

# ***FARM OF THE FUTURE***

**Michael Boehlje**

Trey Malone

Chad Fiechter

# THE MIDWEST CROP FARM IN 2040

- Products/Services Produced
- Technology Used
- Resource Use/Availability
- Production/Processing/Distribution Systems
- Management Concepts/Processes



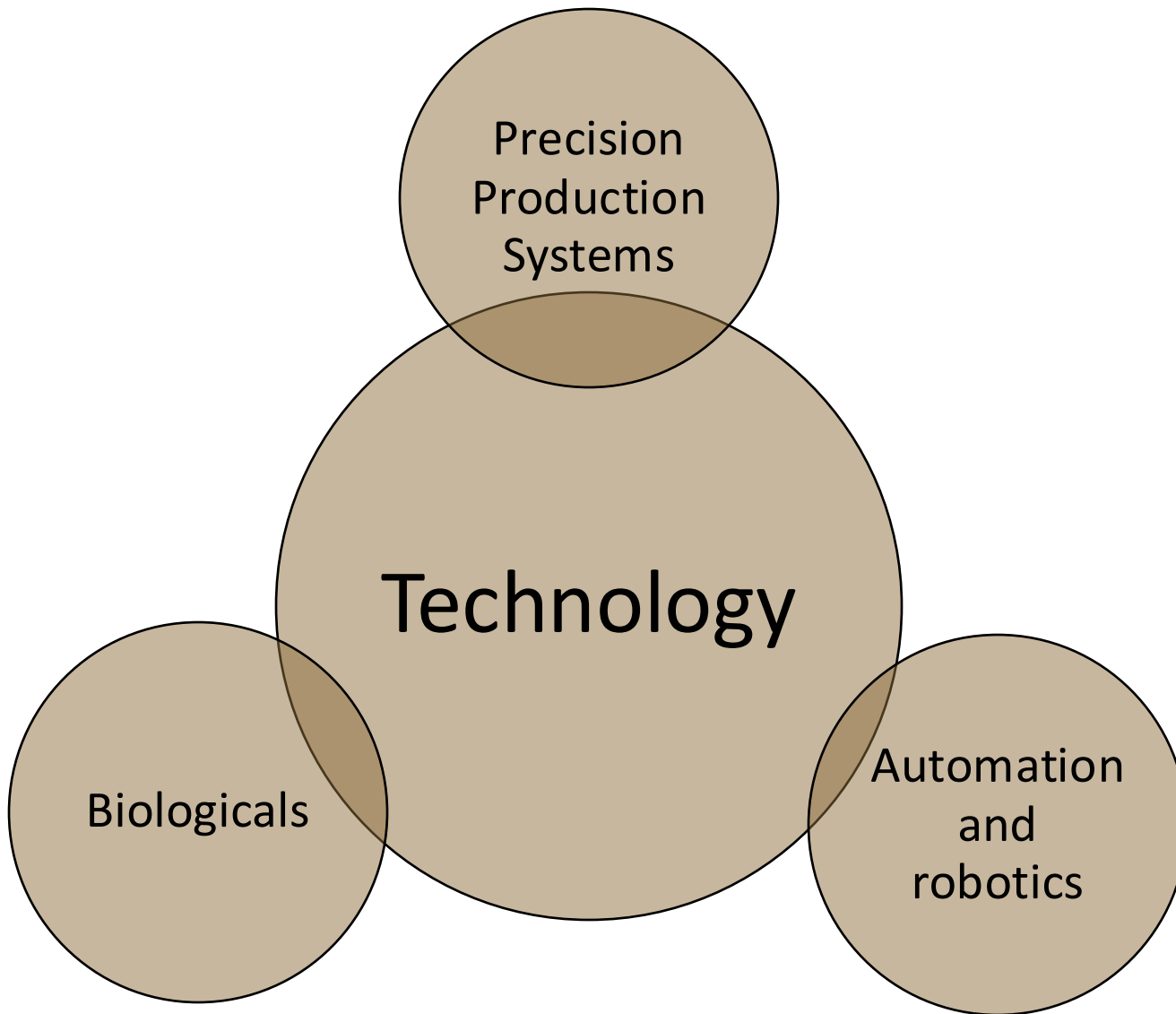
Traditional commodity products (corn, beans, wheat, new crops)

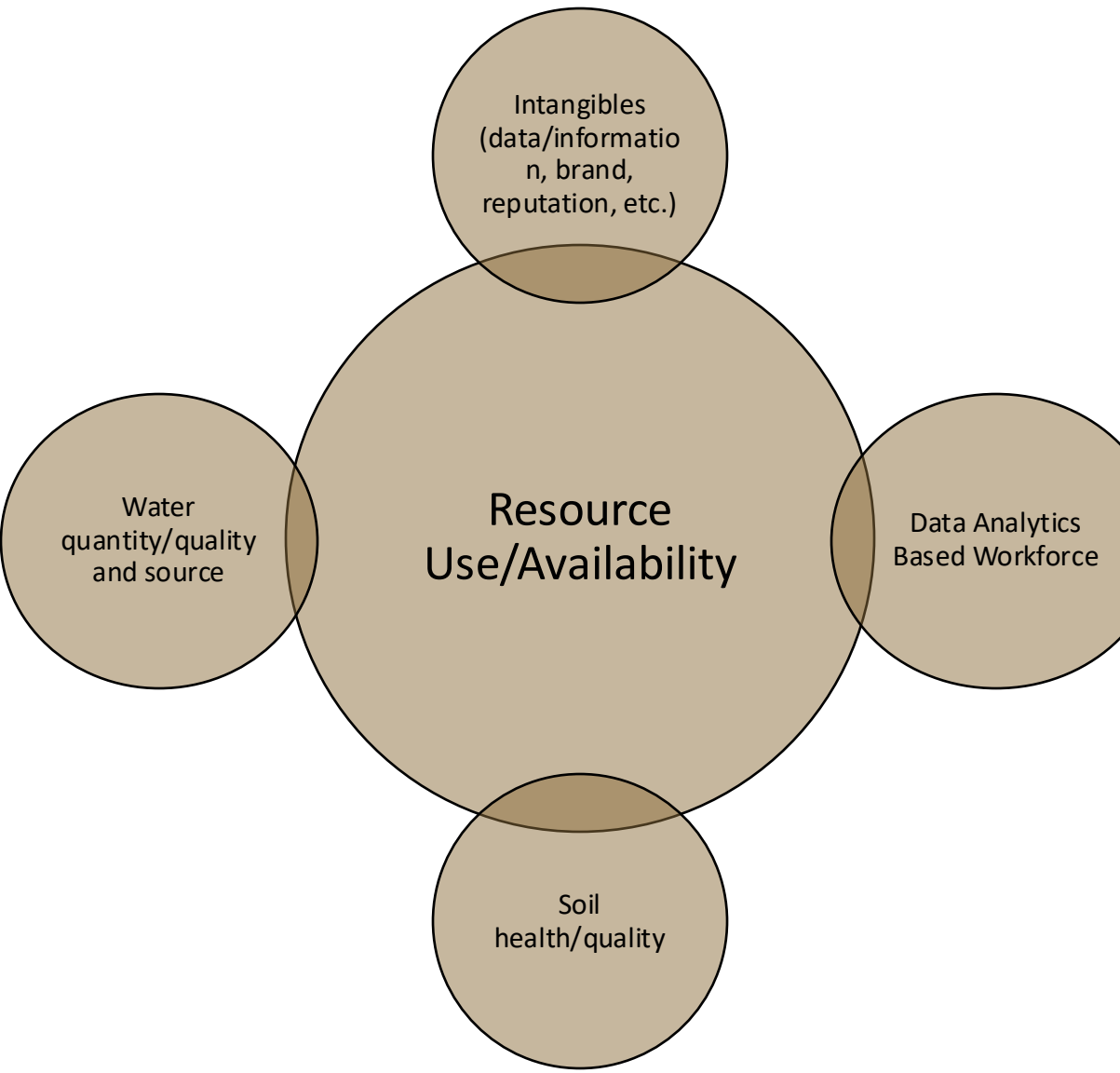
Renewable energy (Solar/Agrivoltaics, windmills, biofuels)

