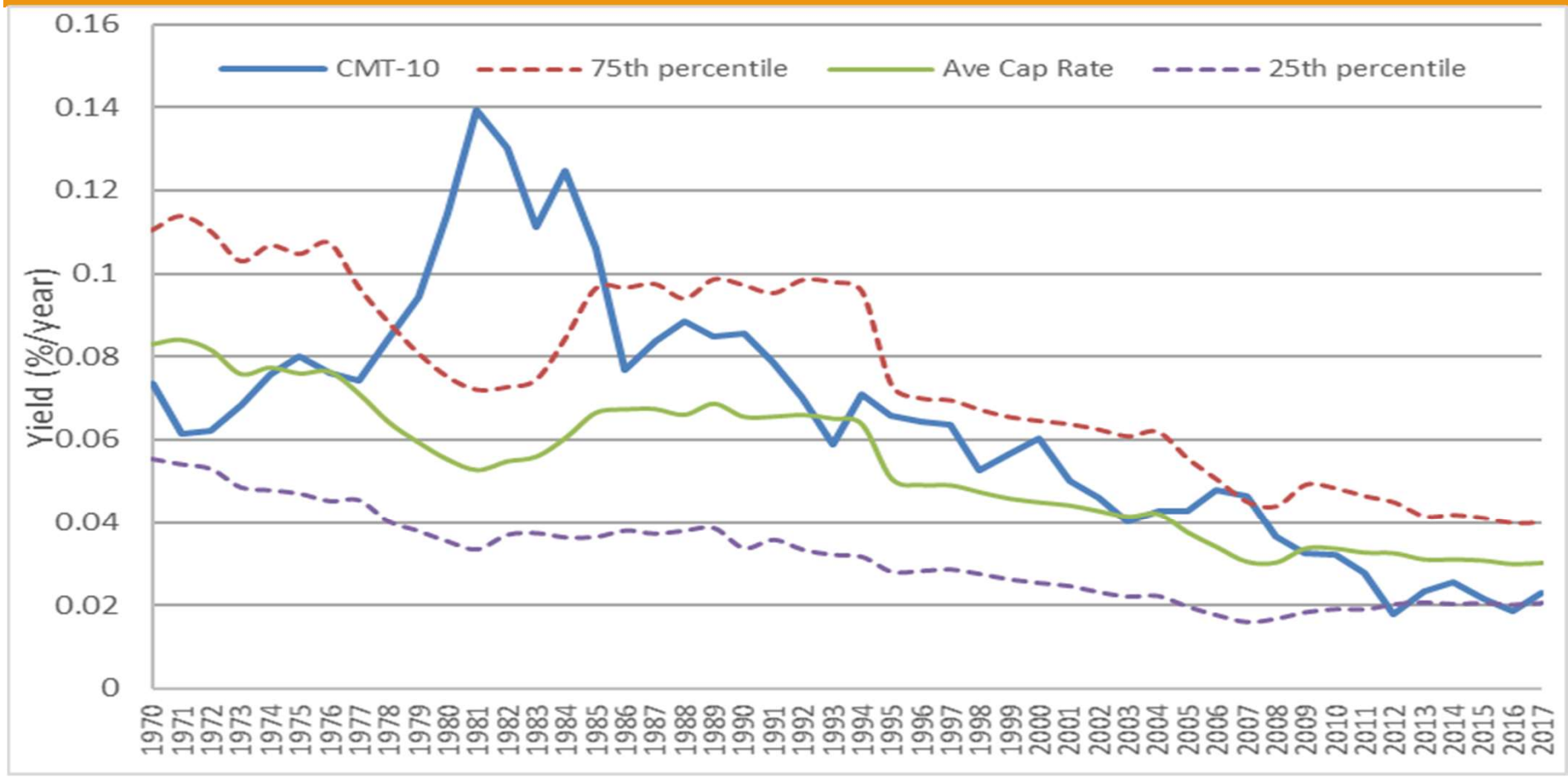
Does the Farmland Market Make Sense?




