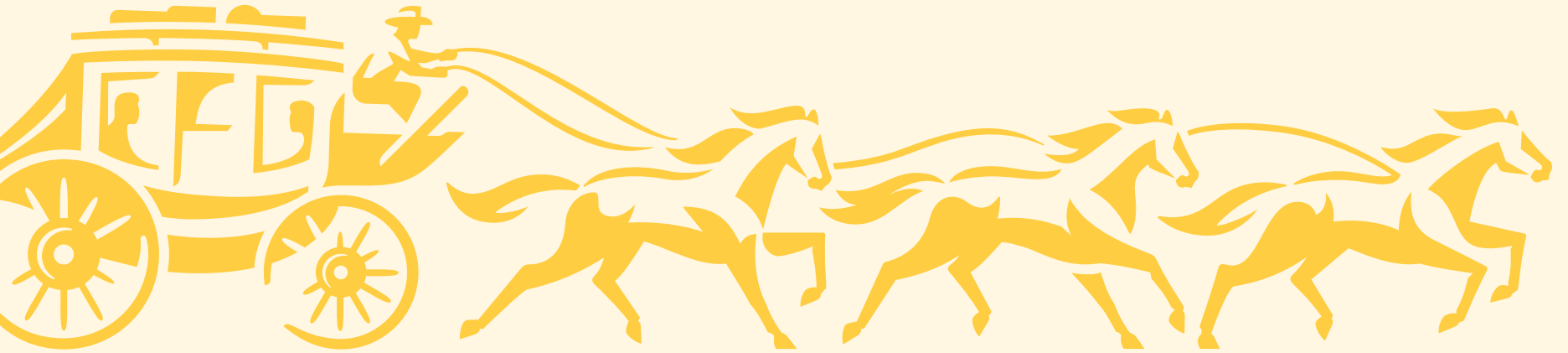


**WELLS
FARGO**



Agricultural Outlook: Rebalancing Agriculture

September, 2019
Michael Swanson Ph.D.
Agricultural Economist

The Global Ag Sector “renormalizes”

- Biofuels growth approaches zero
- The world is “long” grains and oilseeds
- The world is “long” agriculture
 - Not well distributed
 - Hard to argue on raw calories
- Management fuels large performance gaps
 - Labor management
 - Capital allocation
 - Technology adoption

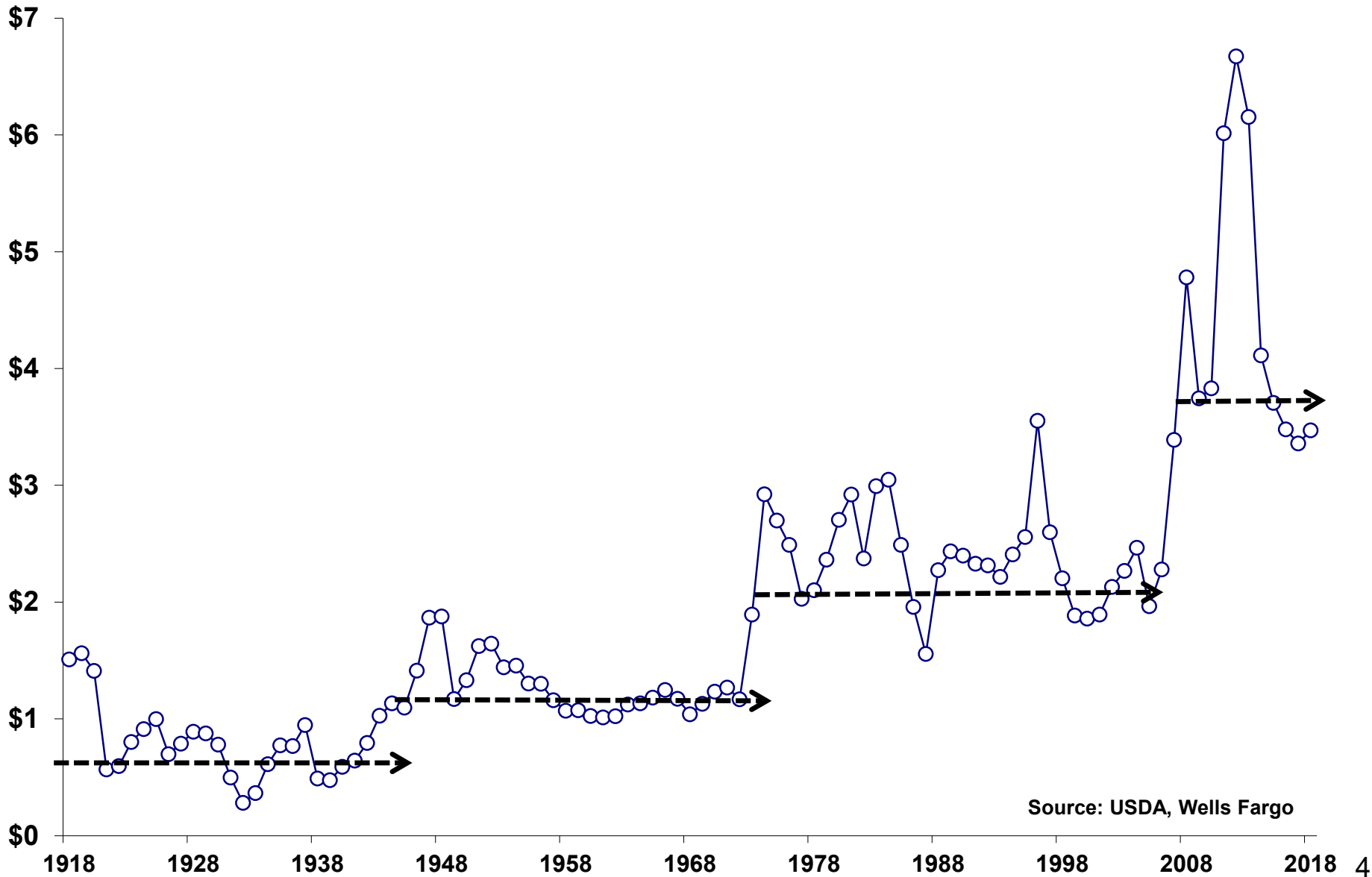
Everything is connected.

We just don't see how.

Connection corollary: Nothing natural moves in a straight line.

Why do commodity prices move like this?

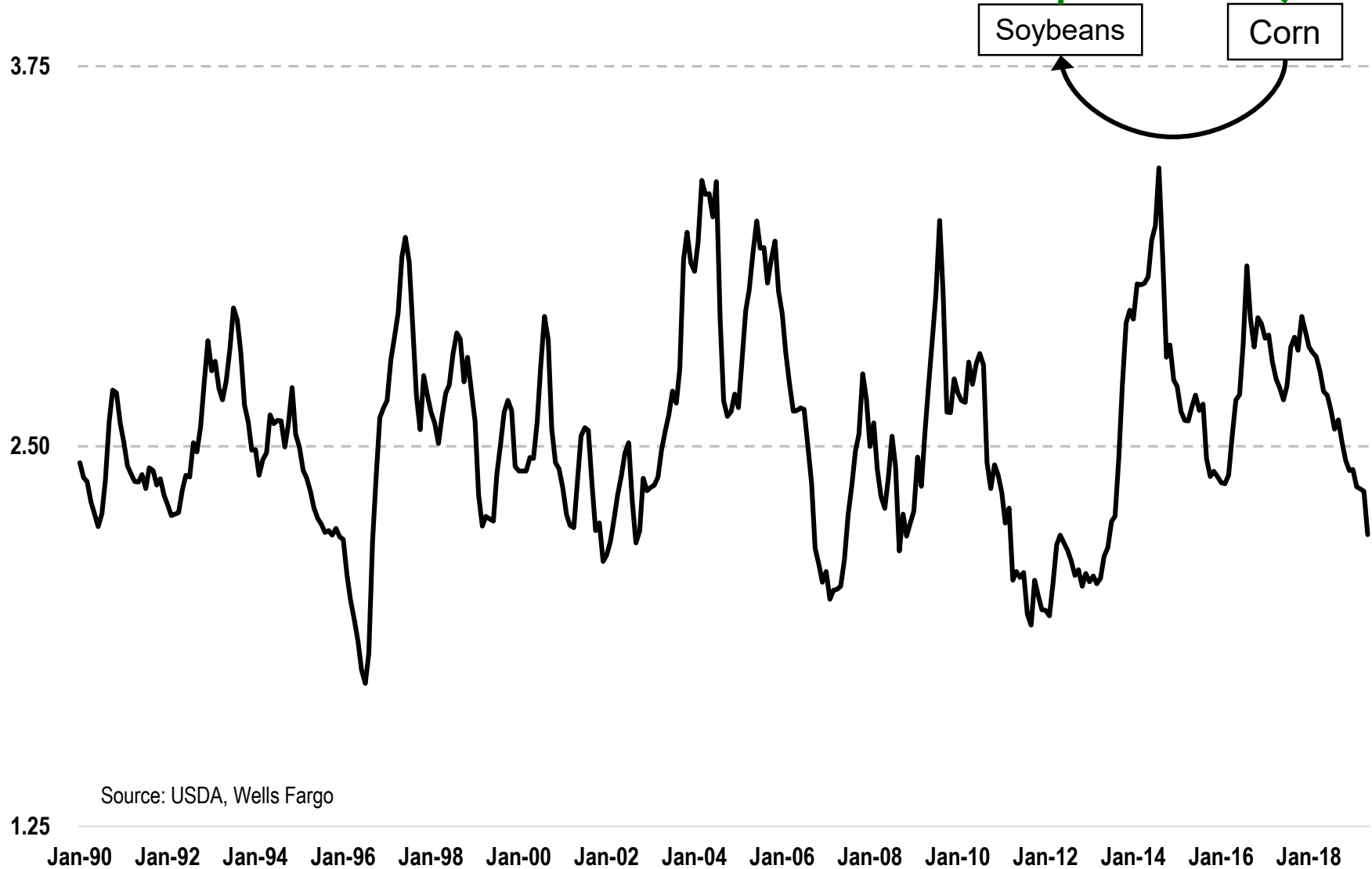
Annual Corn Prices



Source: USDA, Wells Fargo

Subsystems are linked as well

Price Ratio: Soybeans / Corn



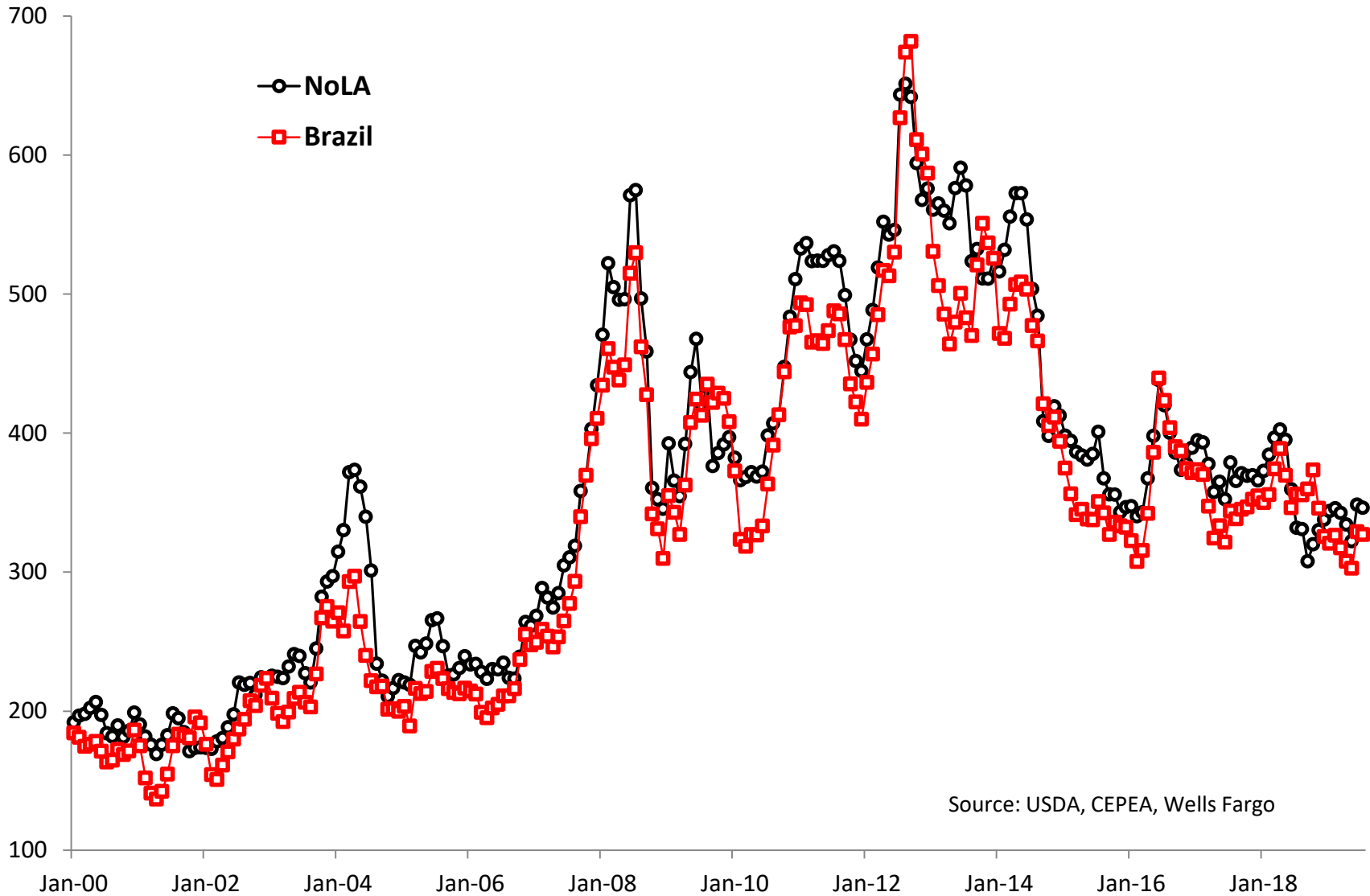
Source: USDA, Wells Fargo

1.25

Jan-90 Jan-92 Jan-94 Jan-96 Jan-98 Jan-00 Jan-02 Jan-04 Jan-06 Jan-08 Jan-10 Jan-12 Jan-14 Jan-16 Jan-18

Markets are linked as well by prices

New Orleans v. Brazilian Soybeans per MT

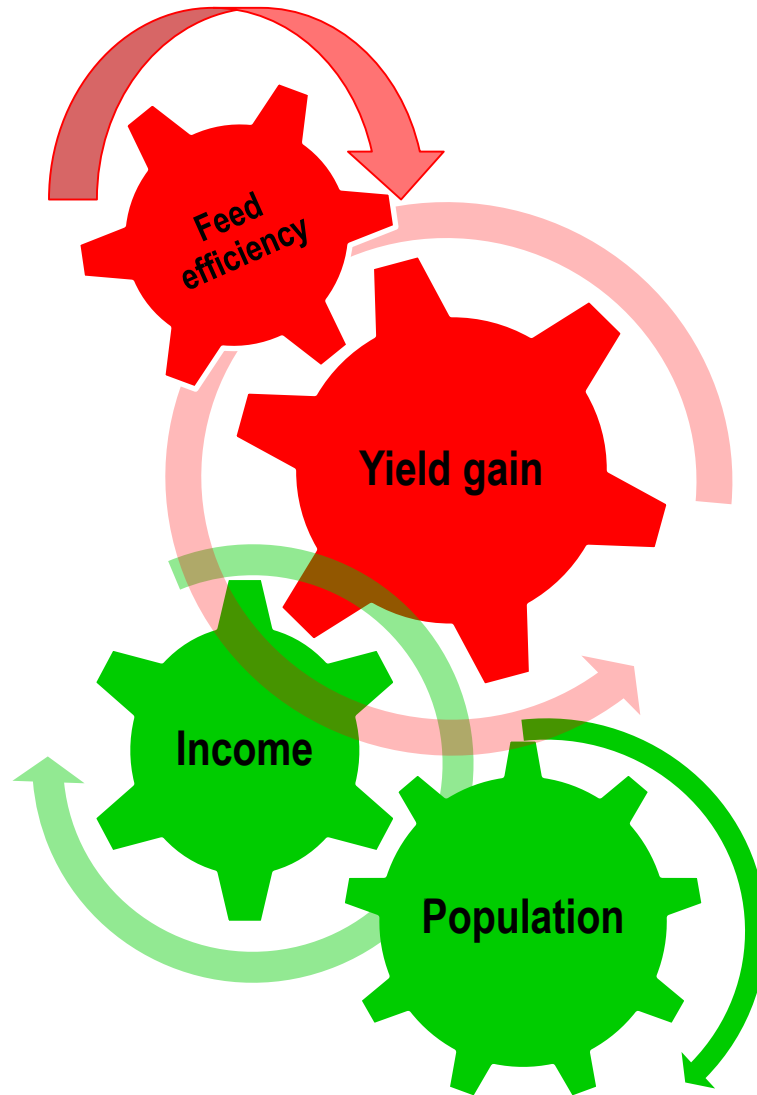


Source: USDA, CEPEA, Wells Fargo

When it involves people

There are no constants in economics. People can always change their minds, and that changes everything.