Products/Services

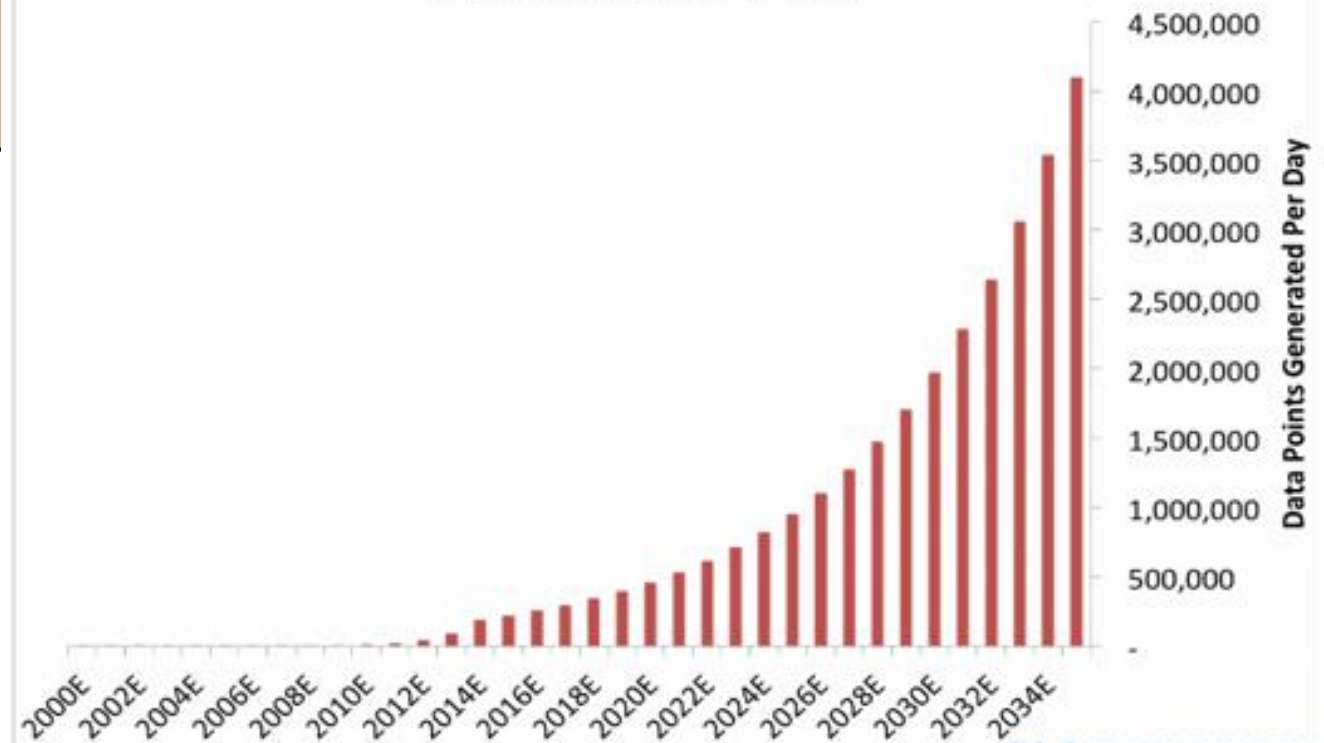
Differentiated ag products

Carbon sequestration/greenhouse gas mitigation

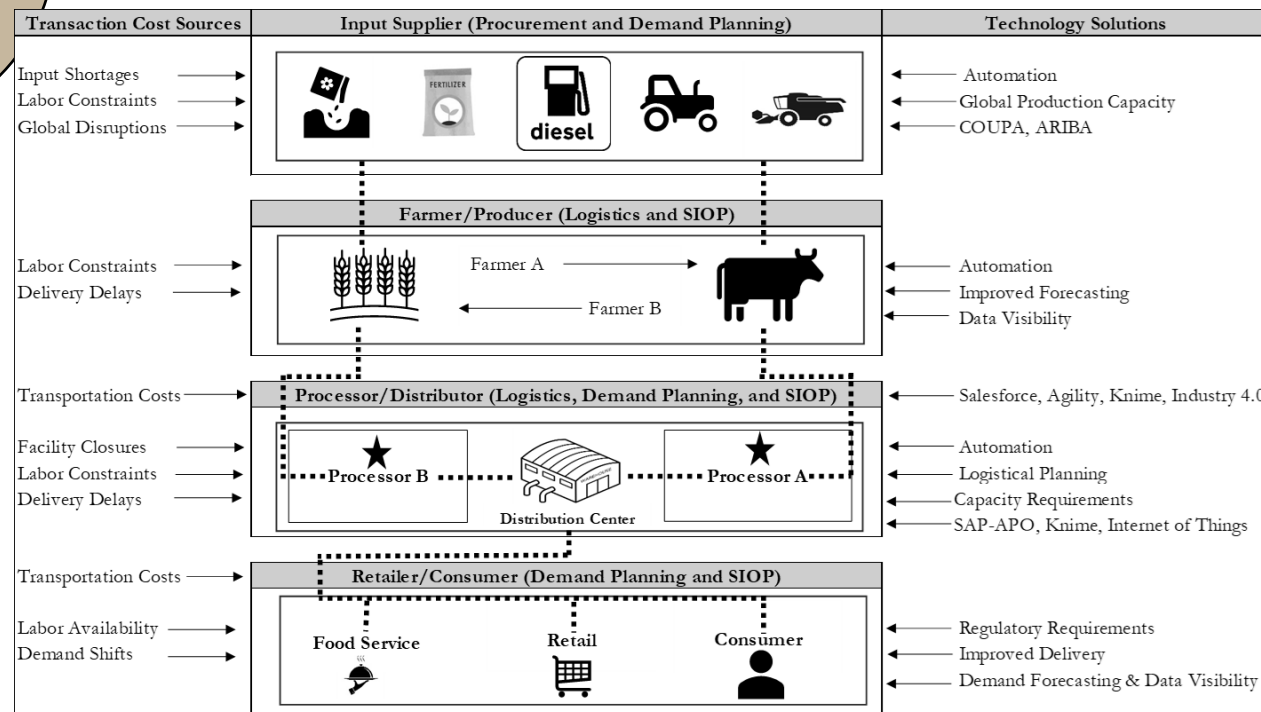
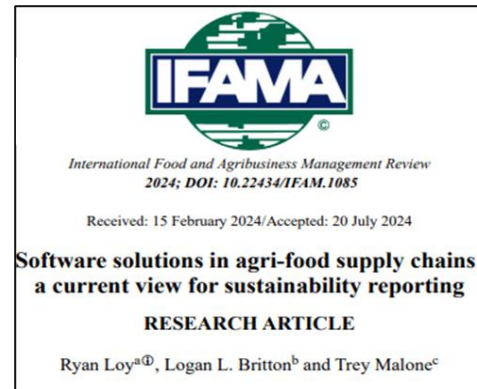
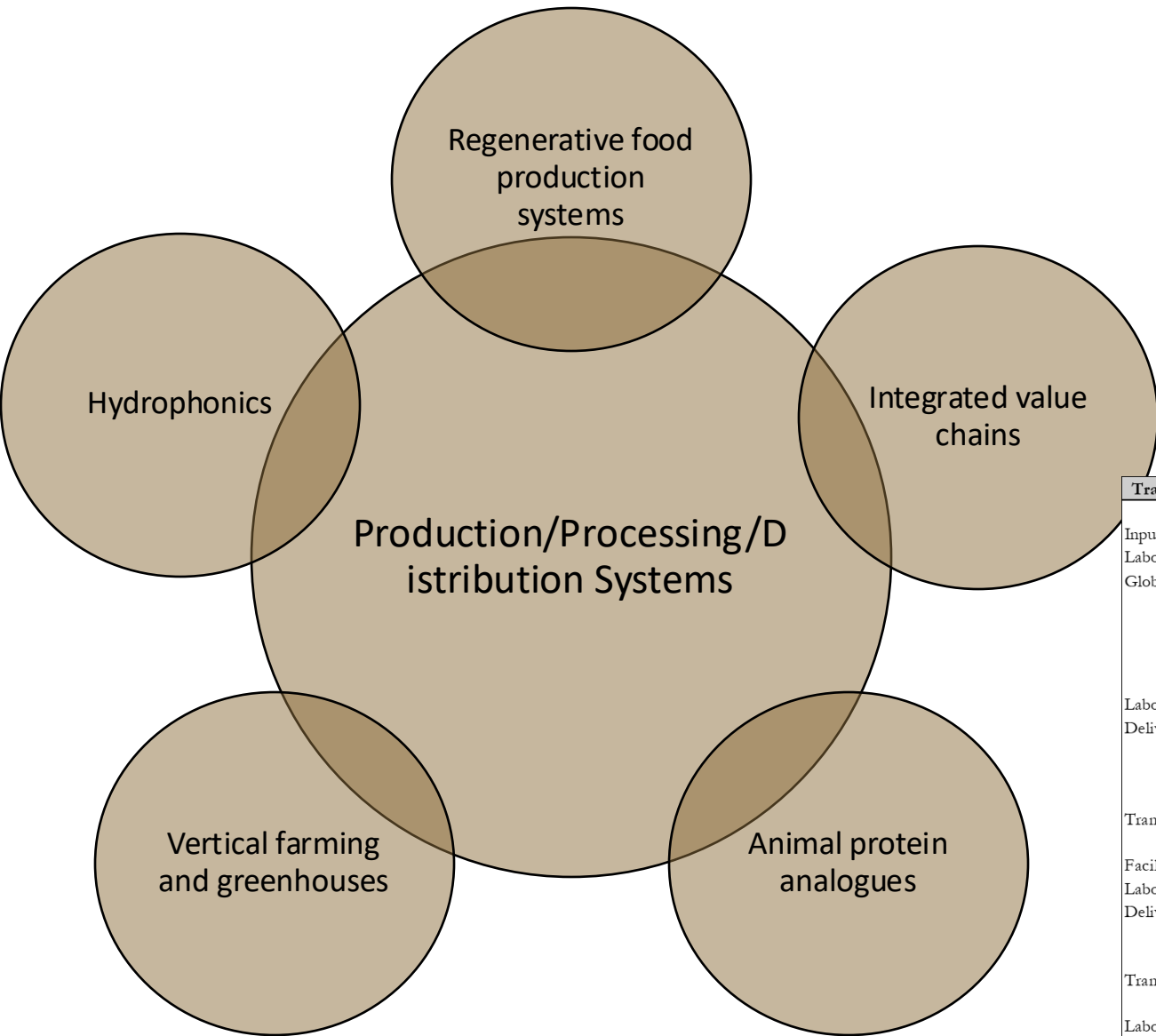