CMT-10
75th percentile
Ave Cap Rate
25th percentile
Yield (%/year)
0.16
0.14
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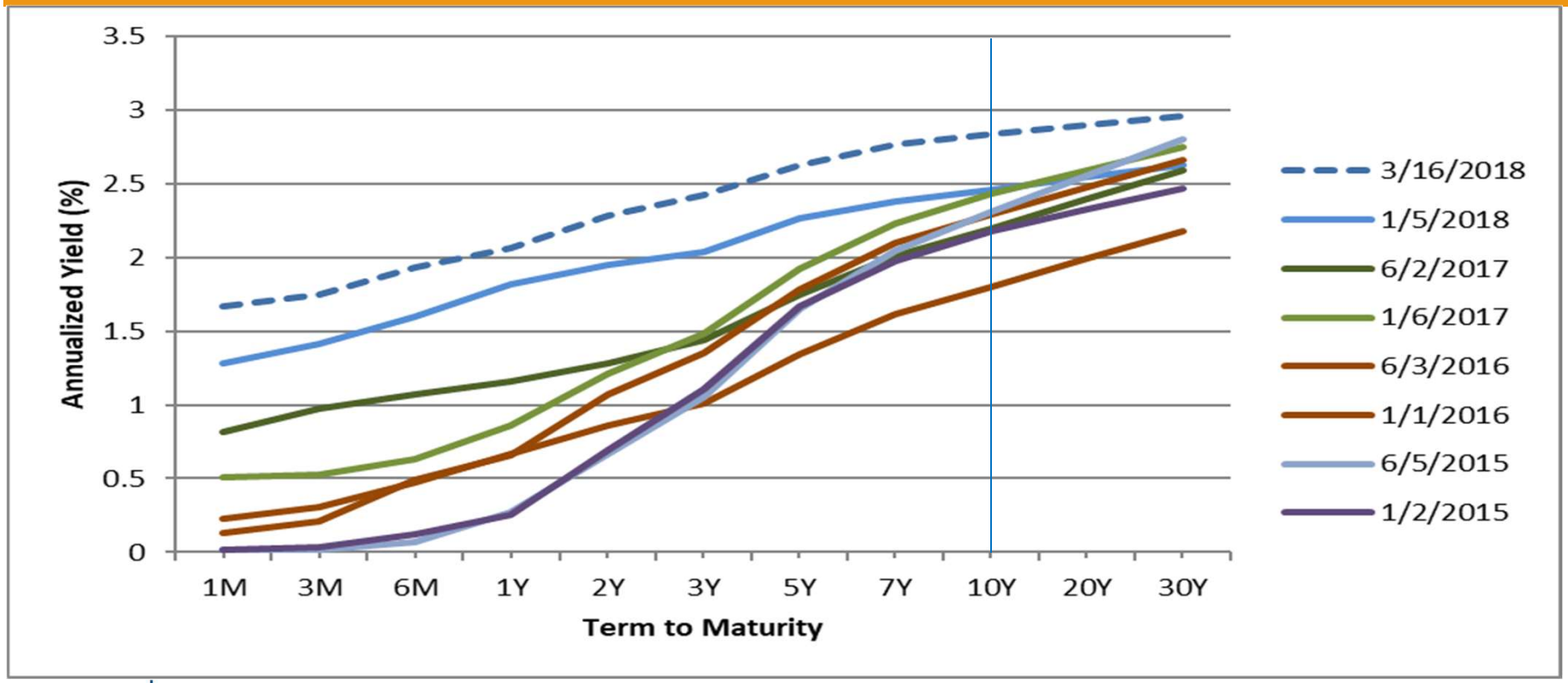
Will the Farmland Market Make Sense *(and to whom?)*



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Farmland Returns in context – 1970-2017

Table 1. Asset Return Characteristics

Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	Correlation
		---------- 1970 - 2017----------		
Illinois	10.14%	9.58%	0.945	1
S&P500	7.02%	16.47%	2.347	-0.229
NASDAQ	10.09%	24.89%	2.467	-0.075
EAFE	6.32%	20.37%	3.222	-0.247
AAA	8.71%	2.79%	0.320	-0.186
TCM10Y	6.48%	2.97%	0.458	-0.116
Mort30F	8.07%	3.29%	0.408	-0.124
All REITS	9.08%	19.90%	2.191	-0.117
Gold	7.51%	22.56%	3.006	0.139
CPI	3.91%	2.83%	0.724	0.370