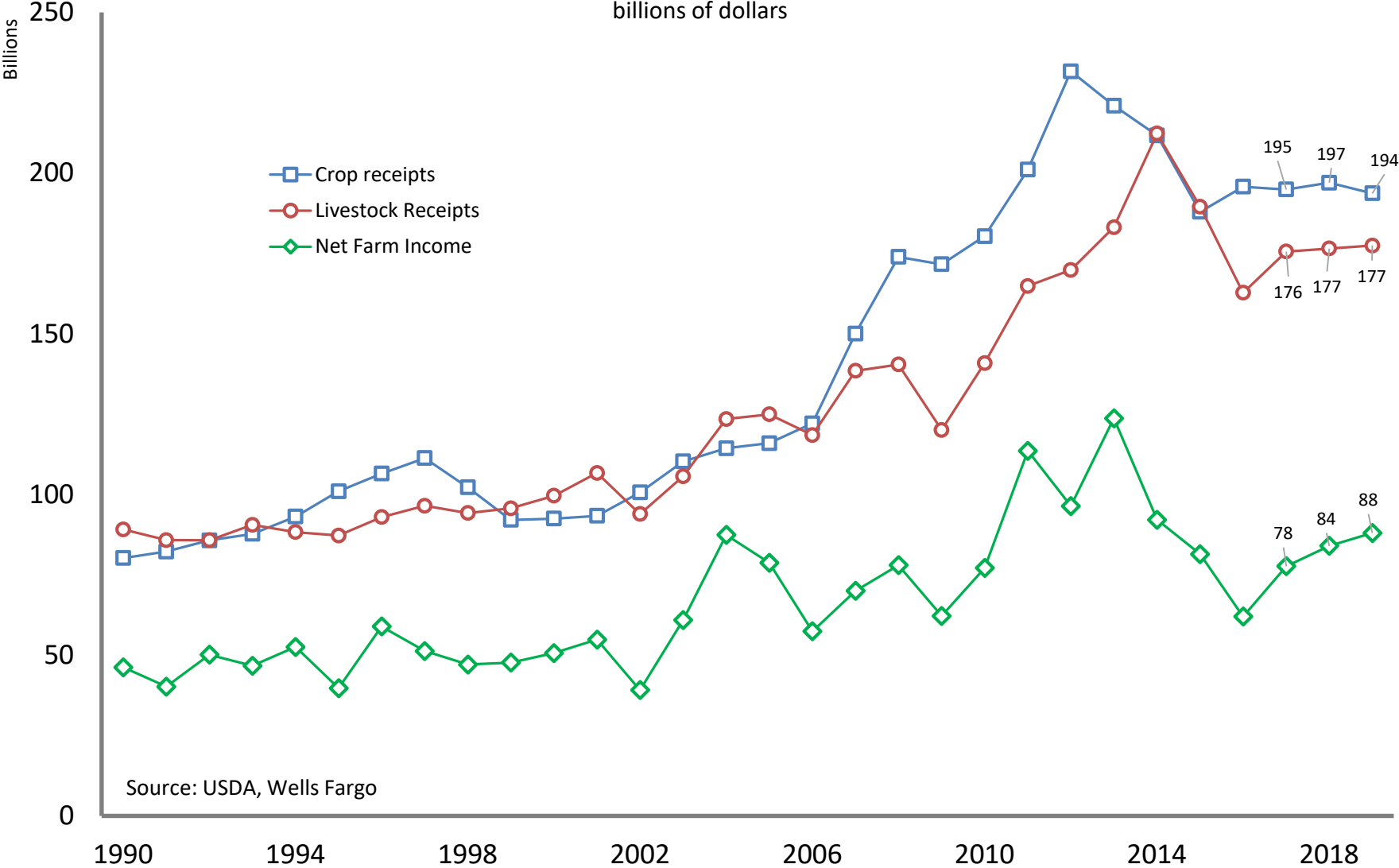
We need to remember **both** the **accelerating** and **decelerating** gears of growth



Ranch and farm markets are linked

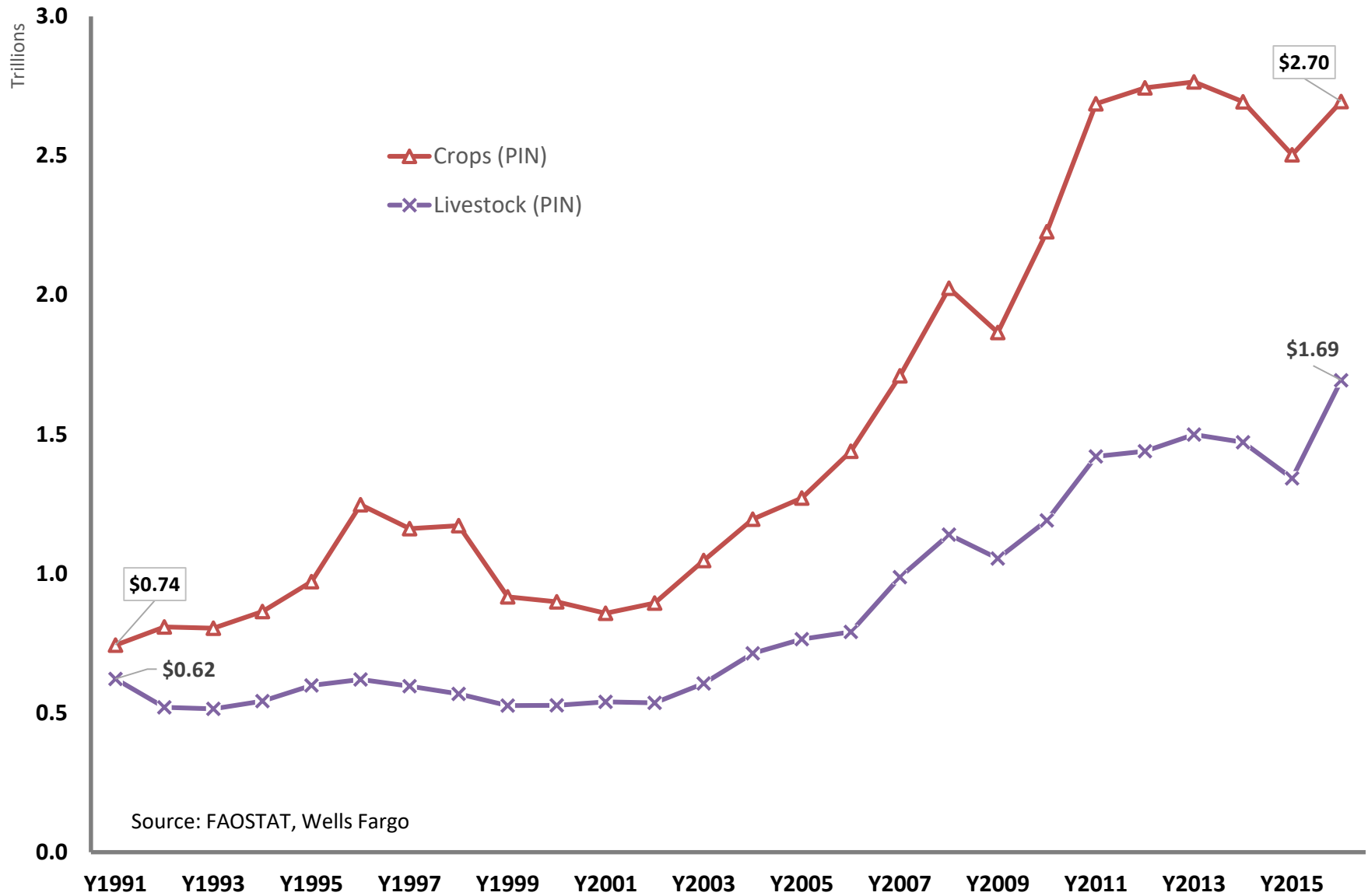
USDA Estimates of Revenue and Income

billions of dollars



All inputs are bought using gross revenues

Global Agricultural Revenues in Trillions of USD

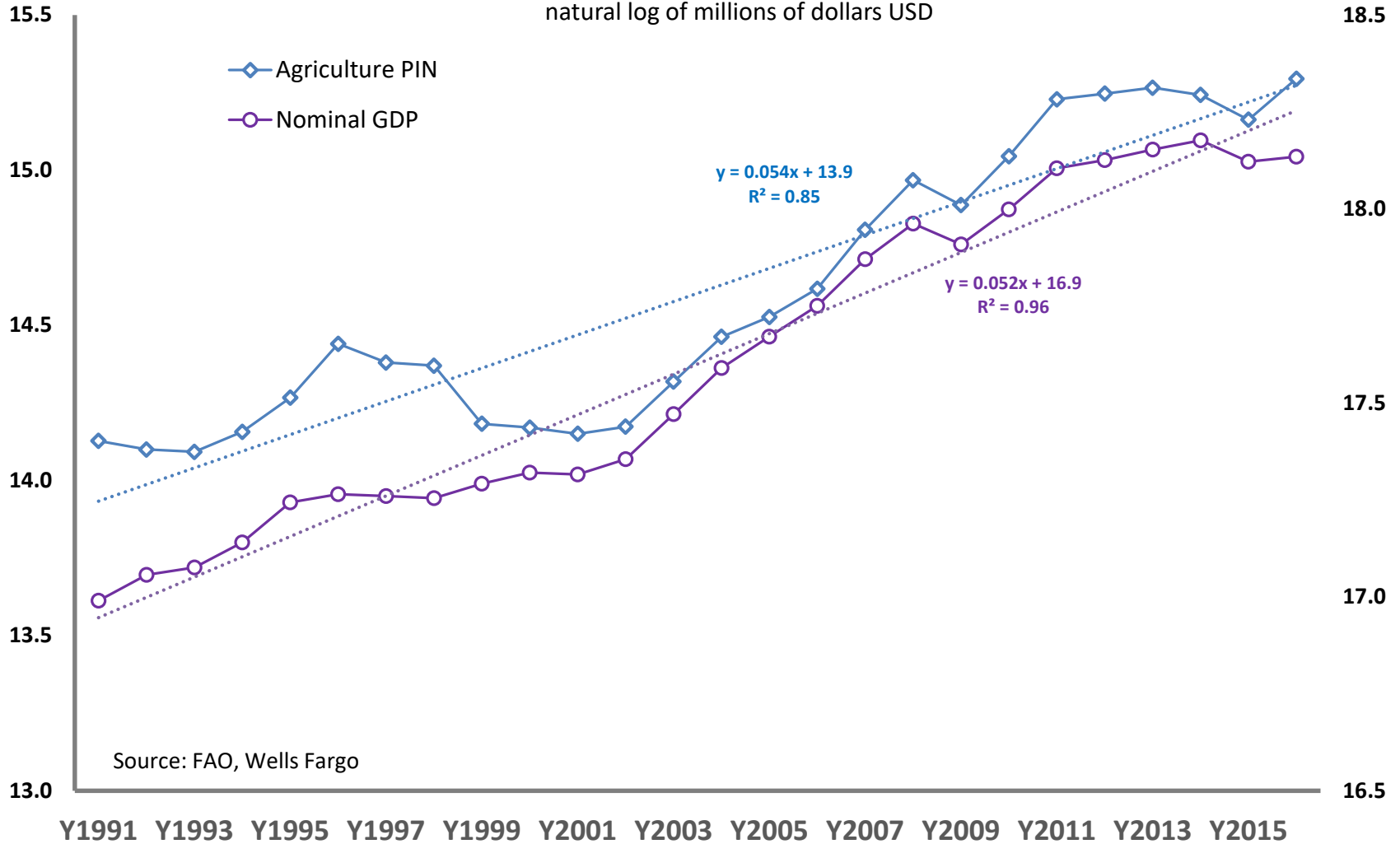


Source: FAOSTAT, Wells Fargo

The demand will grow with the GDP

Growth Rates of Global GDP and Agriculture

natural log of millions of dollars USD

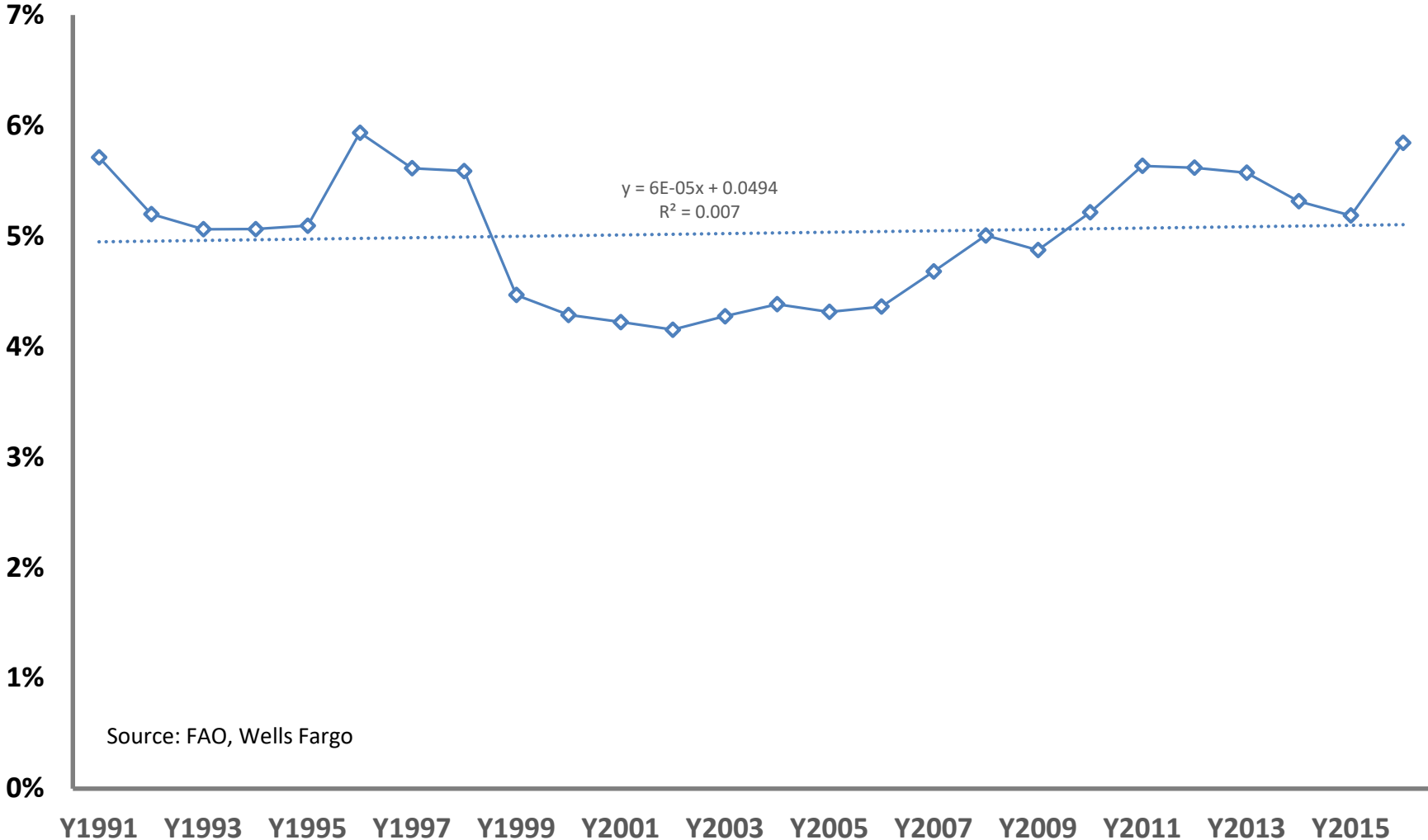


Global trends are stable and positive

- **Population growth is 1.1% annually**
 - Trend continues to slow
 - Wide spread between regions
 - Economic growth slows population growth
- **Global GDP growth 3%**
 - Trend remains stable
 - With sporadic volatility
 - It's has survived many "crises"
 - Careful with "it's different this time"