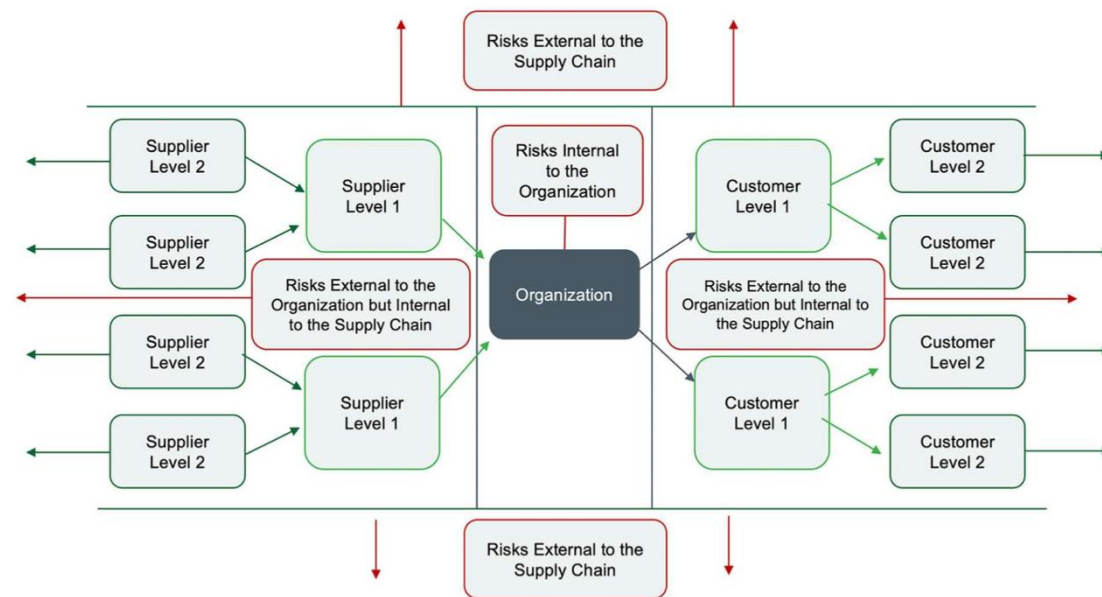
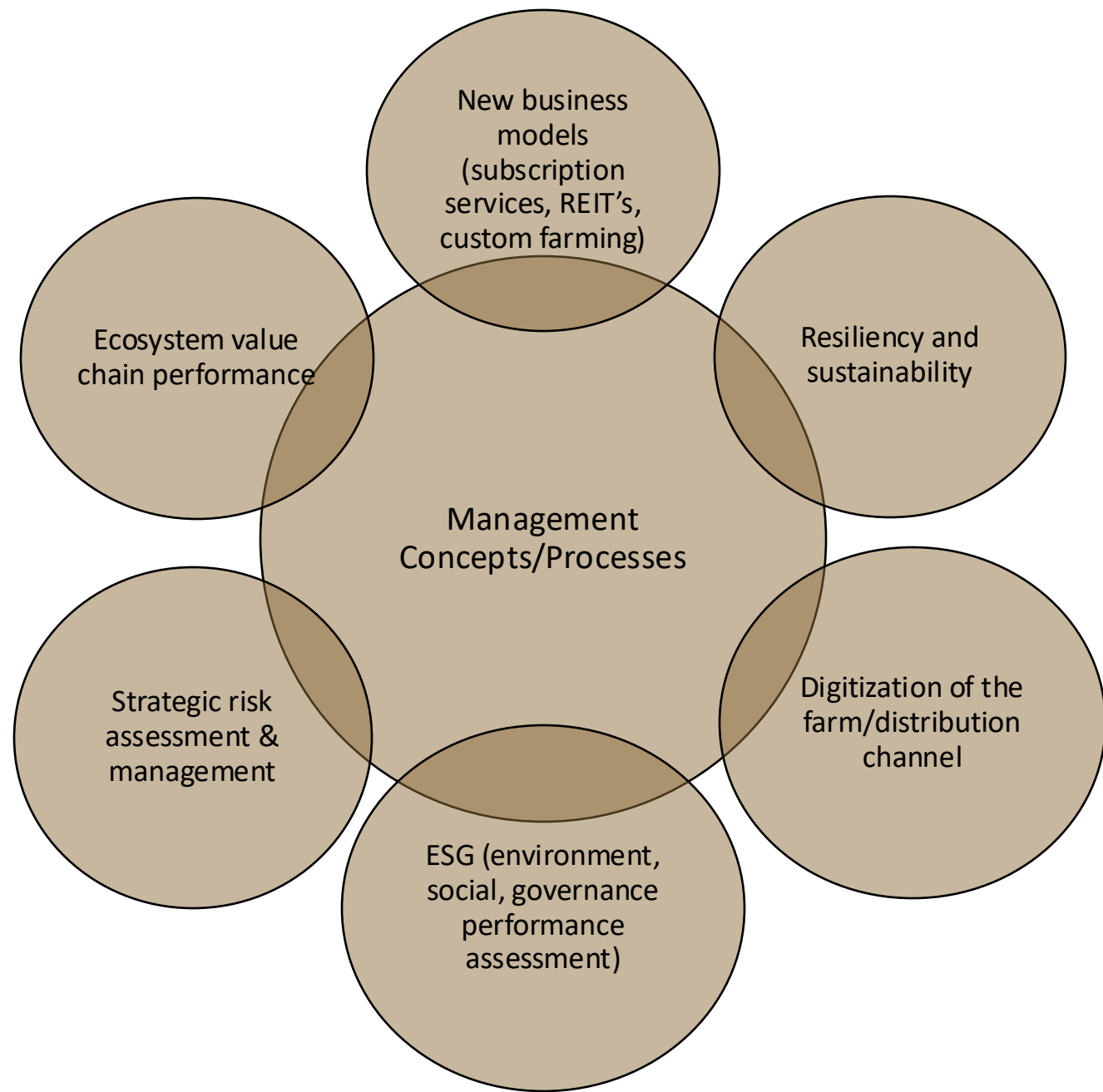