Farmland Returns in context – 1980-2017

Table 2. Asset Return Characteristics

Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	Correlation
	---------- 1980 - 2017----------			
Illinois	7.90%	8.11%	1.026	1
S&P500	8.45%	15.73%	1.863	-0.135
NASDAQ	10.09%	24.89%	2.467	-0.075
EAFE	6.47%	20.46%	3.164	-0.310
AAA	8.55%	3.08%	0.361	-0.349
TCM10Y	6.22%	3.25%	0.522	-0.297
Mort30F	7.88%	3.60%	0.456	-0.274
All REITS	10.25%	16.85%	1.644	-0.140
Gold	2.43%	15.96%	6.556	-0.089
CPI	3.07%	2.08%	0.678	0.062

Farmland Returns in context – 1990-2017

Table 3. Asset Return Characteristics

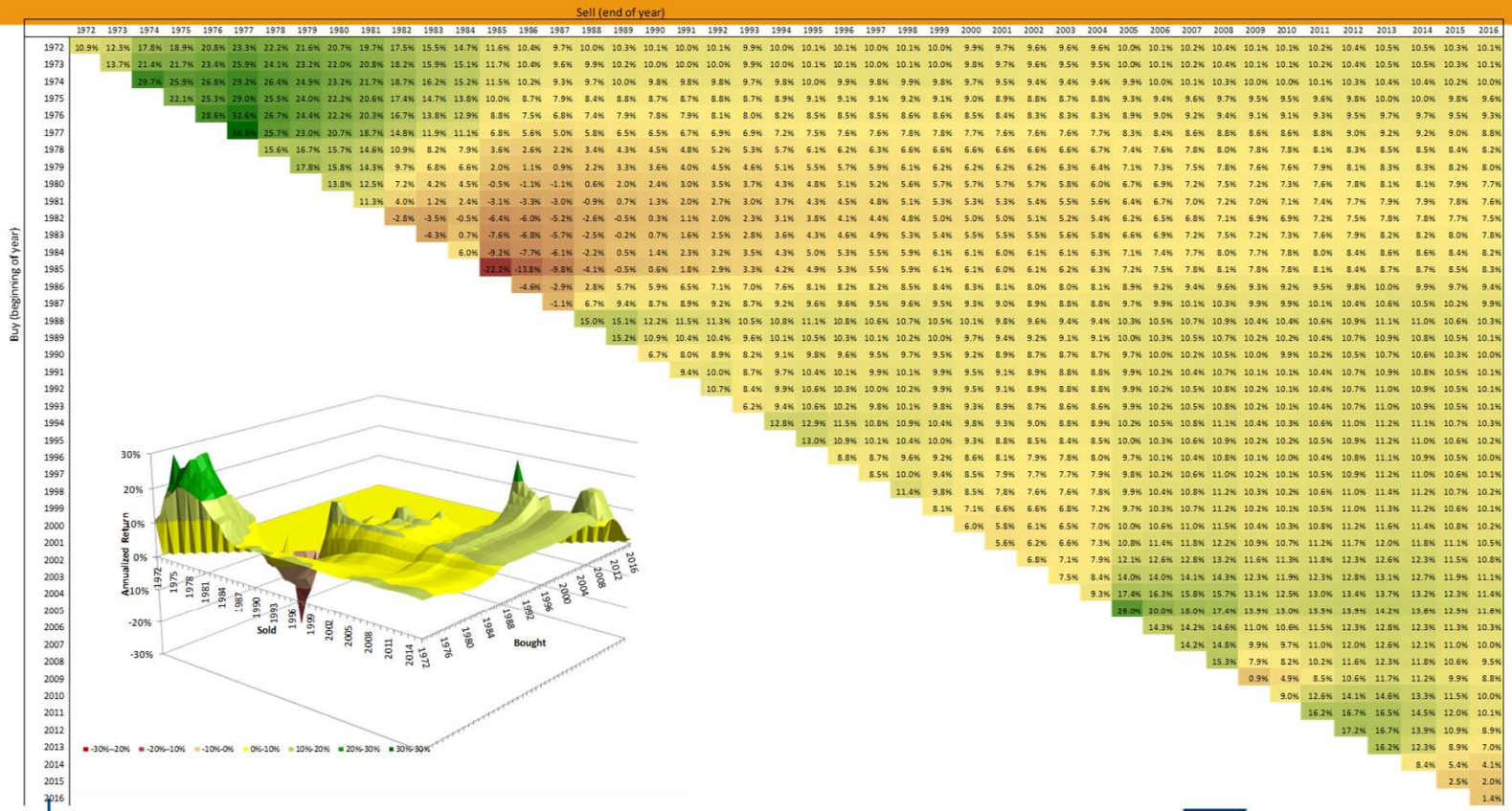
Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	Correlation
		1990 - 2017		
Illinois	9.79%	5.49%	0.561	1
S&P500	7.23%	17.03%	2.357	-0.061
NASDAQ	9.71%	26.60%	2.739	-0.055
EAFE	2.40%	19.91%	8.303	-0.034
AAA	7.02%	1.55%	0.220	-0.066
TCM10Y	4.65%	1.87%	0.403	0.025
Mort30F	6.16%	2.09%	0.340	0.118
All REITS	9.71%	18.35%	1.890	-0.209
NCREIFTotal Farmland	11.85%	6.66%	0.562	0.797
Gold	4.20%	14.11%	3.362	0.004
CPI	2.39%	1.11%	0.465	0.056