Trend, cycle and random noise

Agriculture's Share of Global GDP



Source: FAO, Wells Fargo

M&A: opportunities and risk

■ Crop production

- ◆ Land is over-priced even by historical standards
- ◆ Crop inputs oligopolies have major influence

■ Livestock production

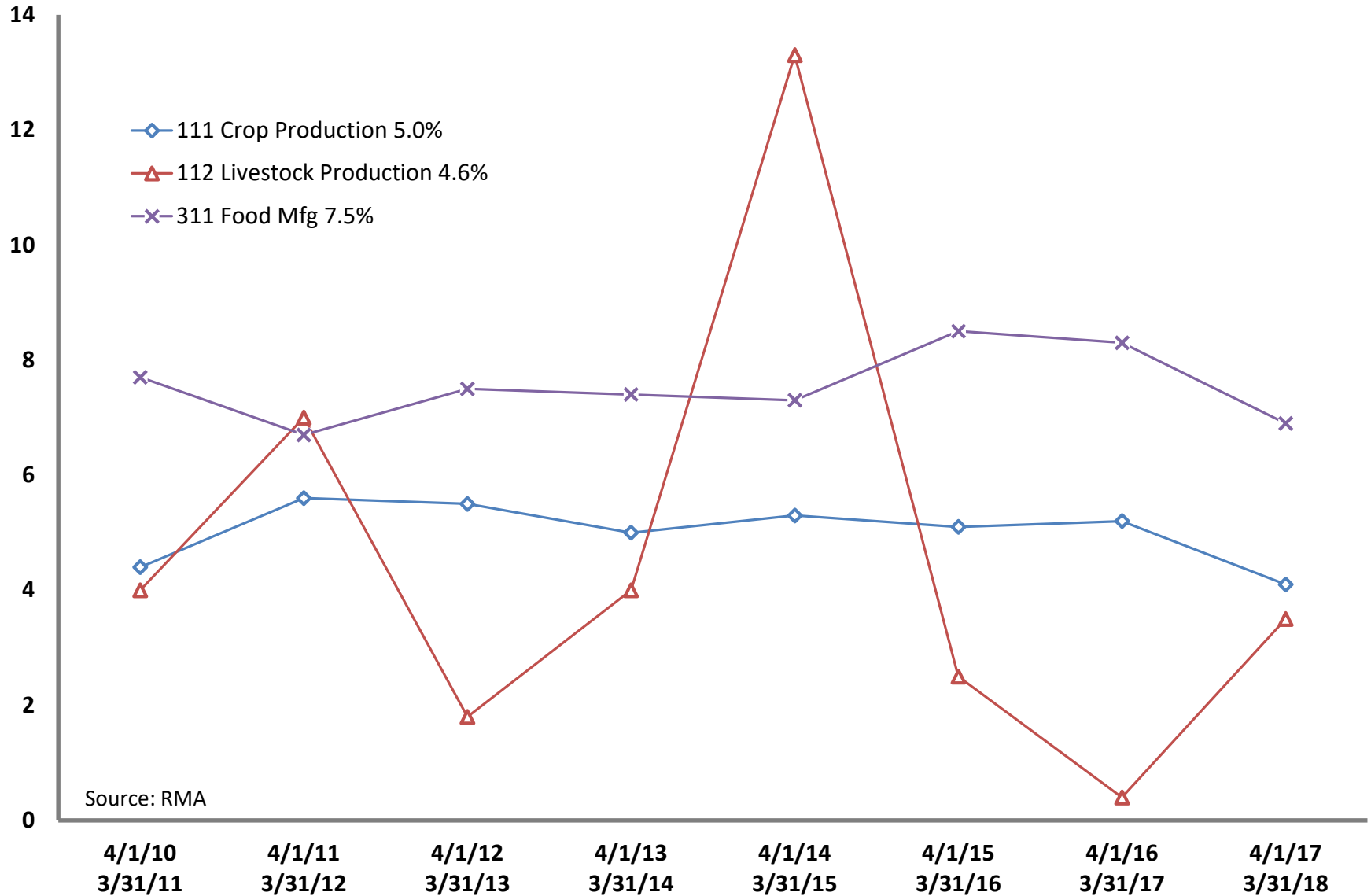
- ◆ Labor and automation challenges
- ◆ Permitting and siting challenges
- ◆ Diversity of technology suppliers
- ◆ Higher value-added

■ Food Manufacturing

- ◆ Changing preferences
- ◆ FSMA excellence
- ◆ Labor and automation

Capital always moves to the opportunity

Profits before Taxes / Total Assets

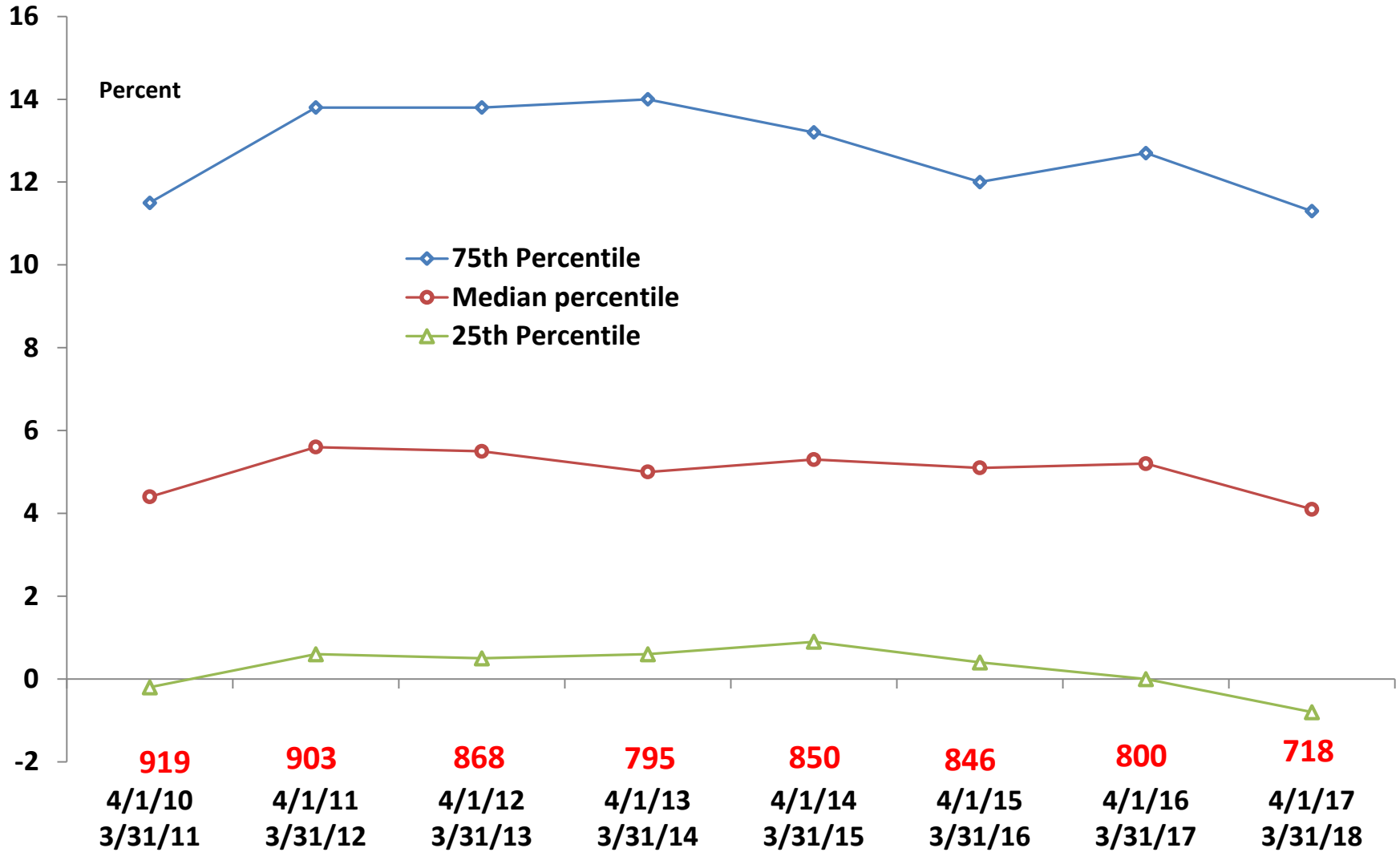


Source: RMA

Environment v. Execution: Which rules?

RMA data: Crop Production

Profits B4 Taxes / Total Assets

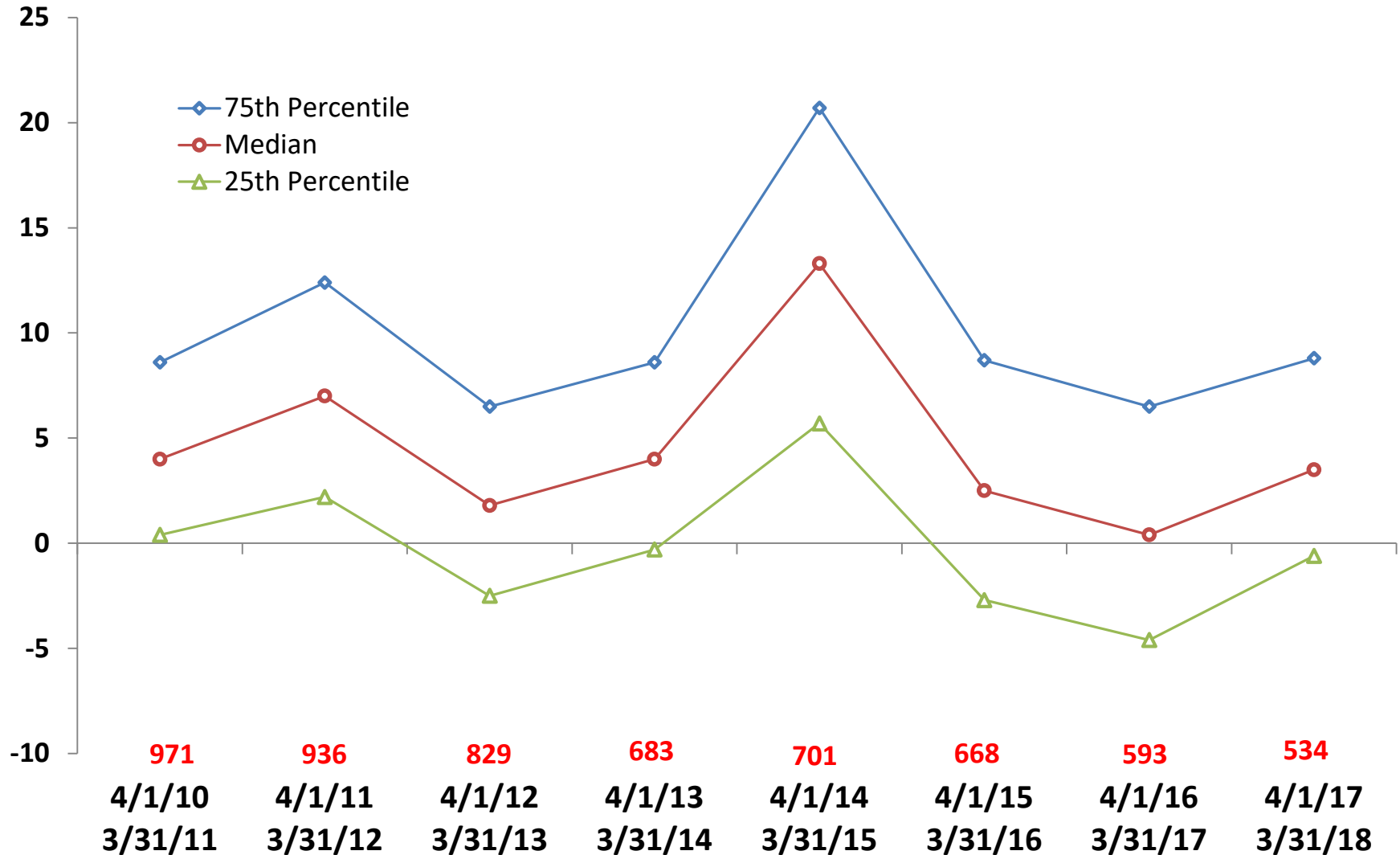


Source: RMA

Environment v. Execution: Which rules?

112 Animal Production and Aquaculture

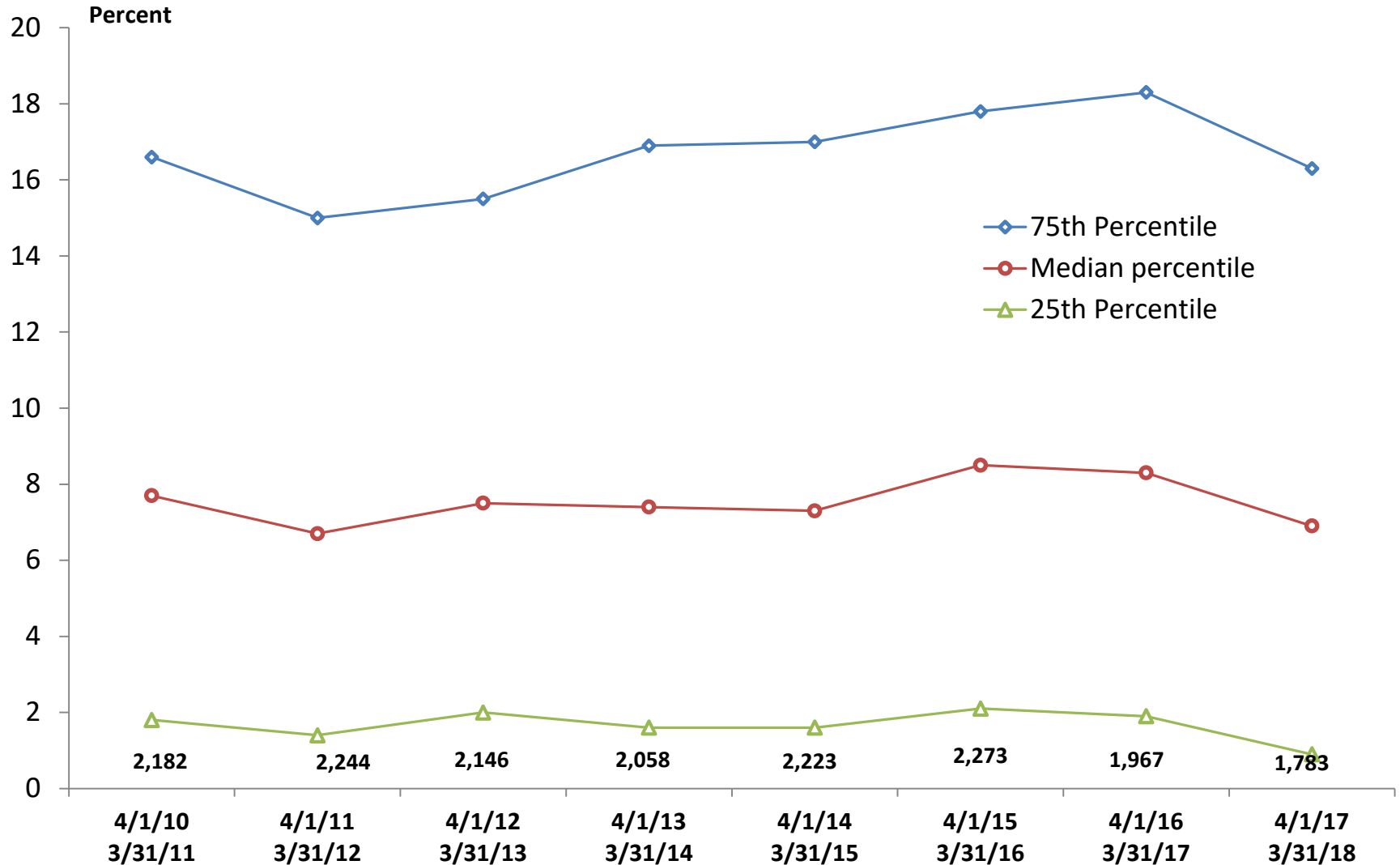
Profits before Taxes / Total Assets



Source: RMA

Environment v. Execution: Which rules?