**Estimated Amount Of Data Generated By The Average Farm Per Day**



Source: OnFarm, BI Intelligence Estimates, 2015





# ***FOOD SUPPLY CHAIN OF THE FUTURE***

Michael Boehlje

**Trey Malone**

Chad Fiechter



**THE BULLWHIP EFFECT:  
SMALL, UNEXPECTED DEMAND  
CHANGES CAN LEAD TO  
INCREASING SWINGS DOWN  
THE SUPPLY CHAIN.**

**Takeaway #1: No Food, No Farms –  
Monitoring consumer markets is more  
important than ever.**

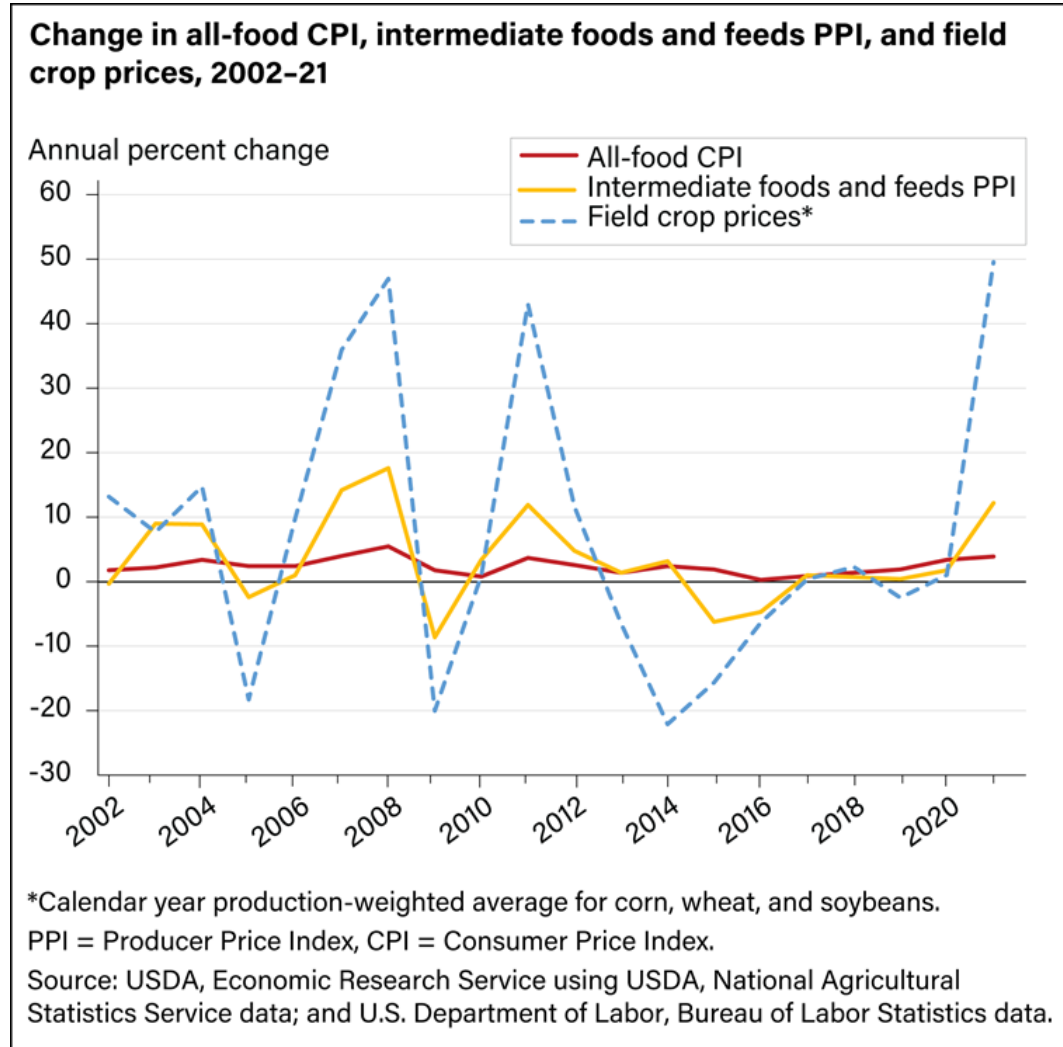
**Prediction #1: Consumer markets will  
continue the wild ride.**

# Small Changes in Food Prices, Large Swings in Commodity Prices

A single and sudden change in demand can have increasing effects across the whole supply chain.

Important to understand:

1. Seasonality
2. Business Cycles
3. New Product Introduction
4. Products' end of life
5. Unforeseen circumstances

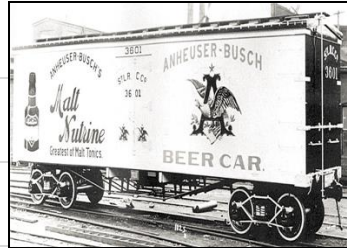


**Takeaway #2:** Food markets have moved from a producer “push” to a consumer “pull.”

**Prediction #2:** Resiliency will be increasingly limited by asset specificity.

# Average Number of Products in a U.S. Grocery Store

50,000  
45,000  
40,000  
35,000  
30,000  
25,000  
20,000  
15,000  
10,000  
5,000  
0



1975



2020

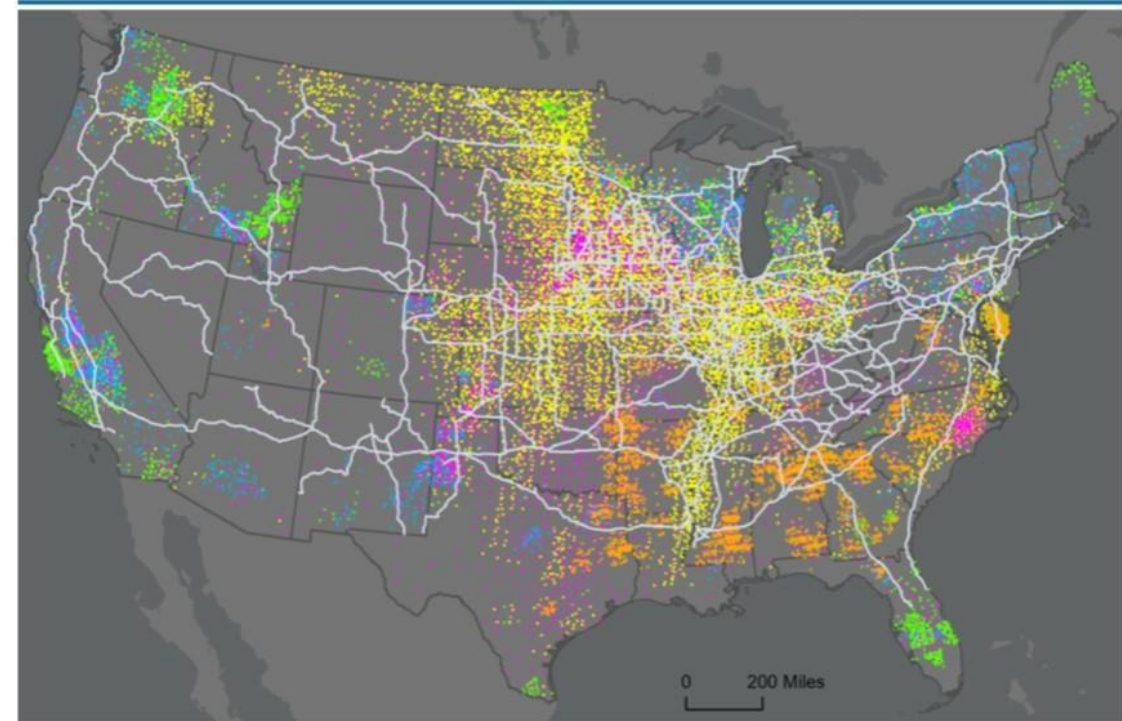


Department of Agricultural  
Economics and Agribusiness  
University of Arkansas  
Division of Agriculture

# WHEN LONG TAILS MEET ASSET SPECIFICITY



Hard to get the same flavor profile if they were to substitute away from soft red winter wheat.