Farmland Returns in context – 2000-2017

Table 4. Asset Return Characteristics

Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	Correlation
		---------- 2000 - 2017----------		
Illinois	9.91%	6.63%	0.669	1
S&P500	3.33%	18.13%	5.452	-0.095
NASDAQ	2.94%	26.48%	9.017	-0.077
EAFE	0.85%	21.72%	25.573	-0.045
AAA	6.21%	1.18%	0.191	-0.045
TCM10Y	3.53%	1.20%	0.341	0.114
Mort30F	5.07%	1.74%	0.344	0.231
All REITS	10.77%	18.65%	1.731	-0.265
NCREIFTotal Farmland	13.69%	7.58%	0.554	0.869
Gold	8.29%	14.59%	1.760	0.008
CPI	2.12%	1.00%	0.474	0.190

Farmland: time and all holding periods



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(Illinois 1970-2016)

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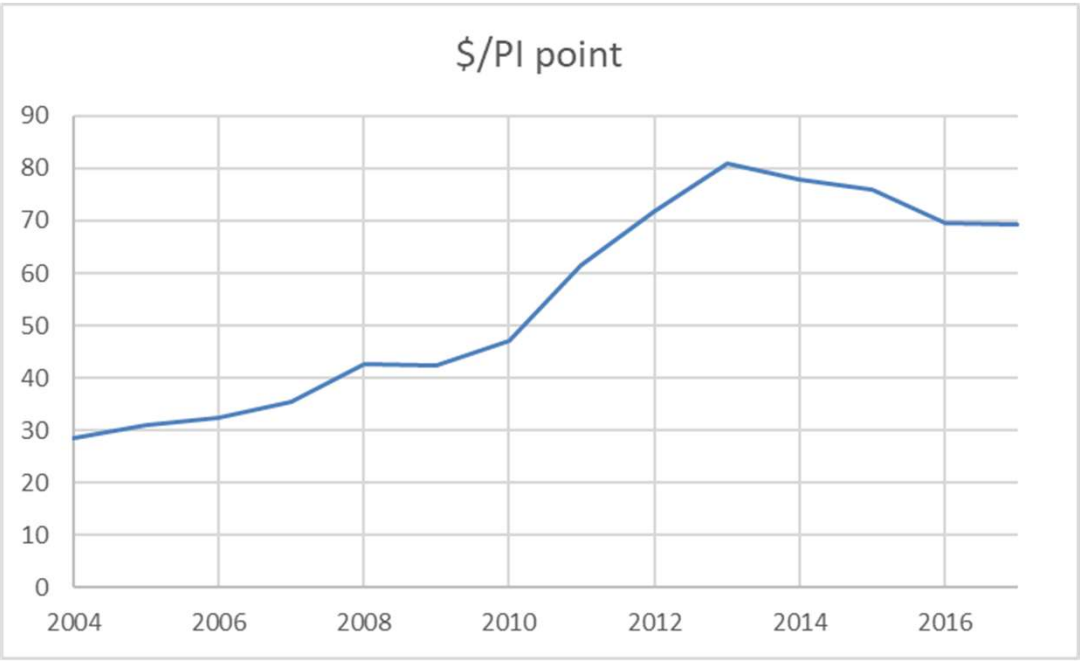
The Illinois Case through time in aggregate



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$Farmland\ Value = E(R)/(i-g)$