Pct: Profits before taxes / Total Assets
Food Manufacturing



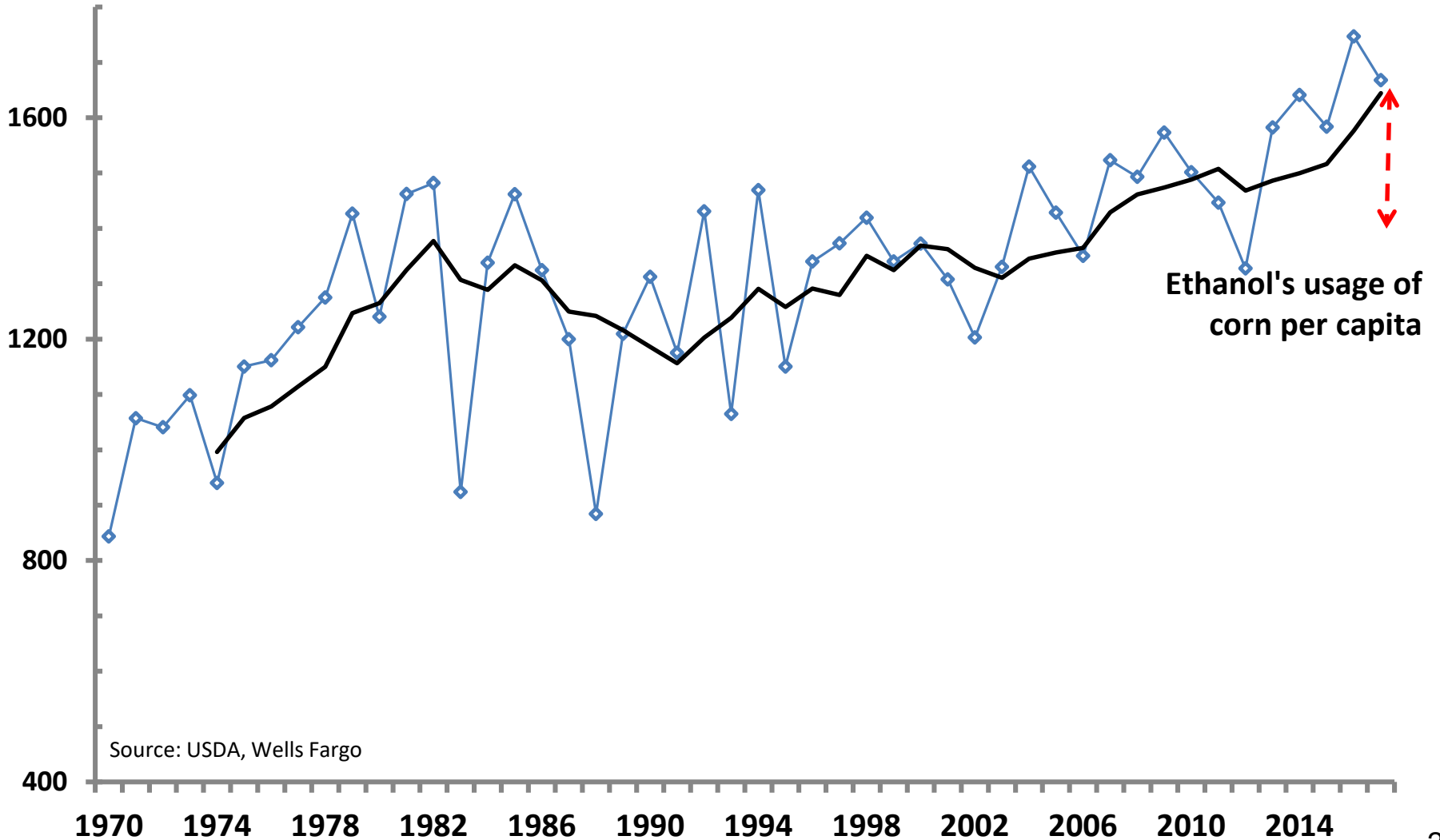
Source: RMA

We are back to being “long” grains and oilseeds.

And, it will grow.

Yield gains 1.6%+ v. population growth of 0.7%

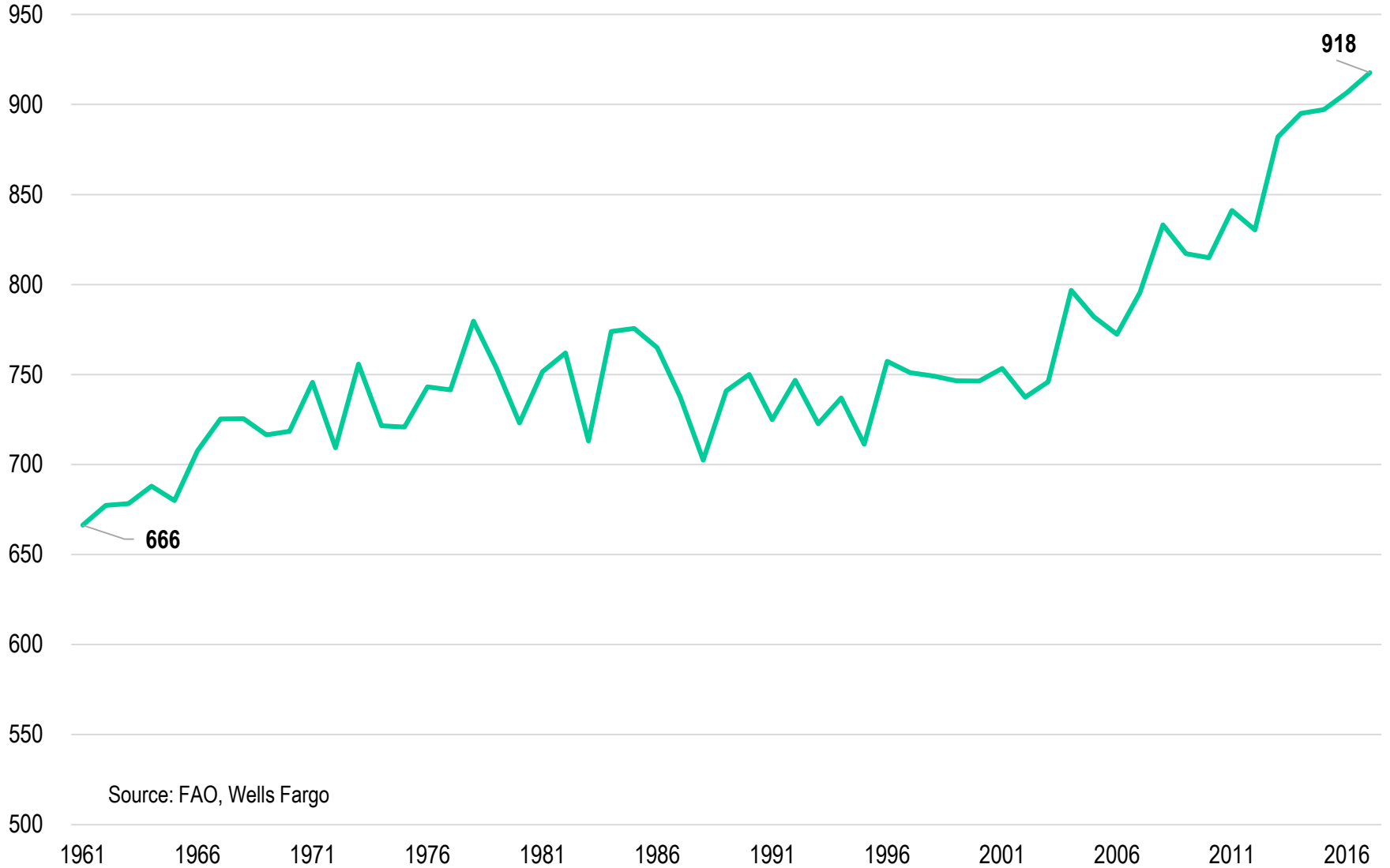
U.S. Corn, Soybean and Wheat: Kilograms per capita



Source: USDA, Wells Fargo

What about the global situation?

Kilograms per capita
Global Crop Production



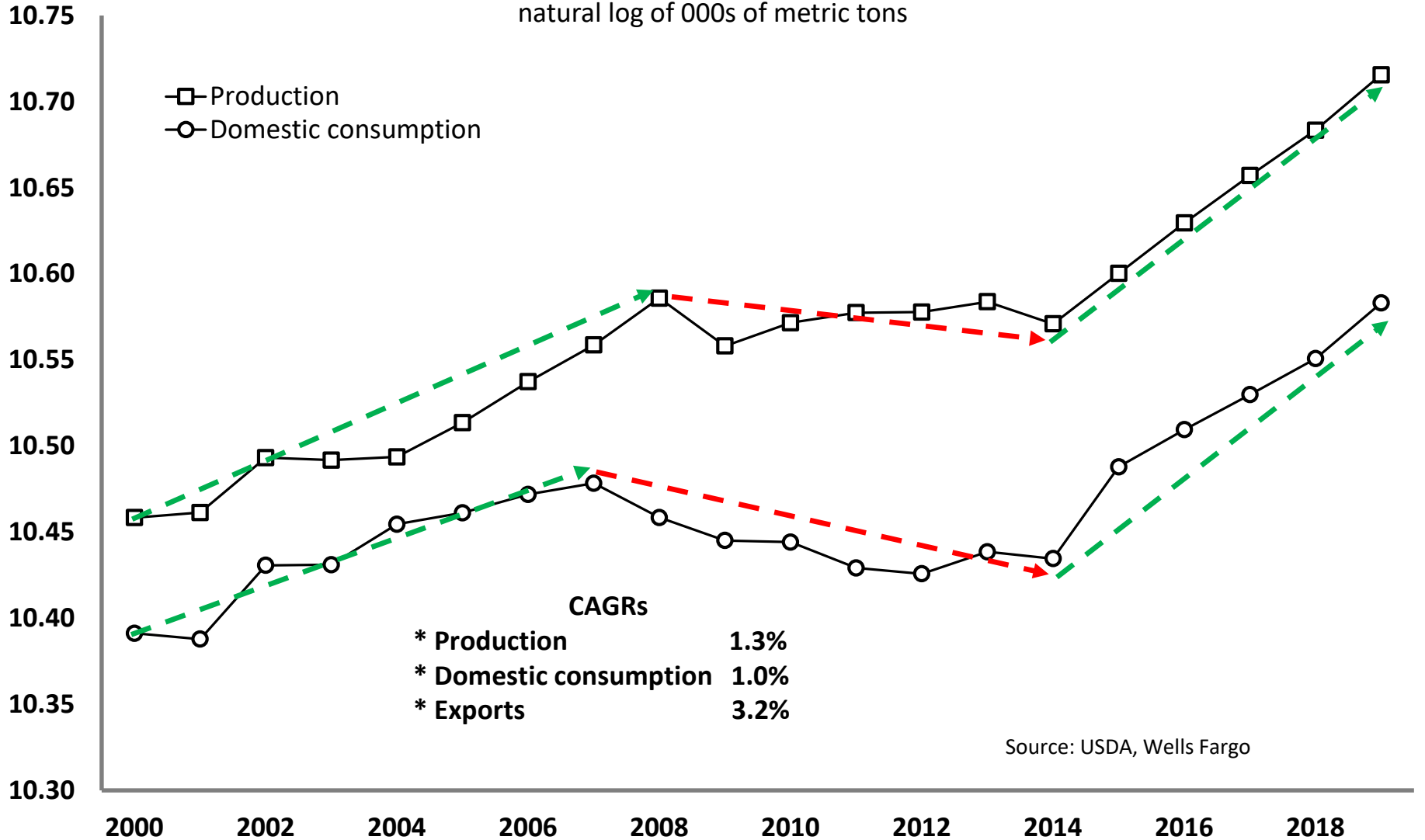
Source: FAO, Wells Fargo

All proteins are good substitutes (at the right price)