Source: Volpe Center analysis of 2017 Census of Agriculture and 2018 IHS Markit Transearch data

### Legend

- 1 dot ● = 1,000 Acres of Fruits & Vegetables Harvested
- 1 dot ● = 20,000 Acres of Grain Harvested
- 1 dot ● = 3,000 Heads of Dairy Cows
- 1 dot ● = 75,000 Heads of Livestock
- 1 dot ● = 400,000 Heads of Poultry
- High-Volume Domestic Agricultural Highways

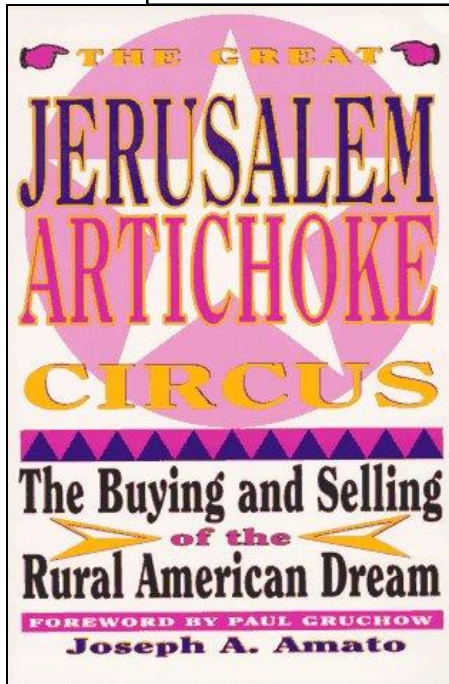


# HOW TO AVOID INVESTING IN A CONSUMER SPECULATION BUBBLE

*Review of Agricultural Economics—Volume 29, Number 2—Pages 286–305*  
DOI:10.1111/j.1467-9353.2007.00343.x

## Alpaca Lies? Speculative Bubbles in Agriculture: Why They Happen and How to Recognize Them

Tina L. Saitone and Richard J. Sexton



1. The asset itself and not its product is promoted.
2. Investors have unrealistic expectations regarding the market, including:
  - a) Potential for growth in sales of the product
  - b) The benefits that will be derived if such growth materializes
  - c) The prospects for and consequences of outside competition
3. Information is controlled through industry sources
4. Small-scale investors predominate
5. Biological or trade barriers to growth in the stock of the asset are present

**Takeaway #3:** Sustainability will increasingly drive the policy conversation.

**Prediction #3:** Consumers will not be willing to pay for what they vote for, but large firms will so they can hit their climate targets.



# Sustainability and the Push to "Regenerative"

In your own words, how would you define "sustainability" in the context of agriculture?



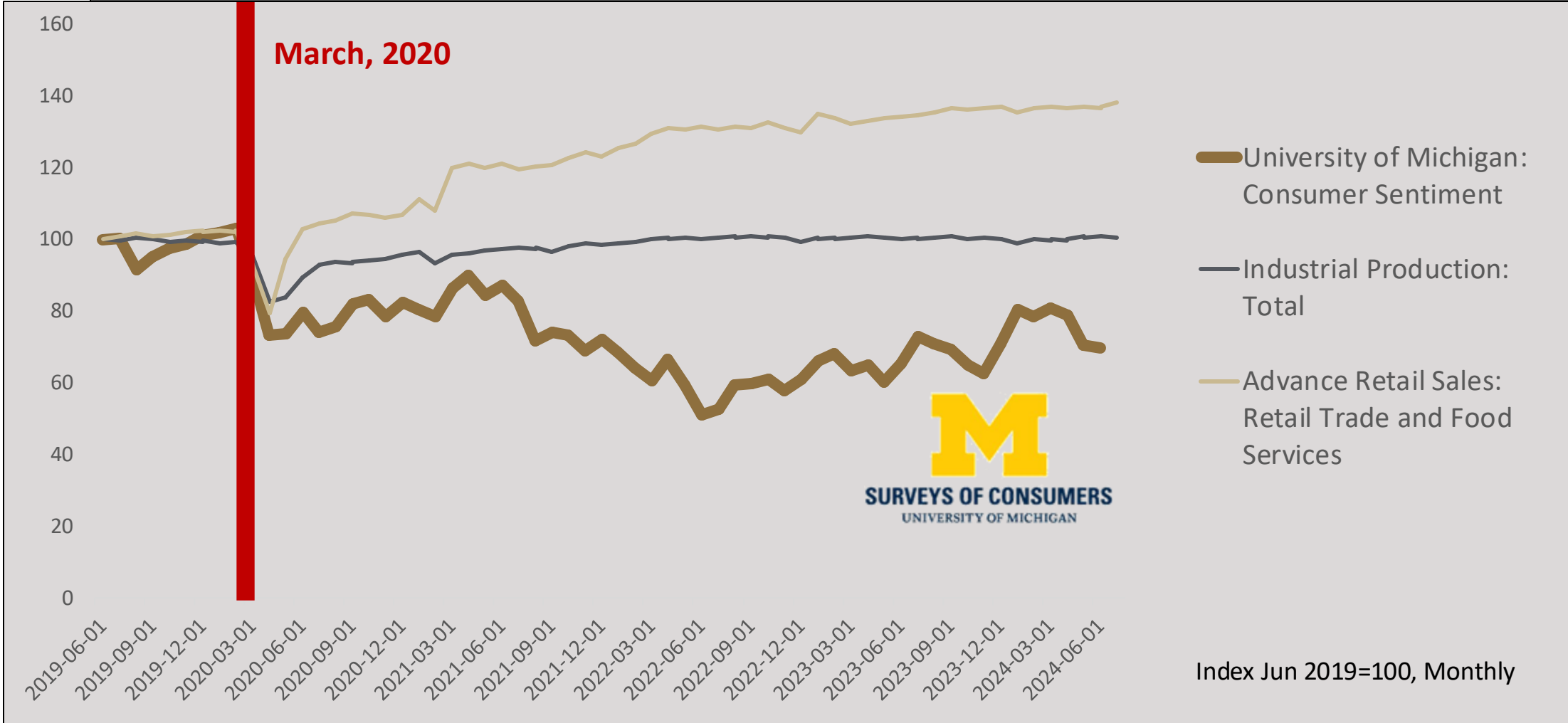
In your own words, how would you define "regenerative" in the context of agriculture?