E(R) ($/ac/year)	Discount Rate = i: 3.0%	3.5%	4.0%	4.5%	5.0%	5.5%	6.0%
150	7,500	6,000	5,000	4,286	3,750	3,333	3,000
175	8,750	7,000	5,833	5,000	4,375	3,889	3,500
200	10,000	8,000	6,667	5,714	5,000	4,444	4,000
225	11,250	9,000	7,500	6,429	5,625	5,000	4,500
250	12,500	10,000	8,333	7,143	6,250	5,556	5,000
275	13,750	11,000	9,167	7,857	6,875	6,111	5,500
300	15,000	12,000	10,000	8,571	7,500	6,667	6,000
325	16,250	13,000	10,833	9,286	8,125	7,222	6,500
350	17,500	14,000	11,667	10,000	8,750	7,778	7,000
375	18,750	15,000	12,500	10,714	9,375	8,333	7,500
400	20,000	16,000	13,333	11,429	10,000	8,889	8,000

1% = g or growth rate of income

(example – for others see link in Wind Lease article)

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"Futuring Forces" –iSHARES Ag Conference

- **Dystopia or Plenty?:** Malthus will always be wrong. Fast forward to 2035 and look back: Did we get proteins from crickets instead of beef? Global warming freeing expanding farmland? Increased production from 3rd world countries? Or continued ag productivity gains from traditional crops?
- **Consumer First: Gen Z Takes Control-** Millenials are very particular about their food. Fearful of GMOs but embracing CRISPR. They are biohacking. Liberated from privacy and fanatical for data, Gen Z studies the source of food like one might talk about a fine wine. They innovate. … Perfect traceability of every ingredient
- **Hyper Local Data: Meet Your Burger** - It's 2035. Search by whatever meta variable meets your fancy: Organic, Free-from, Includes --, Healthy, Nutritionally Available, Antibiotic-free, Cage-free, Free Range, Sustainable, non-GMO, Traceable, "Single Cow" Burgers.
- **Convergence of Ag and Health** - Am I healthy because I eat well, or do I eat well because I am healthy? Need labels beyond production mode. *What was that Organic thing of the past?*
- Wang, Polaroid, Kodak. AOL, Yahoo, GE. **Do the Ag Giants have the same future** or pivot like IBM or AT&T? Why has **Walmart** filed for the most ag patents lately? What can Amazon do with ag drones? Granular announced partnership with PlanetLabs. This is a big deal….

… iSHARES Ag Conference topics

- **Mister Gadget and the Farm** In 2035, the farmer is a knowledge worker. Robots do the manual labor. At night, Roomba-like devices wander the field killing weeds. Fertilizer is precisely placed. At harvest, automated carts gather grain and sort based on the attributes of each plant.
- **The Rise of Synthetic Biology** Memphis Meats is growing meat in a lab from animal cells. How about cotton with the strength of spider silk? How about human milk oligosaccharides — beneficial sugars, naturally occurring in breast milk. How about wine, created on a molecular level, not from grapes? What *can't* we grow next? Grow feed for a lab or for an animal?
- **Alternative Proteins-** One hectare of land yields one metric ton of soy protein or 150 tons of insect protein. Which do chickens prefer? Protein can be produced using bacteria in a bioreactor. The process uses less water, consumes carbon as an input and can be located basically anywhere the protein is needed. And its nutritional content can be customized. Currently very costly.
- **No Land Required: The Rise of Indoor Farming** - Increased concentrations of humans in urban areas, the reduced costs of LED lighting, automation, growth optimization that can only happen in a controlled environment, and demand for clean, sustainable food have driven the efficiency up.

Other issues to consider

- Trade war could disproportionately affect agriculture – How likely?
- Farm Bill not really on the administration's radar – How likely to extend?
- Crop Insurance disconnect continues – How likely to change subsidy?
- *Very positive proposal to share data across agencies – Likely to improve*
- *Energy Policy increasingly tied to farmland – good for ag on balance?*
- *Strength of the dollar and trade deficit – stated goals incompatible*
- *Federal Reserve "dot plots" and sensitivity to equity market reactions*
- *World income growth disruptions/accelerators*

The Horizon effect

- "Financialization" likely to continue for the sector. Equity & indexing vehicles very positive developments despite local concerns
- Financial regulation will **not** retreat significantly in Ag – lenders key
- Relationship of consumers to food and food channel will cost more.
- Better use of data has always been the key to successful management. Technology is exploding and layering transactions with meta data
- *Separation of accounting for ownership and operation is healthy*
- *Farmland markets are still in infancy compared to other real asset markets*
- ***Improved efficiency will always capture economic rents***

Questions/Discussion

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