It is possible to disrupt protein production

U.S. Meat Production and Domestic Consumption

natural log of 000s of metric tons

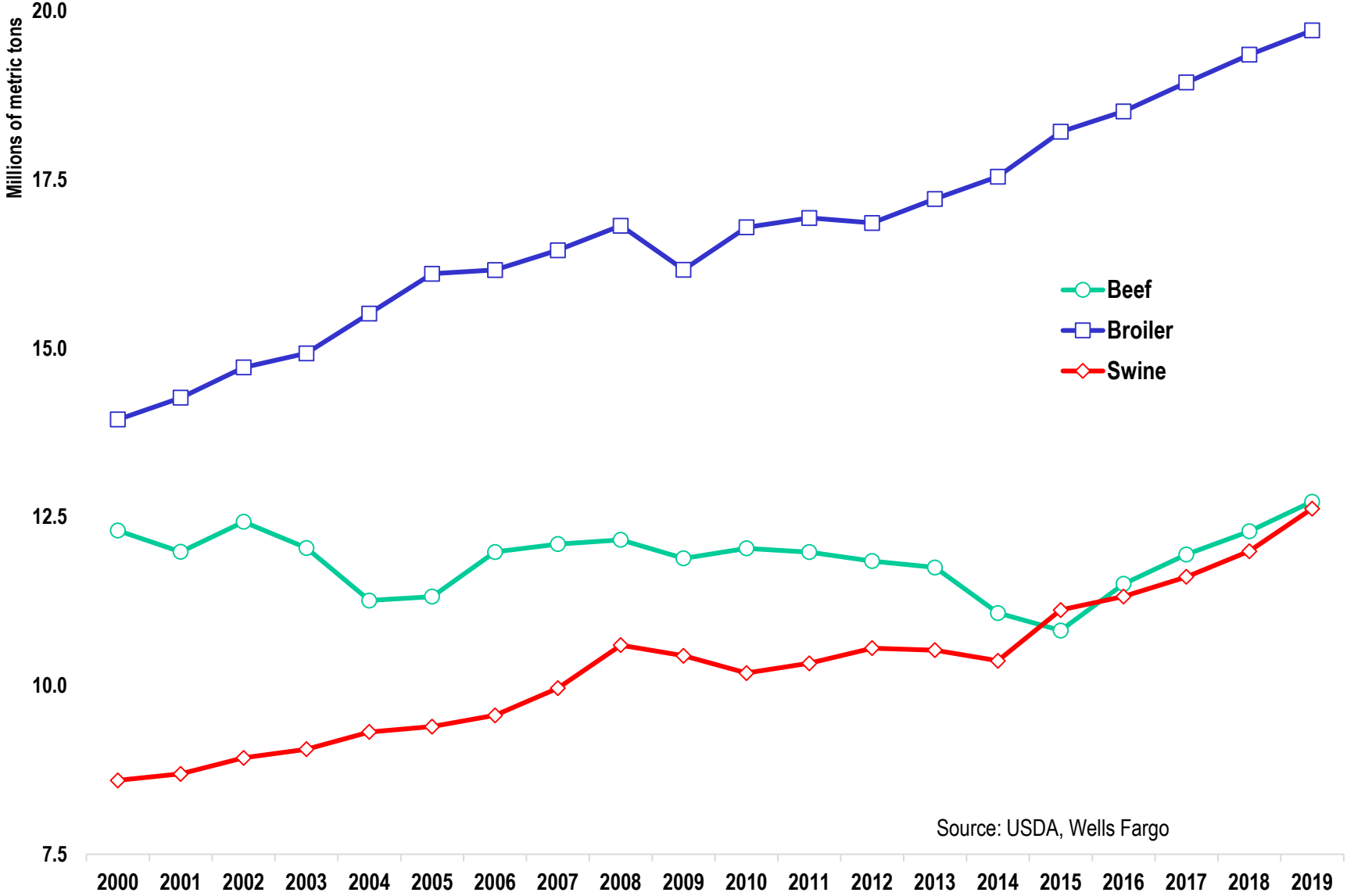


Source: USDA, Wells Fargo

This will require better exports

U.S. Meat Production

millions of metric tons



Source: USDA, Wells Fargo

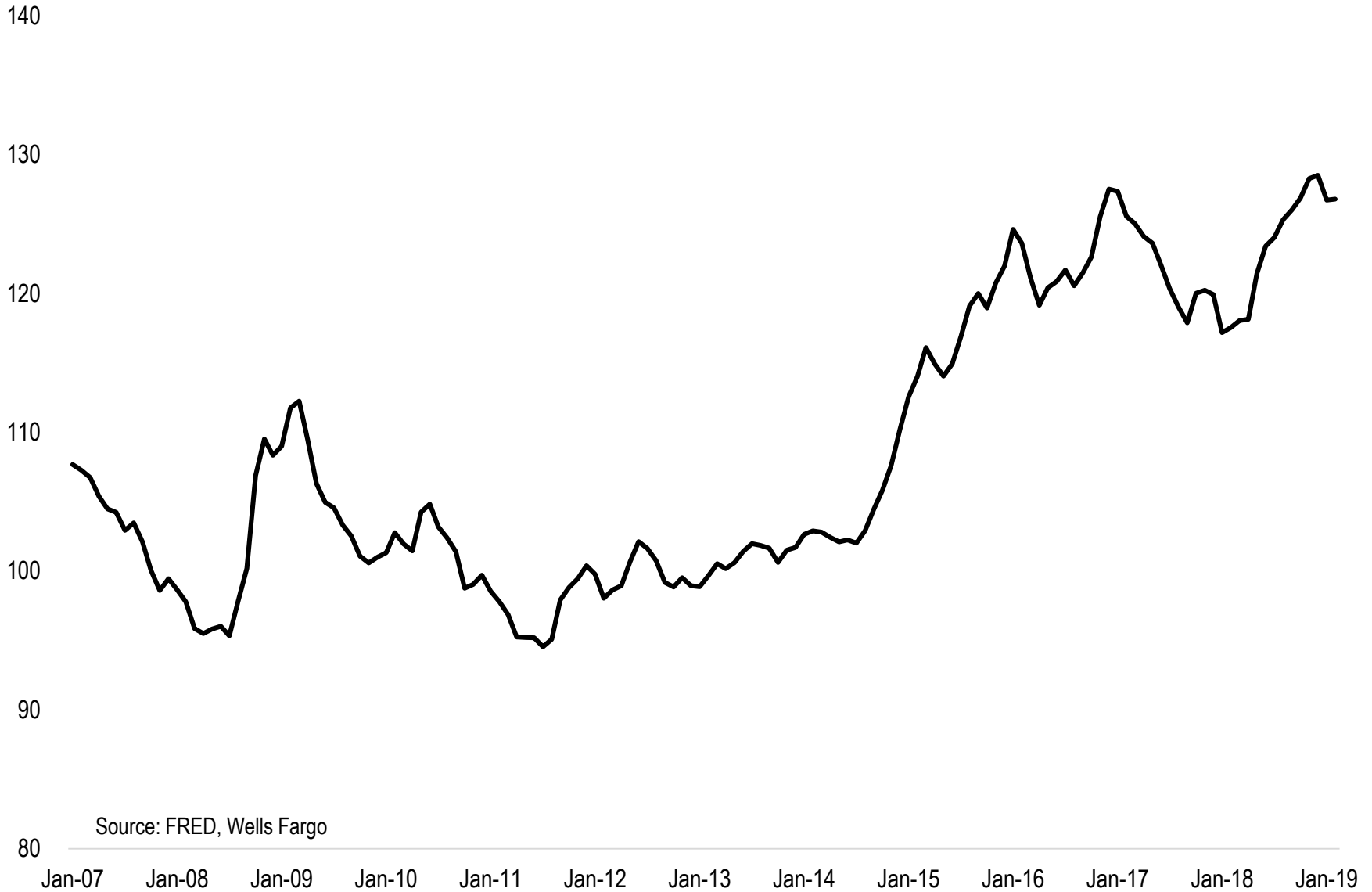
We are demand constrained without the global markets.

Three macro drivers to watch

- **Interest rates/exchange rates**
 - Key relationships
 - Relative growth
- **China growth**
 - Reasonable expectations
 - How much volatility should we expect?
- **Biofuels policy**
 - Energy pricing
 - Governmental policy

This is not about agriculture or food

U.S. Trade Weighted Dollar Index



Source: FRED, Wells Fargo

The U.S. trade has definite structure

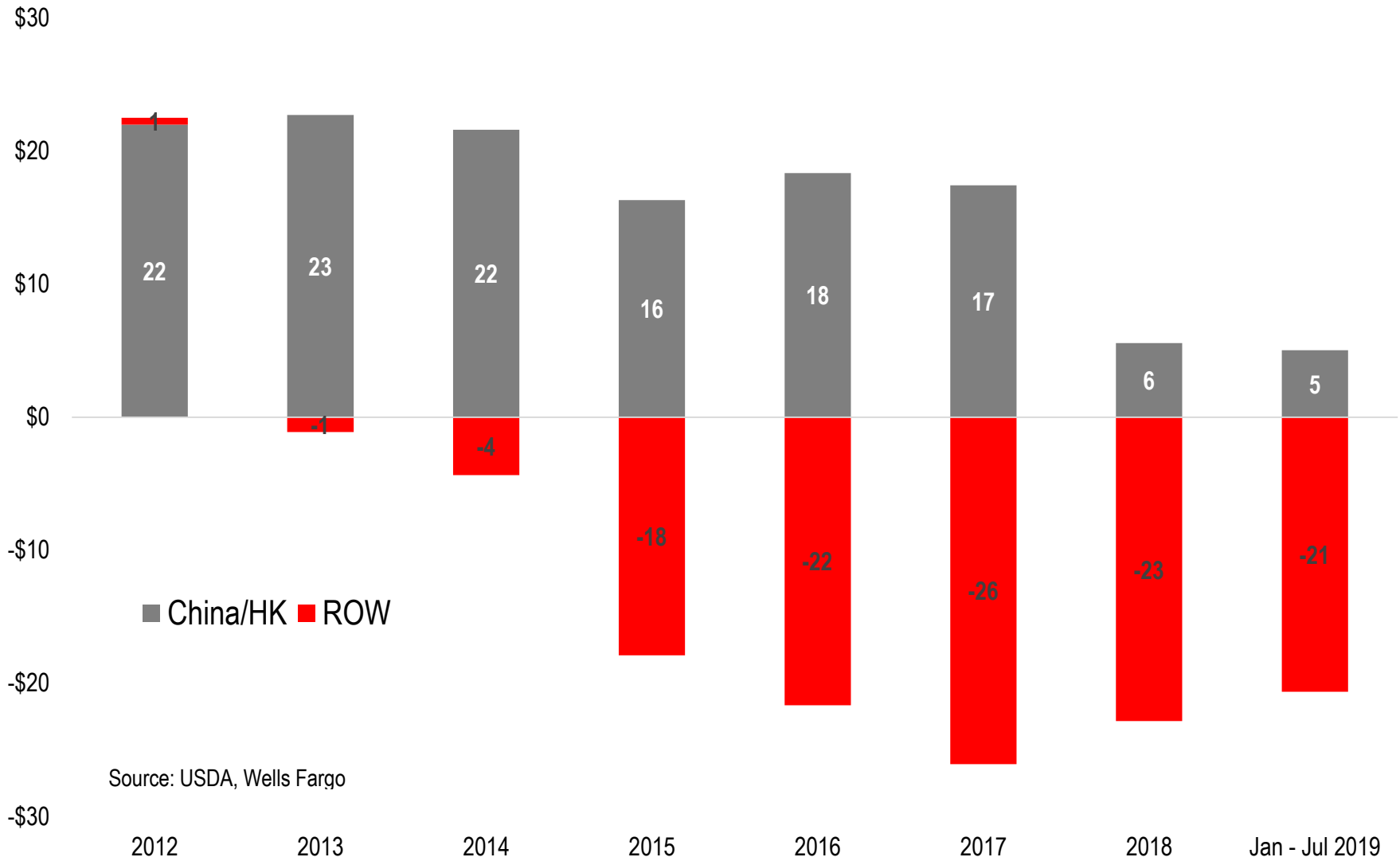
US Ag Net Trade in Billions of dollars

Product	2012	2013	2014	2015	2016	2017	2018	Jan - Jul 2018	Jan - Jul 2019	Chg YTD
Bulk	36	34	37	29	34	34	33	21	17	(3)
Intermediate	4	6	5	4	3	2	2	1	0	(0)
Consumer Oriented	(2)	(0)	(3)	(14)	(17)	(19)	(24)	(16)	(18)	(2)
Forest Products	(5)	(6)	(6)	(8)	(9)	(10)	(11)	(6)	(5)	1
Fish Products	(11)	(13)	(15)	(13)	(14)	(16)	(17)	(10)	(10)	(0)
	23	22	17	(2)	(3)	(9)	(17)	(10)	(16)	(5)