**Takeaway #4:** Inflation isn't going anywhere, but consumer response is strange.

**Prediction #4:** Inflation isn't going anywhere, but consumer response is strange.

# U.S. Consumer Post-COVID Sentiment



**Takeaway #5:** Voting behavior can be even more prone to bullwhip outcomes.

**Prediction #5:** Additional states will sign on for additional animal welfare and low-carbon fuel standards

# Voting Patterns and the “Expressive Voting” Hypothesis

## Featured Article

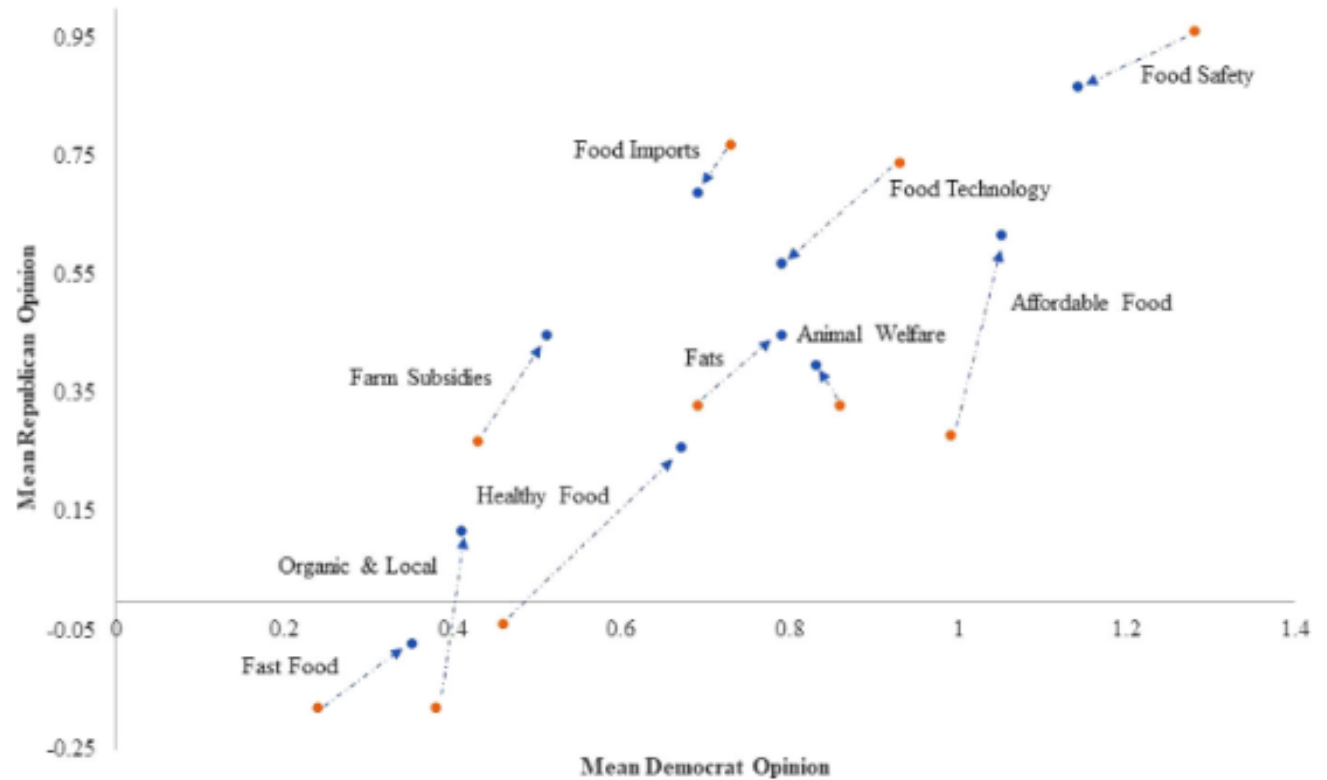
### Exploring Polarization in US Food Policy Opinions

Christina Biedny, Trey Malone\*, and Jayson L. Lusk

*Applied Economic Perspectives and Policy* (2020) volume 42, number 3, pp. 434–454.  
doi:10.1002/aep.13053

**Figure 3** Mean Changes in Policy Opinions for the Average Republican and Democrat in 2011 and 2018

Note: Orange dots denote policy opinions in 2011 and blue dots denote policy opinions in 2018. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



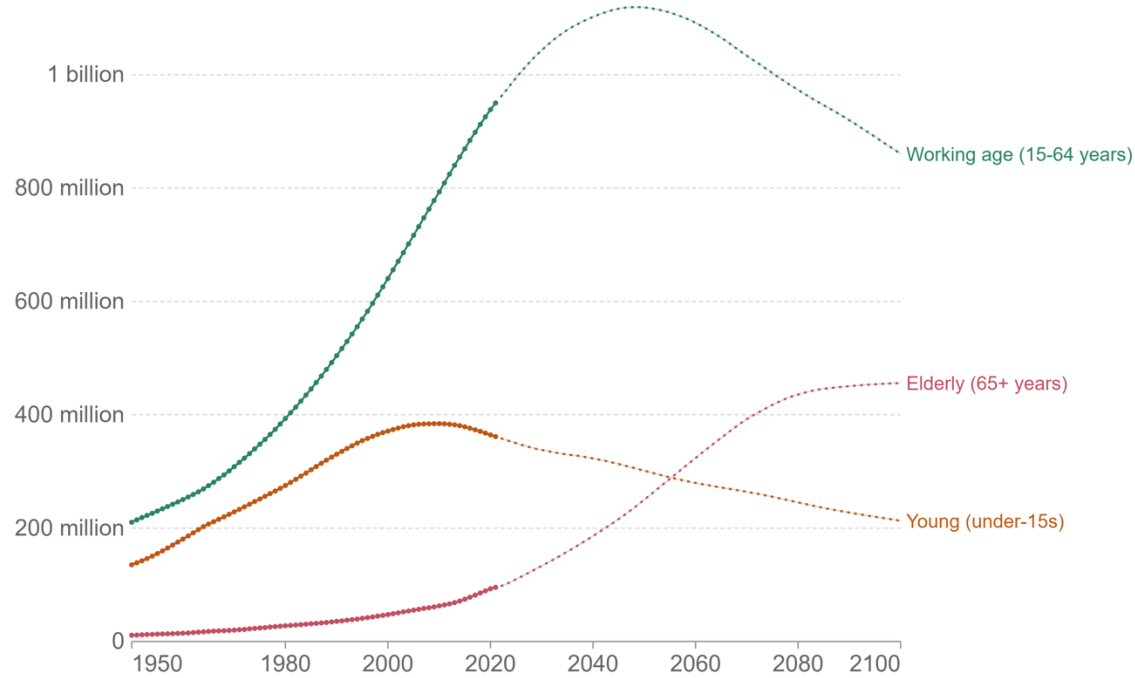
**Takeaway #6: International markets will continue to be critical.**

**Prediction #6: The countries of interest will change as other lower-income countries develop.**

# International Market Demographics

## Population of young, working-age and elderly, India

Historic estimates from 1950 to 2021, and projected to 2100 based on the UN medium-fertility scenario<sup>1</sup>.



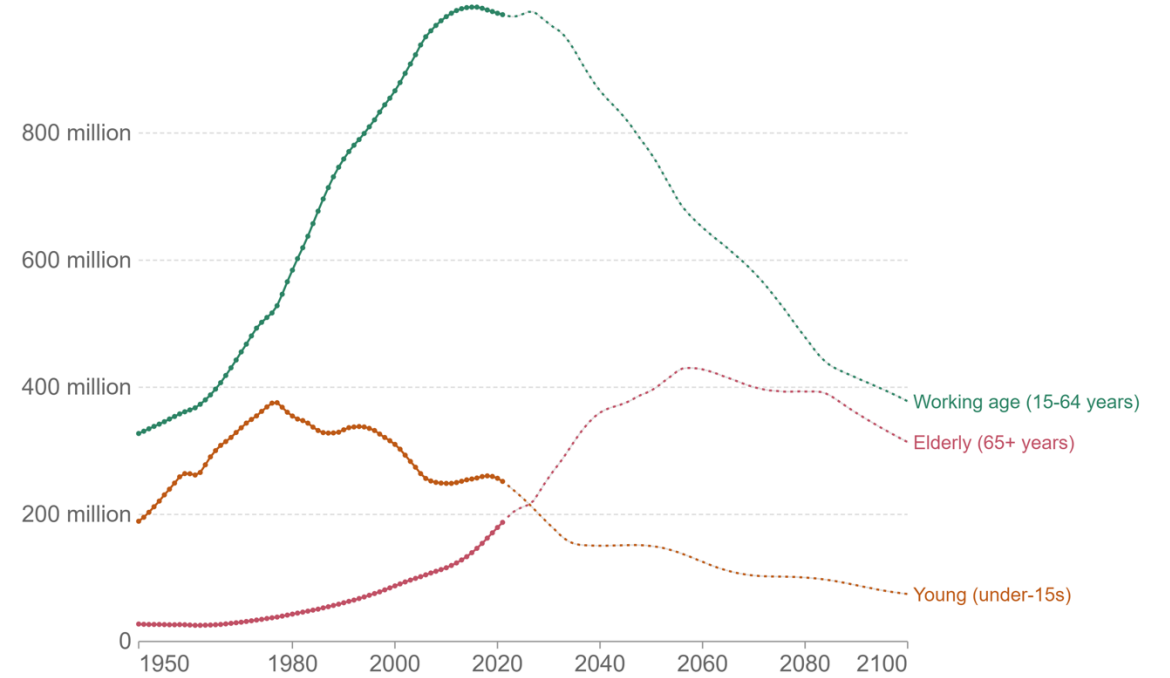
Source: United Nations, World Population Prospects (2022)

OurWorldInData.org/age-structure • CC BY

1. **UN projection scenarios:** The UN's World Population Prospects provides a range of projected scenarios of population change. These rely on different assumptions in fertility, mortality and/or migration patterns to explore different demographic futures. [Read more: Definition of Projection Scenarios \(UN\)](#)

## Population of young, working-age and elderly, China

Historic estimates from 1950 to 2021, and projected to 2100 based on the UN medium-fertility scenario<sup>1</sup>.