Source: USDA, Wells Fargo

20/80 Rule of Trade

U.S. Net Trade in Agricultural Products: Billions of dollars



Source: USDA, Wells Fargo

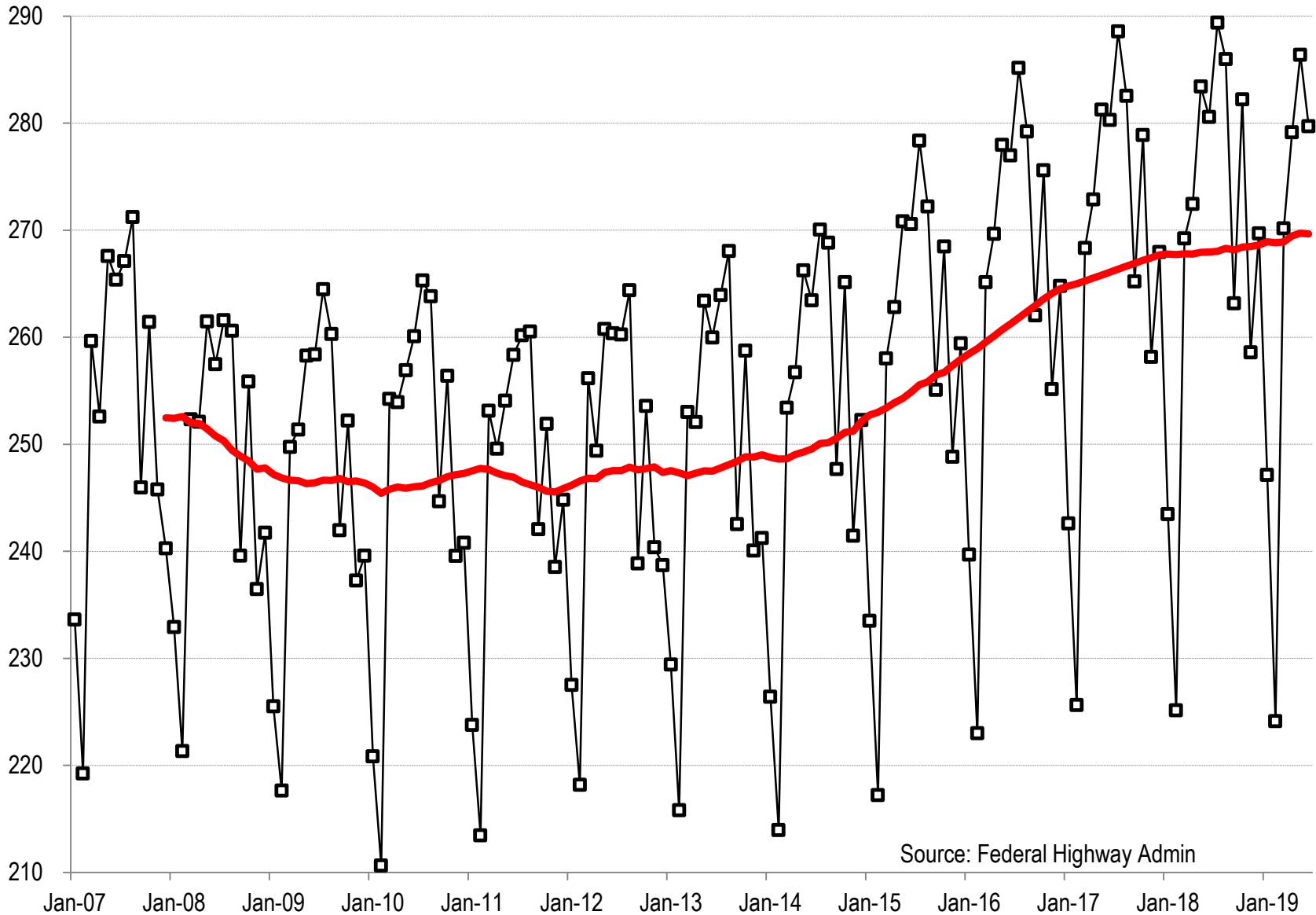
Source: USDA, Wells Fargo

Ethanol demand growth will approach zero in 2019

Longer term it faces very difficult demand issues

Even with growing driving miles – demand is flat

Billions of miles Driven

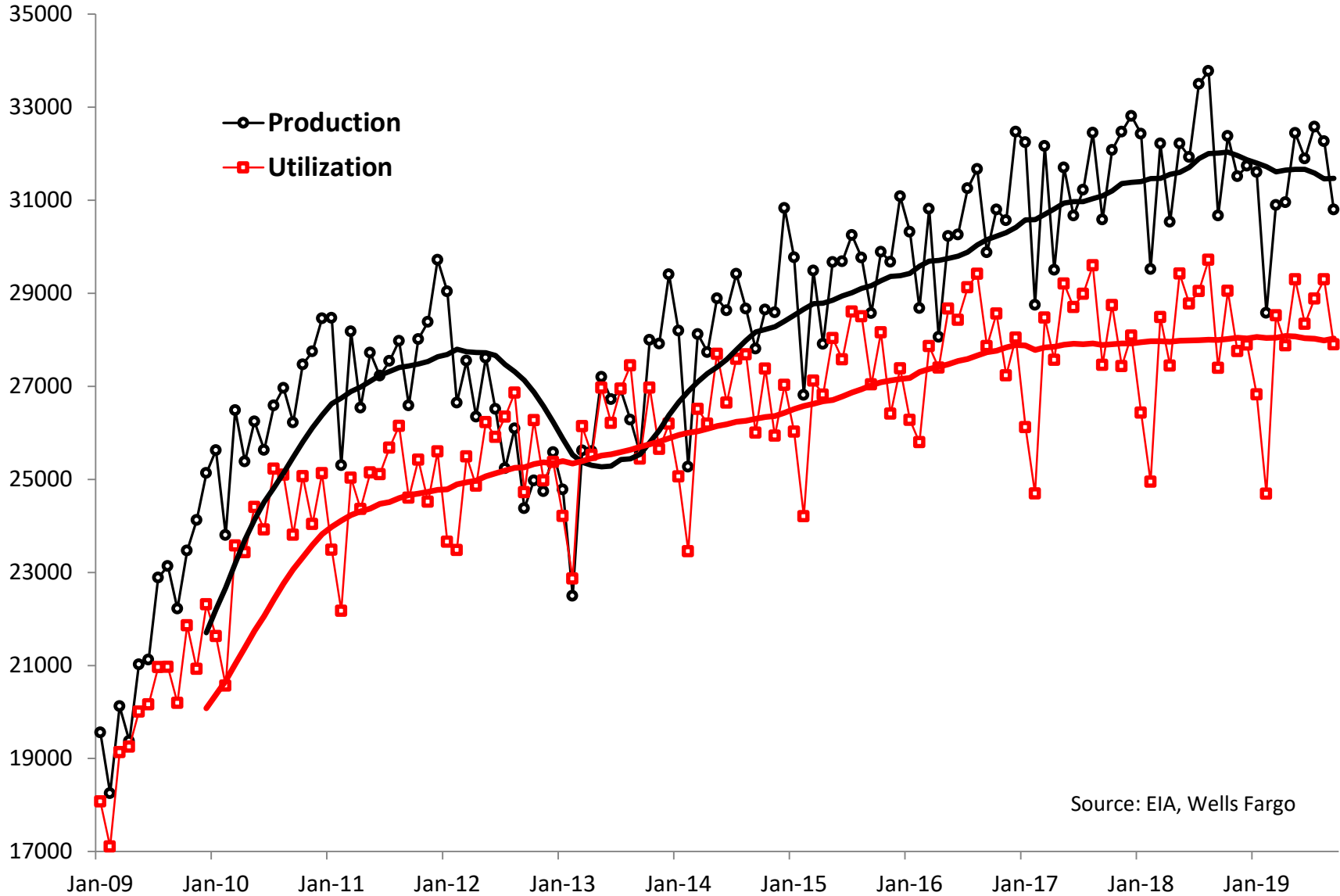


Source: Federal Highway Admin

Ethanol and biodiesel face domestic demand challenges

Ethanol Supply and Demand

000s of barrels

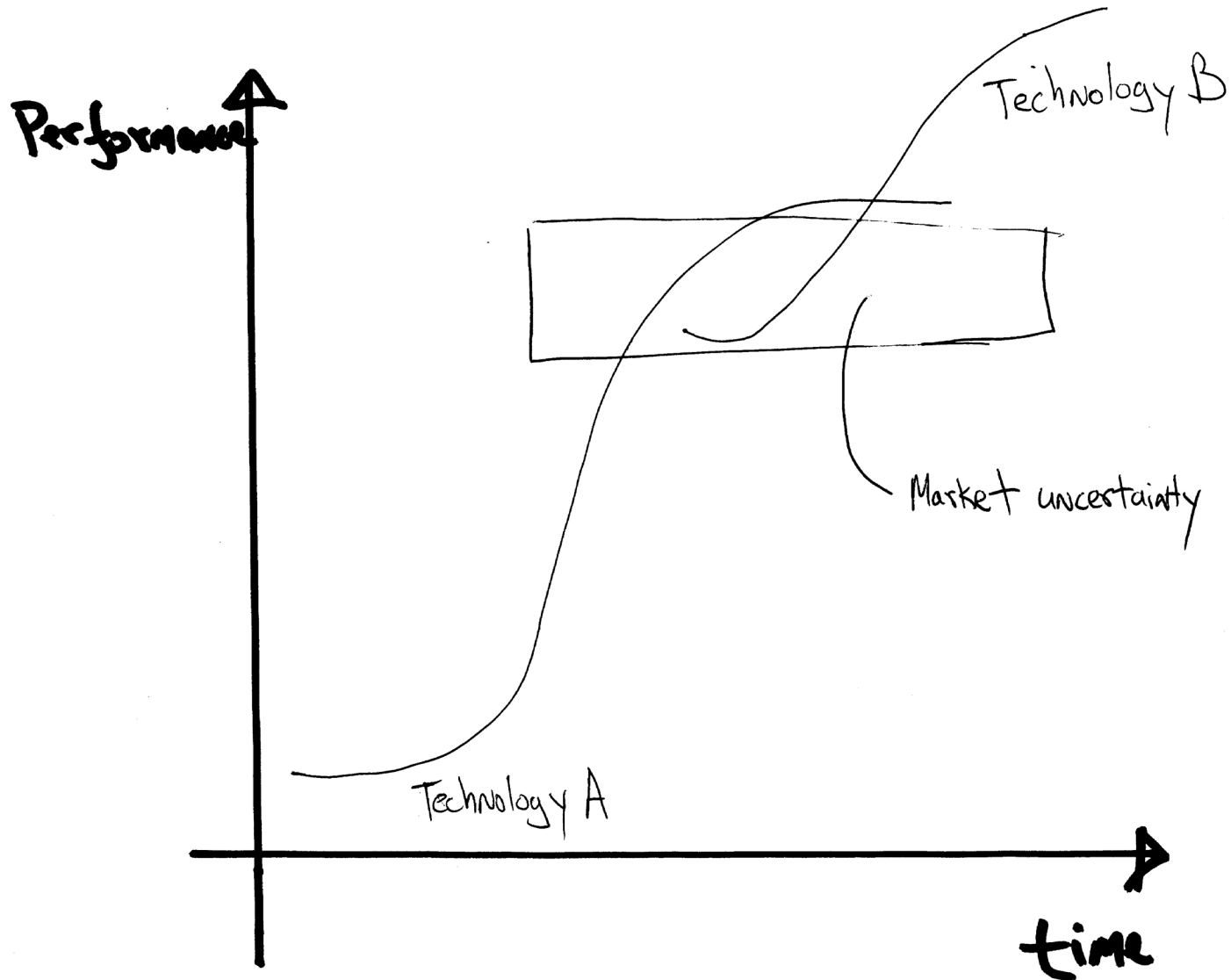


Source: EIA, Wells Fargo

Ultimately, biofuels disappear

- **40% of U.S. corn goes to ethanol**
 - Currently stable
 - Growth is +/- 1%
 - Poor profits pushing a shake-out
- **Battery technology will dominate**
 - 7 to 9 percent improvement annually
 - Cost of manufacturing
 - Absolute performance
 - Chemistry
 - Anode/cathode performance
 - Network of availability and faster charging
 - Thousands of R&D initiatives

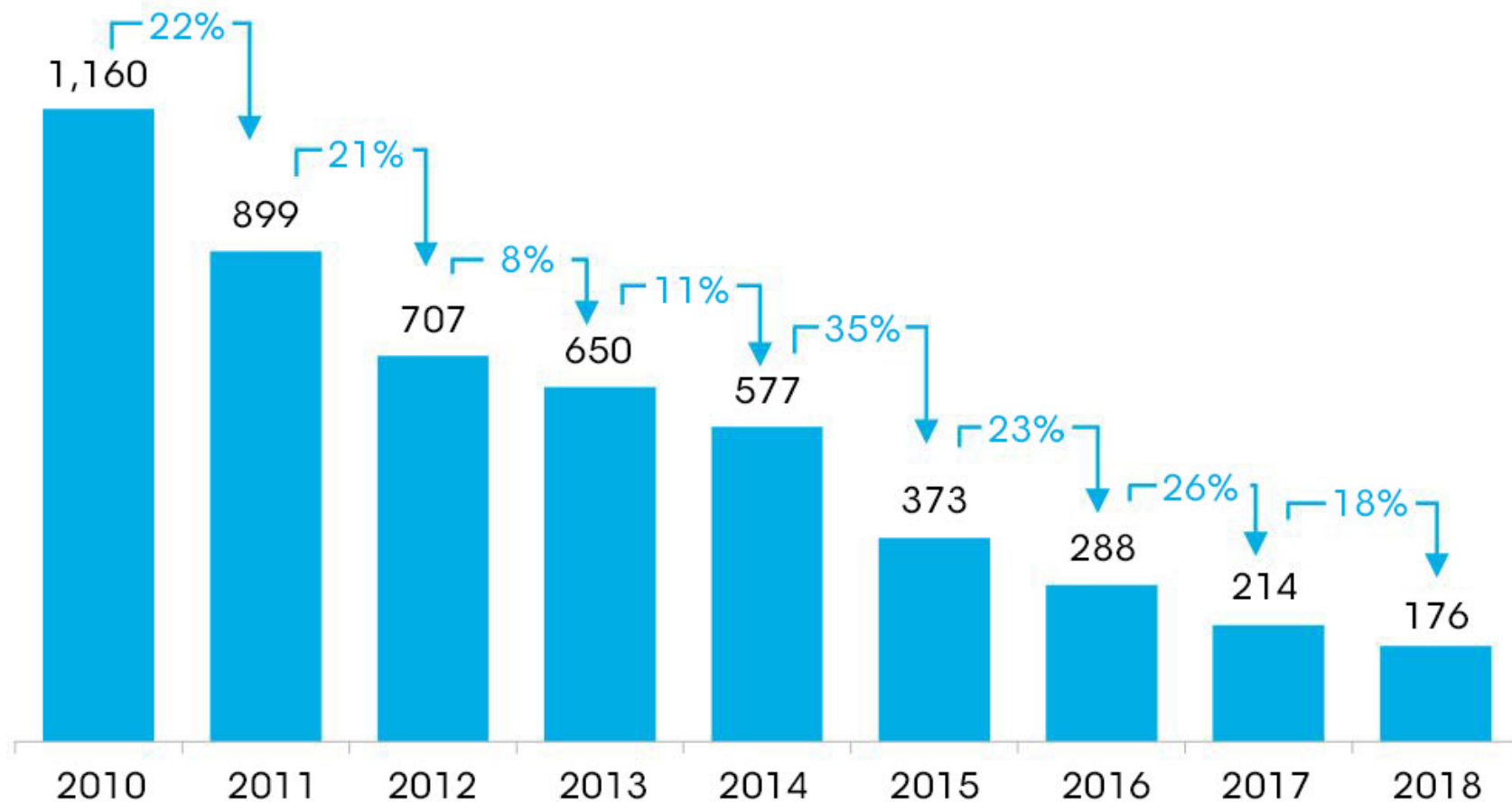
How fast? How certain?



What's the right metric? Money talks and losers walk.

Lithium-ion battery price survey results: volume-weighted average

Battery pack price (real 2018 \$/kWh)

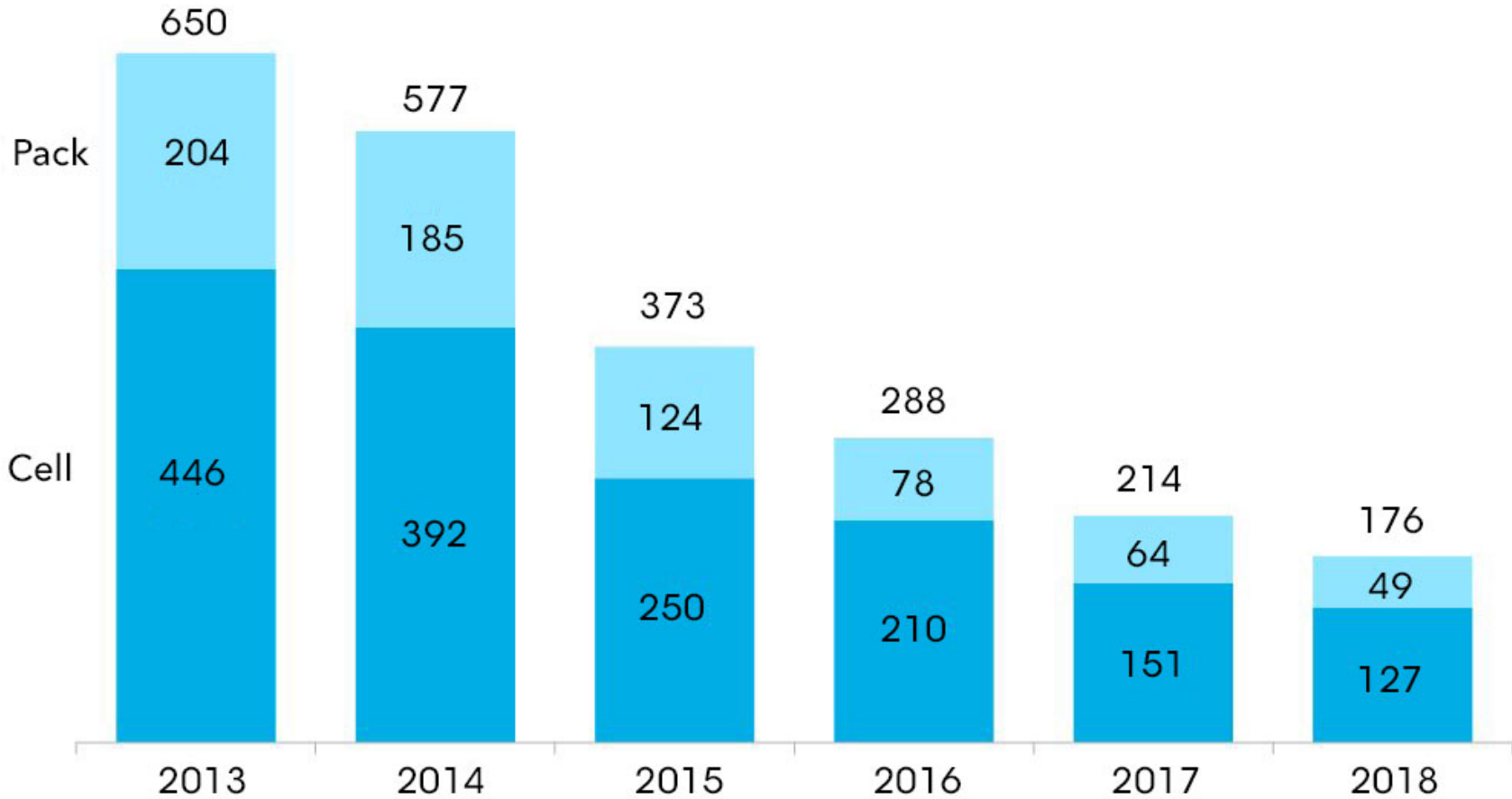


Source: BloombergNEF

Delivered costs depends on many factors.

Lithium-ion battery price survey: pack and cell split

real 2018 \$/kWh

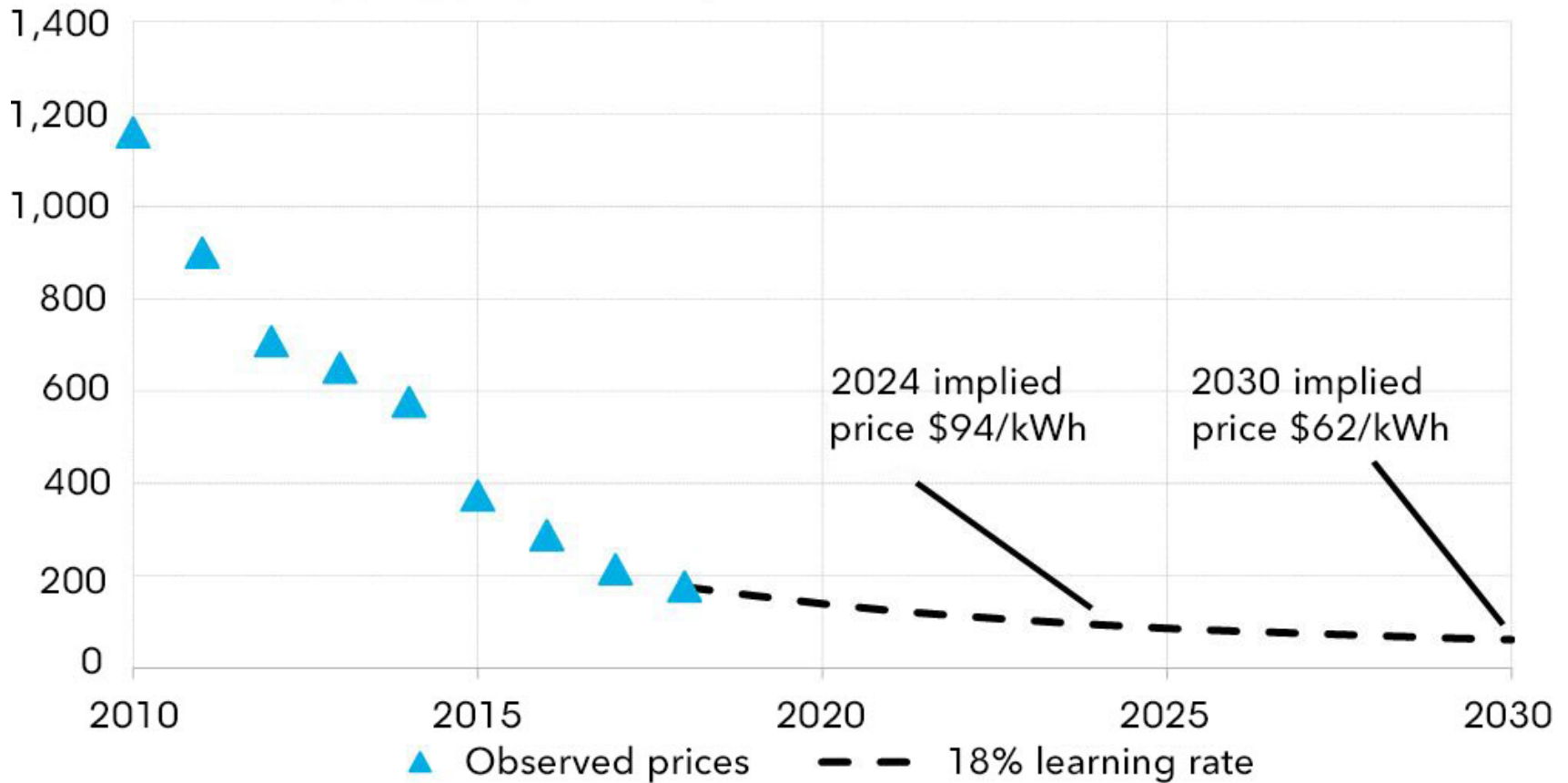


Source: BloombergNEF

Tipping point? What does that really mean?

Lithium-ion battery price outlook

Lithium-ion battery pack price (real 2018 \$/kWh)

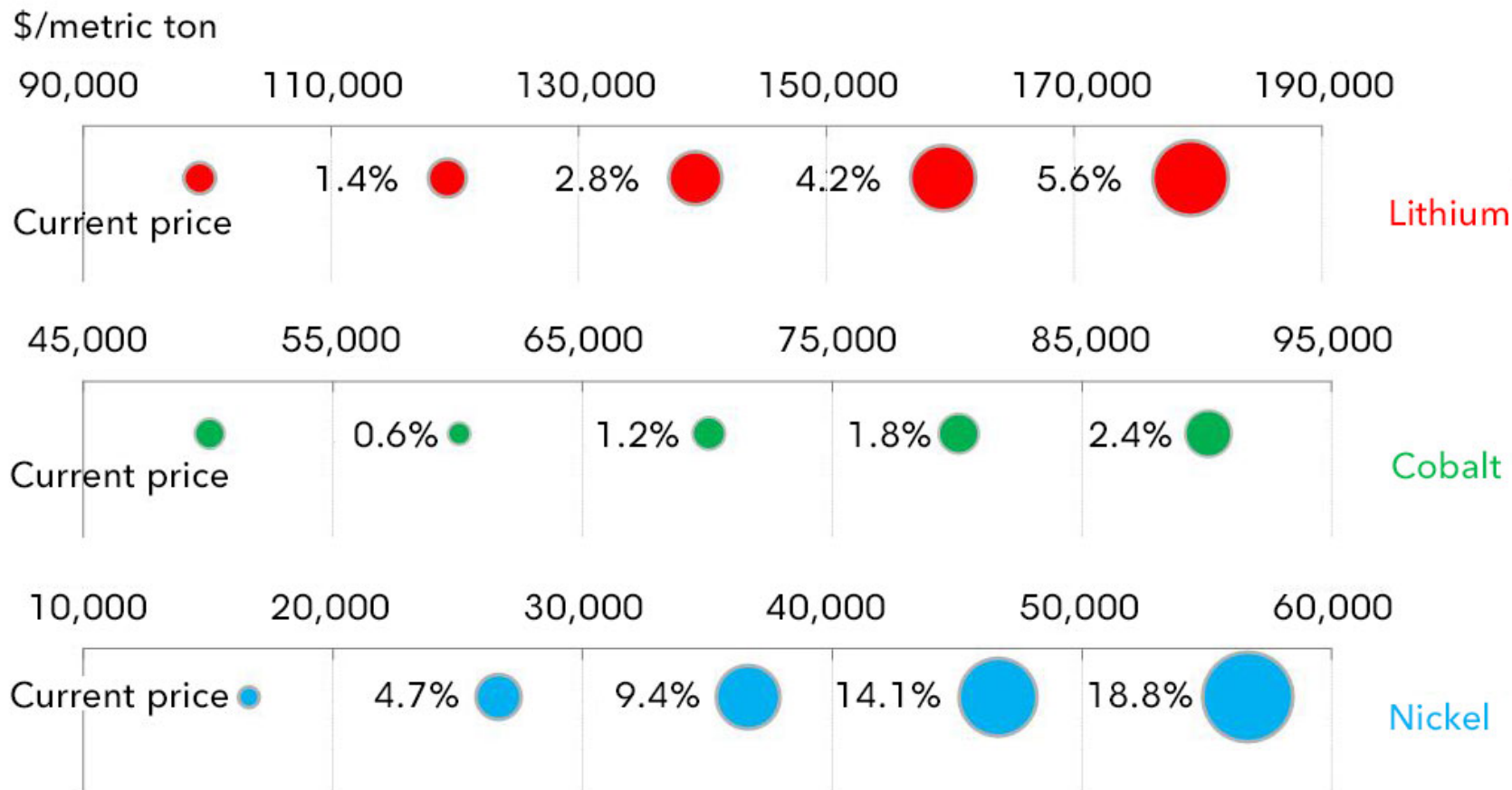


Source: BloombergNEF

Source: Bloomberg

Sitting on a barstool talking like a ...

Price sensitivity of NMC 811 battery pack to changes in commodity prices



Source: BloombergNEF. Note: Prices as of February 2019.

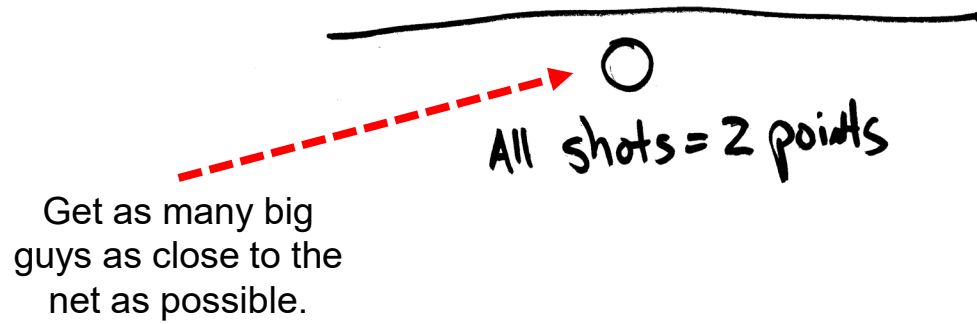
Key questions for farmers

1. What is grain worth?
2. Why is grain worth that?
3. Who gets what share?
4. What differentiates the producers?
5. What's your "play"

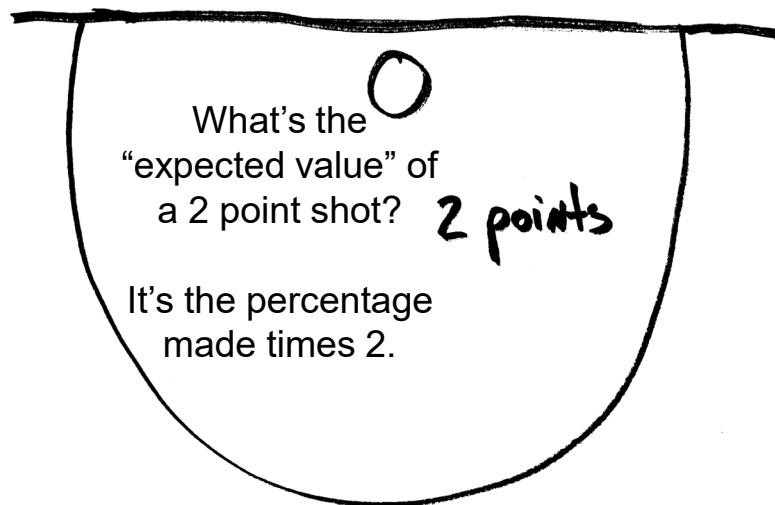
When it involves technology

Technology respects no one's opinion or politics. It will only change faster.

Old school basketball: Big and slow



Today's basketball: Big and fast – premium on shooting the “3s”



$$E(3) > E(2)$$

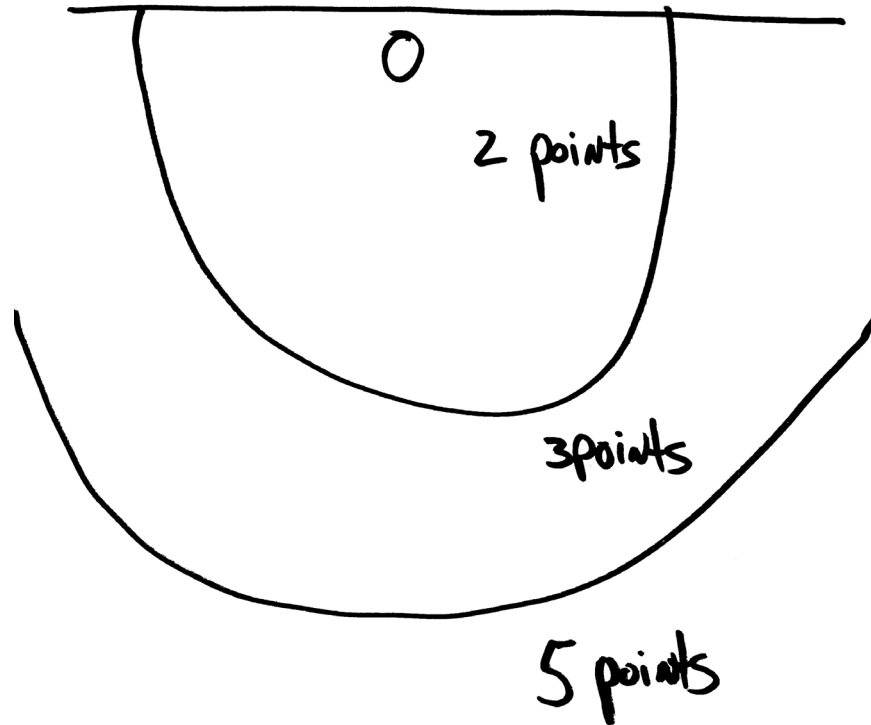
take more 3 point shots.

3 points

What's the “expected value” of a 3 point shot?

It's the percentage made times 3.

What If? Probability * payoff \rightarrow Strategy

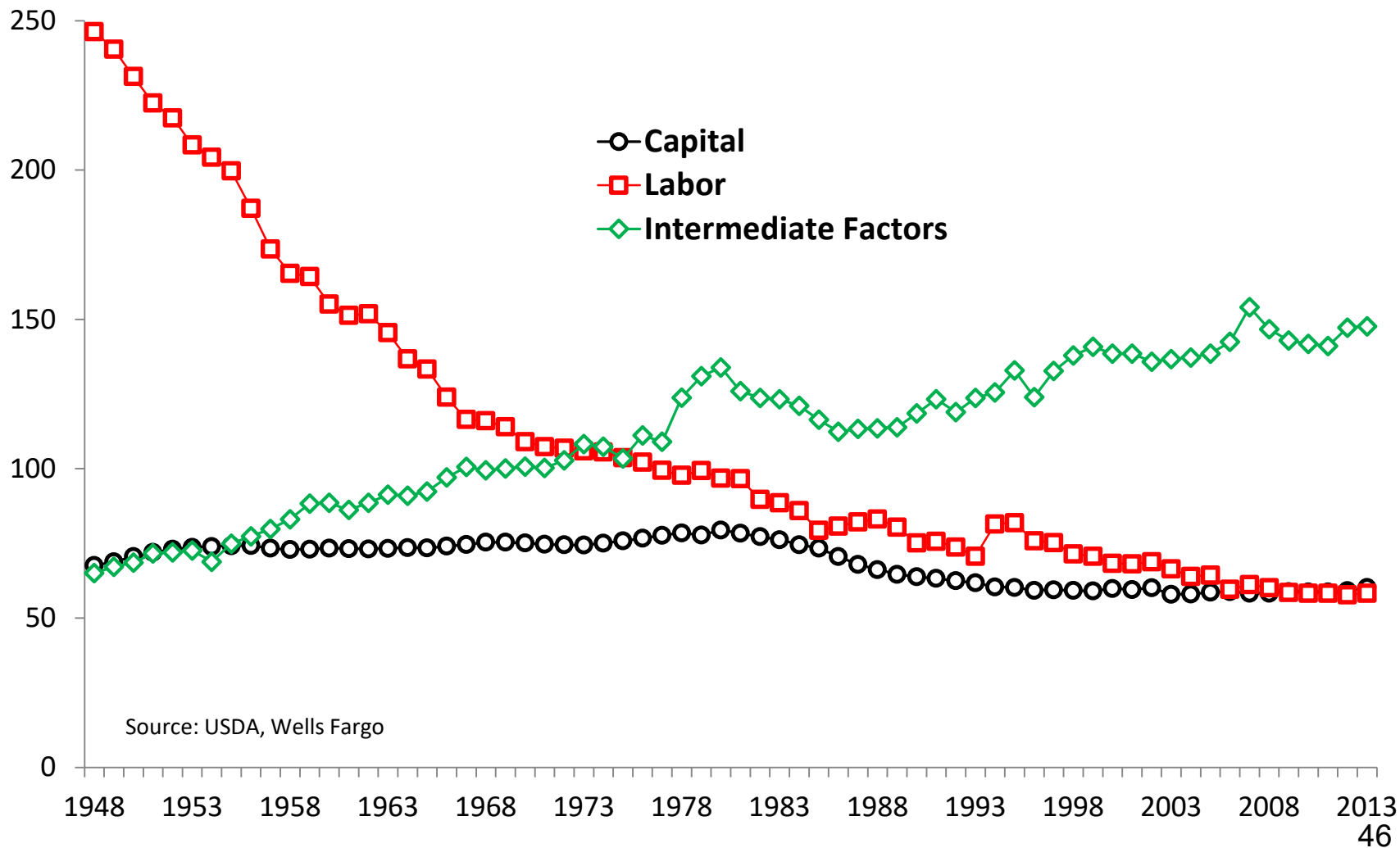


You only get paid for
what you bring to the game.

Substituting technology for labor

What Does Agriculture Use?