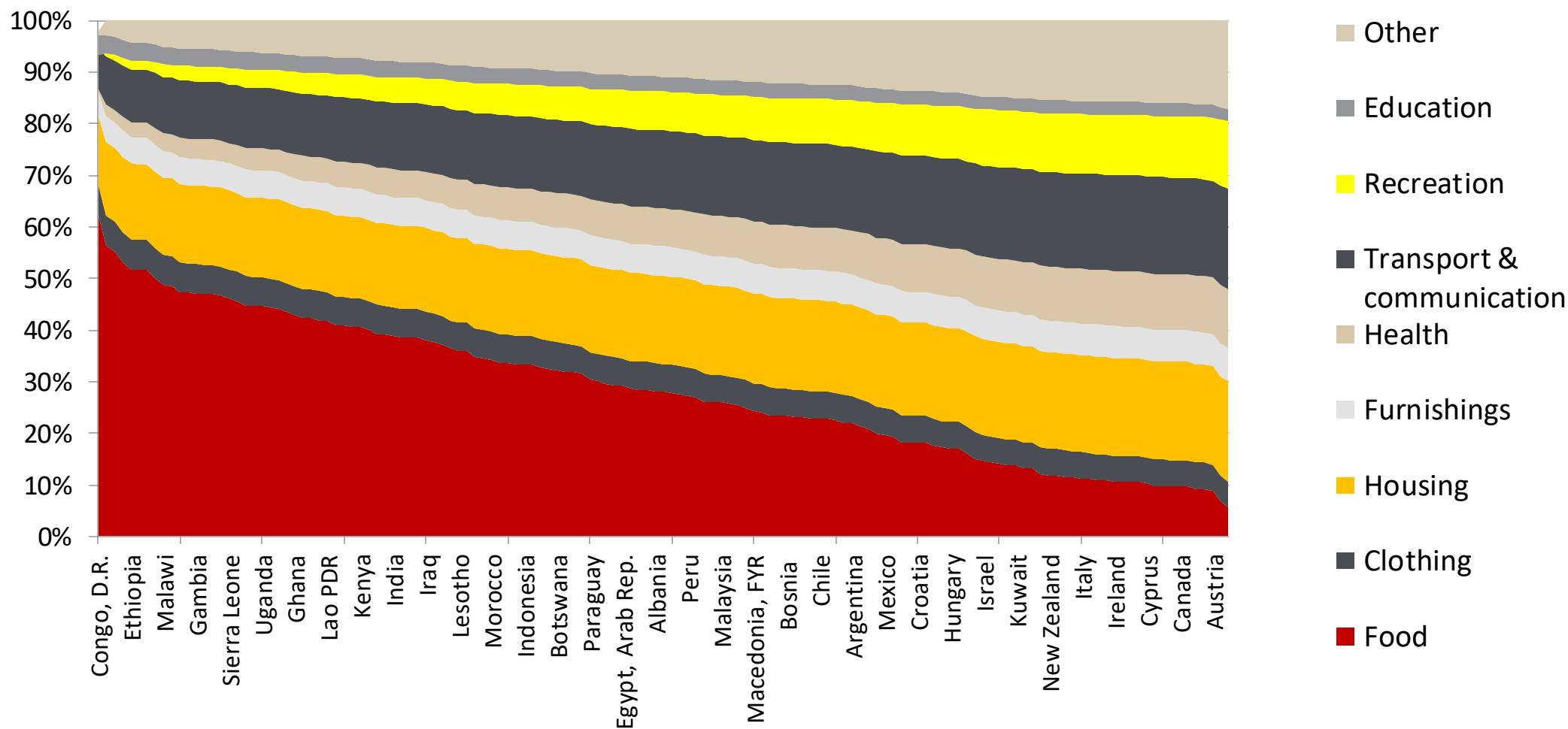
Source: United Nations, World Population Prospects (2022)

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# ADDITIONAL DOLLAR OF INCOME: IMPACT ON FOOD CONSUMPTION

*LOWER INCOME COUNTRIES SPEND MUCH MORE OF THAT ADDITIONAL INCOME ON FOOD*



Source: USDA, Economic Research Service using International Comparison Program 2005 data; USDA Economic Research Service – Foreign Agricultural Trade of the United States (FATUS)



# ***FARM GROWTH: CONSTRAINTS***

Michael Boehlje

Trey Malone

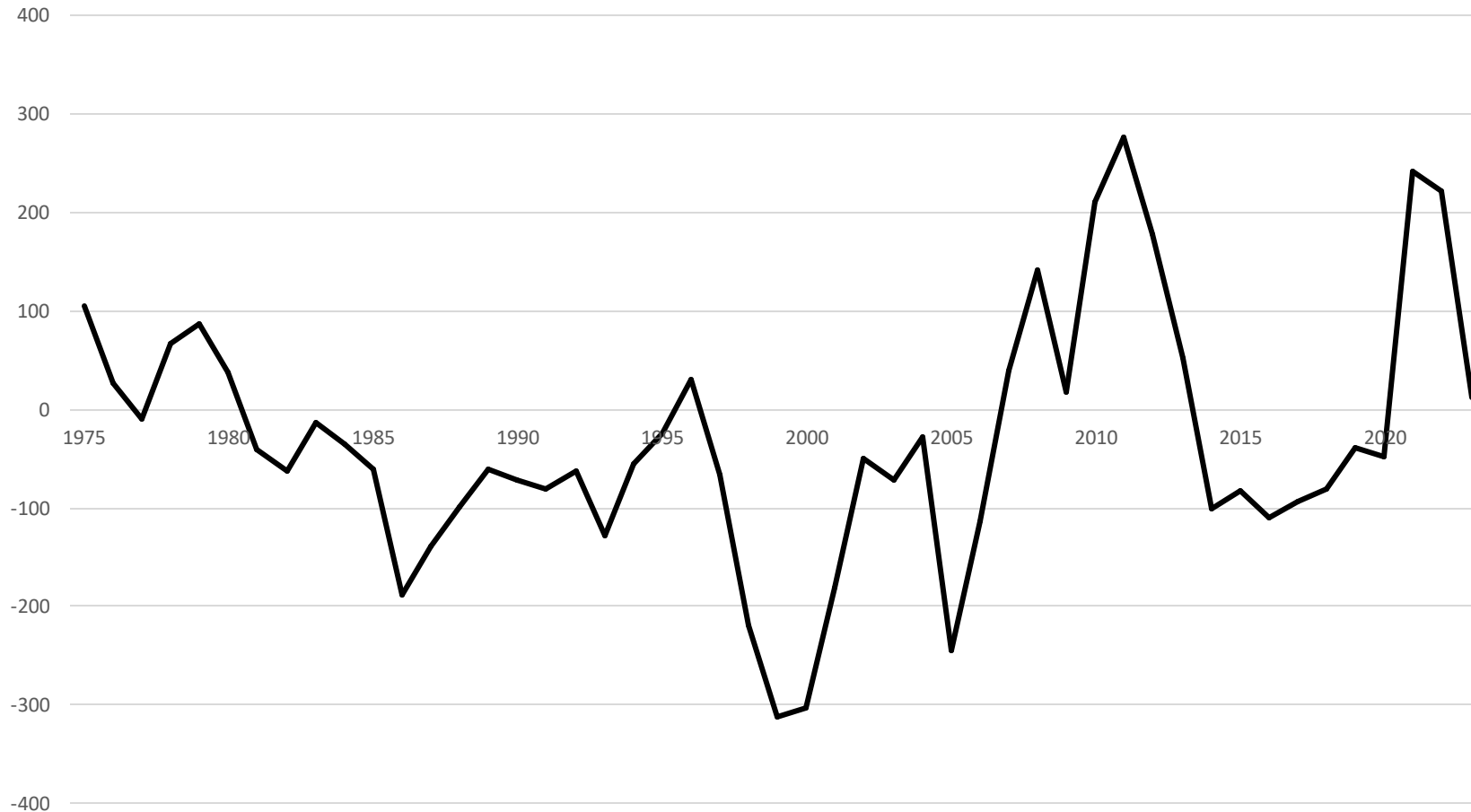
**Chad Fiechter**

# CONSTRAINTS TO GROWING XXX,000 AC.

- Machinery
  - Availability
  - Capacity
- Management
  - Logistics
  - Recordkeeping
  - Labor
  - Financial
- Genetics
- Markets
- Risk Management
- Land Aggregation
  - Costs
  - Availability
  - Social Pressure
- Finance
  - Availability
  - Competition