Inputs billions of \$ indexed to 2005

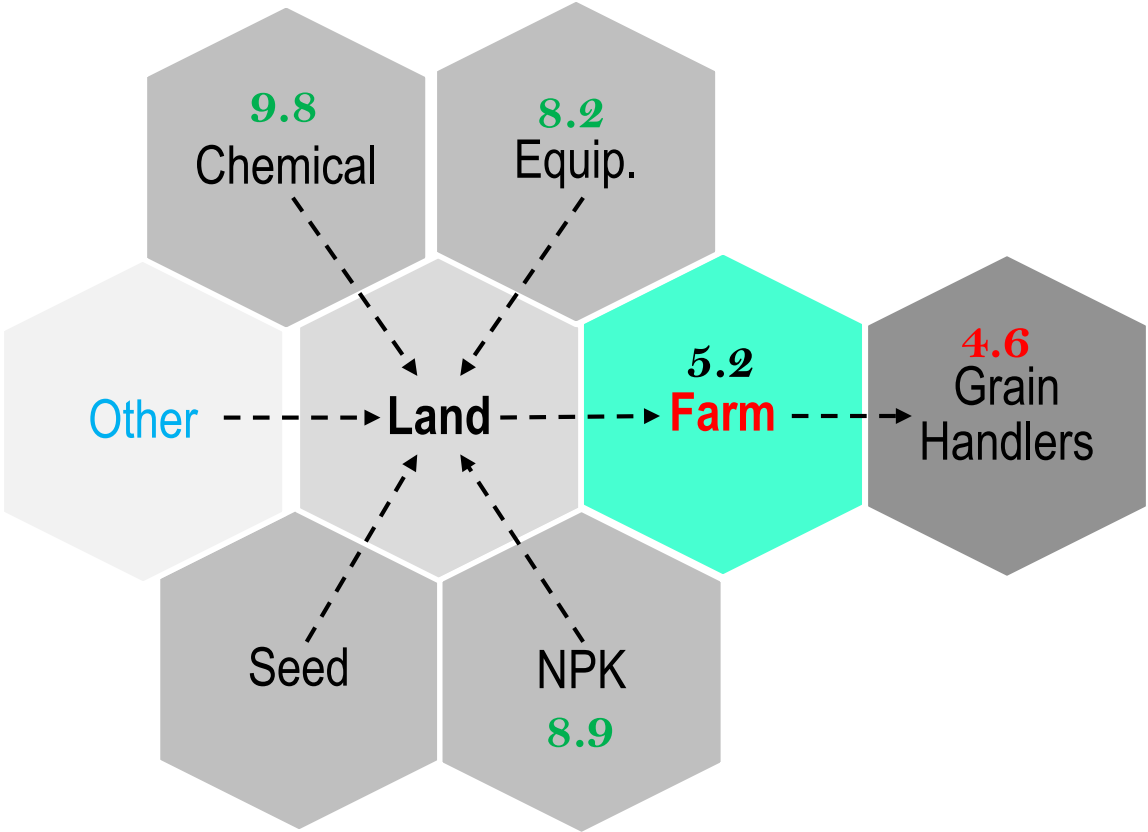


Focus on the big things

The Percent of Yield Going to the Factor			
	Soybeans	Corn	Avg
Seed	10%	12%	11%
Fertilizer	2%	17%	10%
Crop chemicals	8%	7%	8%
Land rent	34%	27%	30%
Machinery cost per acre	19%	18%	19%
Crop Insurance	4%	3%	4%
	78%	85%	81%

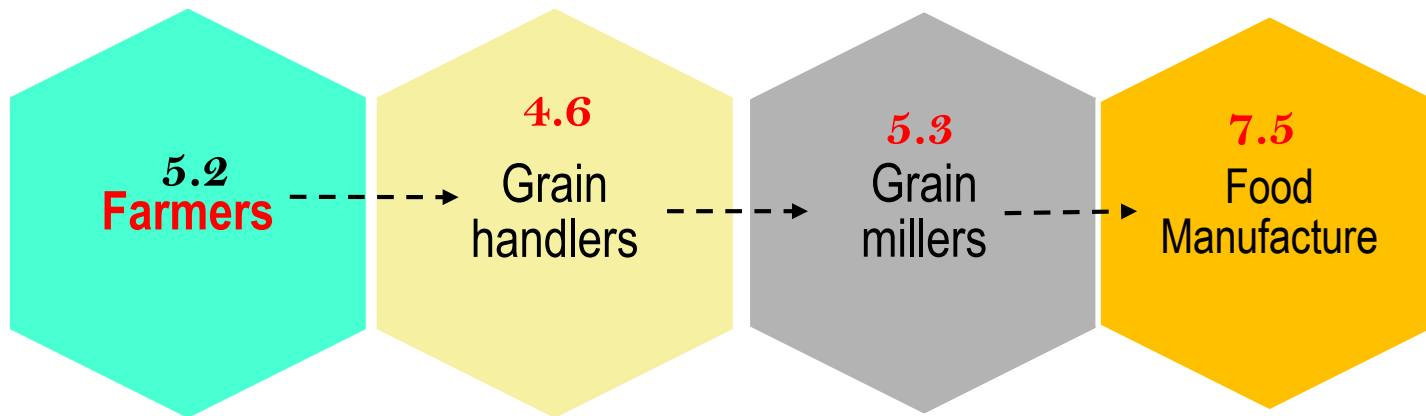
$$\text{Return on Assets} =$$
$$\frac{\$ \text{ profits}}{\$ \text{ of assets}}$$

One Step Adjacencies in Farming



Source: RMA, Wells Fargo

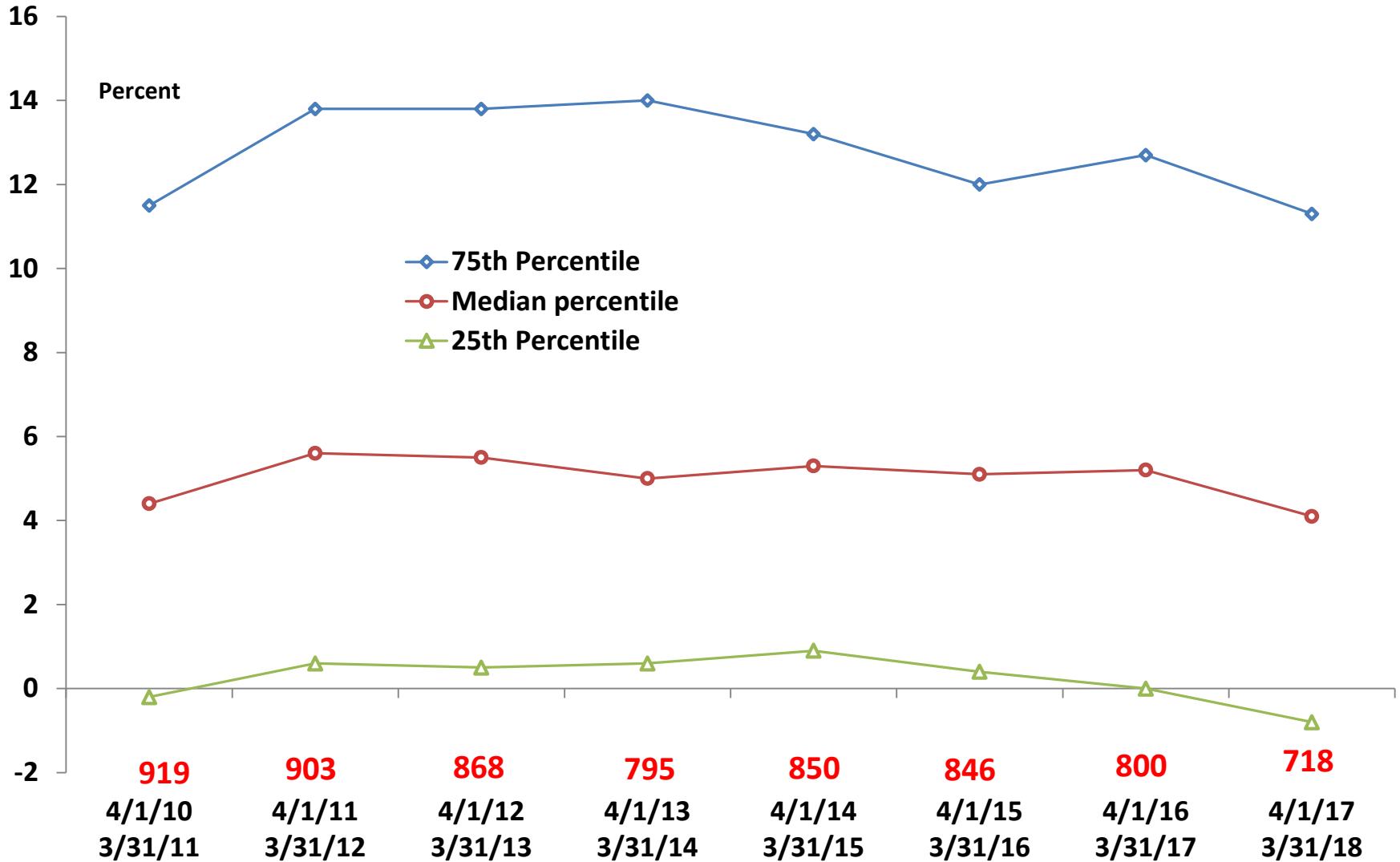
The ROAs of the milling



Environment v. Execution: Which rules?

RMA data: Crop Production

Profits B4 Taxes / Total Assets

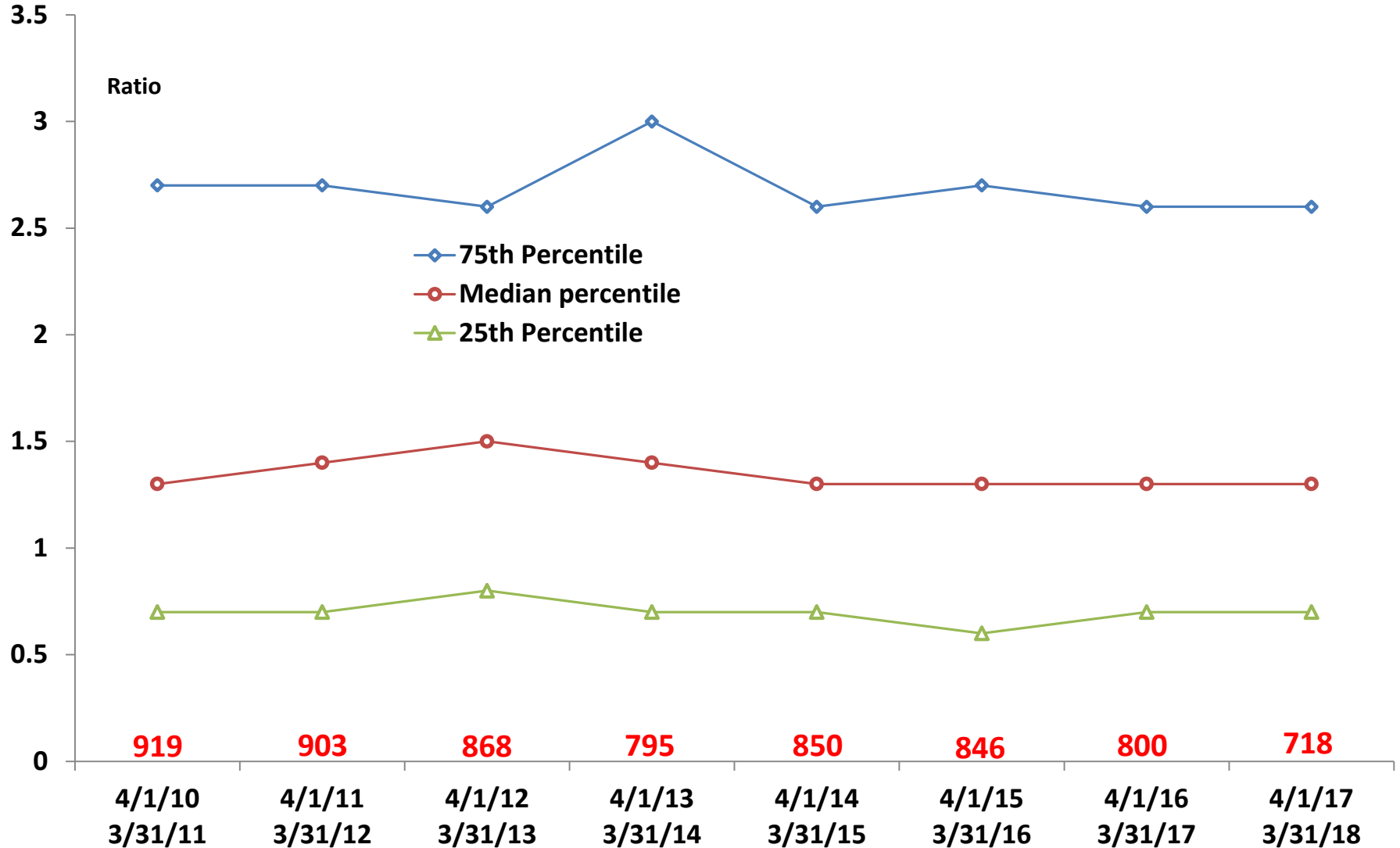


Source: RMA

Should you sell your lazy assets?

RMA data: Crop Production

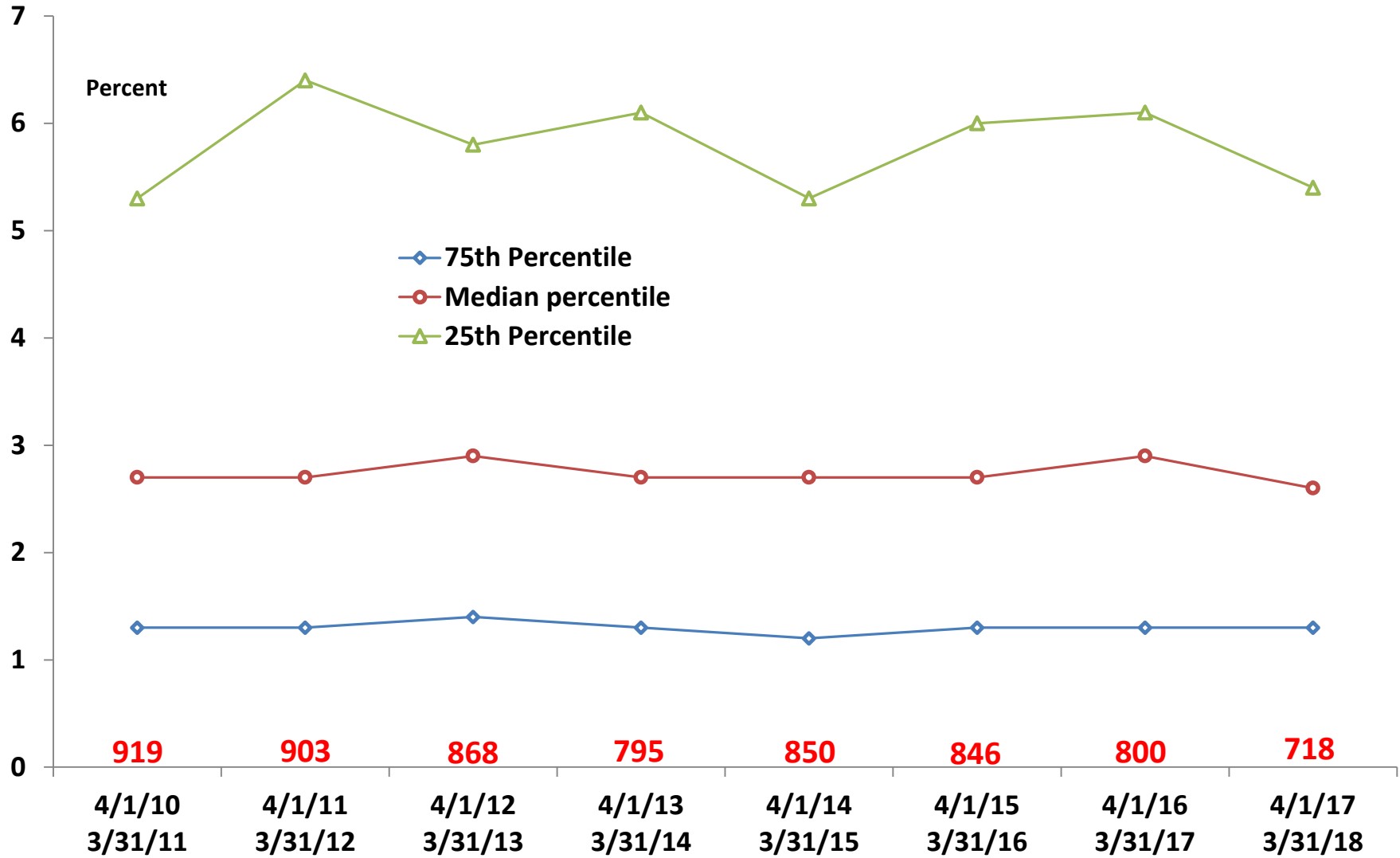
Sales / Total Assets



Amazon's strategy

RMA data: Crop Production

Owner, Director, Officer Compensation / Total Sales



Source: RMA

Everyone needs to be a MoneyBall manager

- **Cost on the unit you get paid in**
 - ◆ Acres v. tons
 - ◆ Plant costs v. cwt of flour
 - ◆ Relative yield and cost
- **Your success is average cost**
 - ◆ Average depends on marginal
 - ◆ Everything is fixed now
 - ◆ Everything is variable tomorrow
- **Adopt and adapt is a learning process**
- **Asset discipline is yours alone**

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