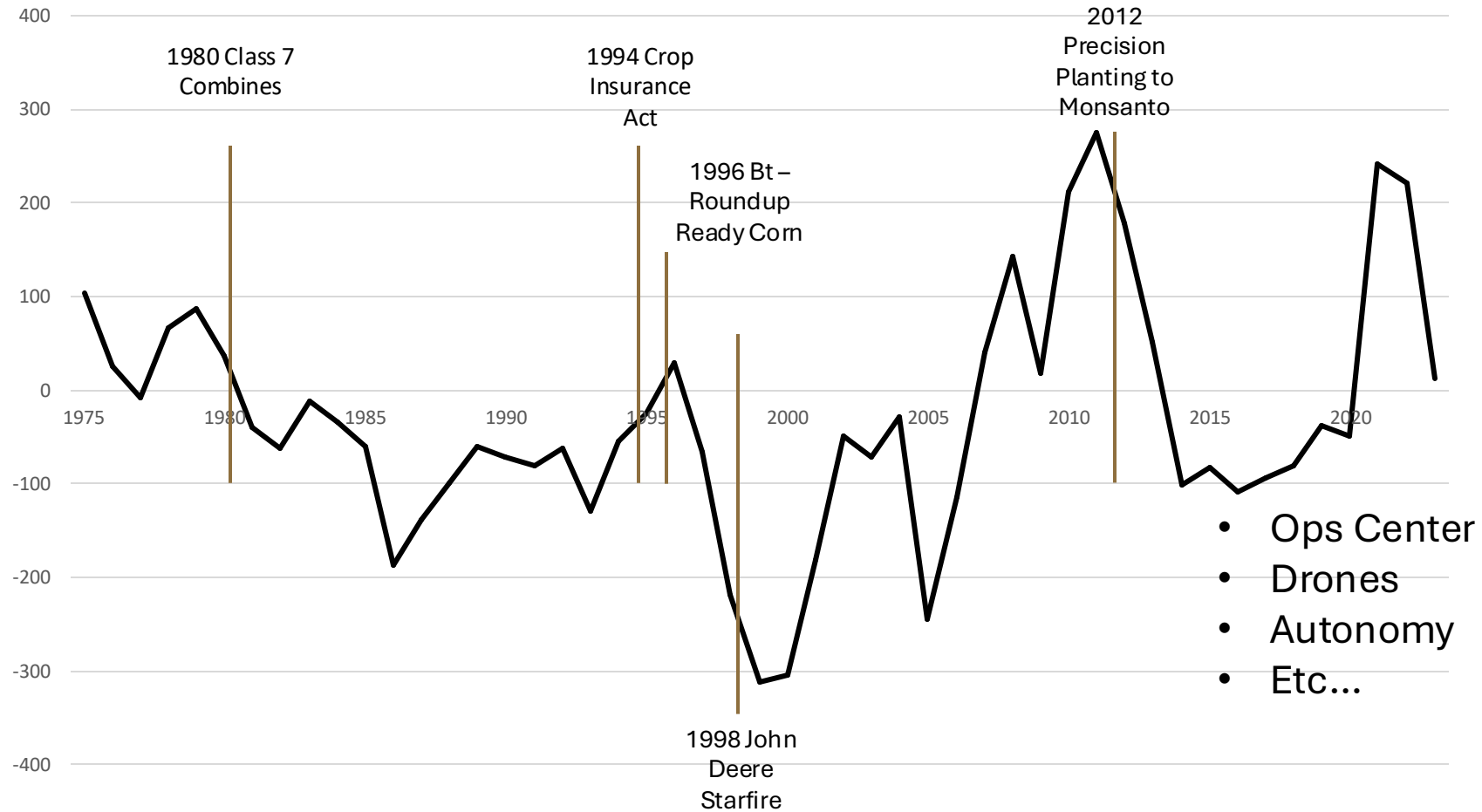
# USDA CORN RETURNS

US Corn Returns per acre in 2023 Dollars



# USDA CORN RETURNS

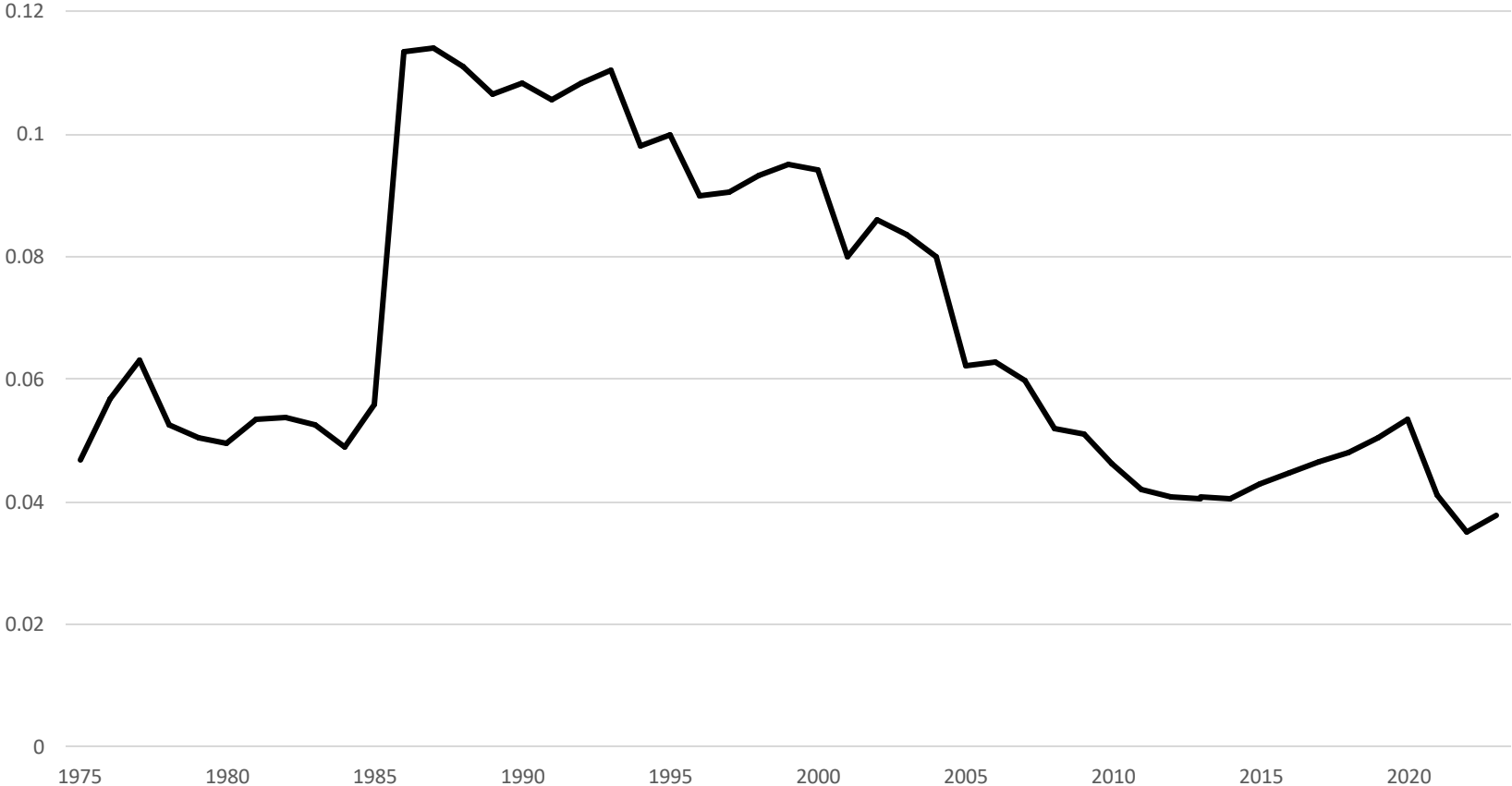
US Corn Returns per acre in 2023 Dollars



- Ops Center
- Drones
- Autonomy
- Etc...

# LABOR COST

Percent of Corn Production Costs allocated to Labor



# THE TASK

On the front of the sheet:

Spend 3 minutes –

write three constraints that you believe hindered farm growth

Flip the sheet – get in groups of 3 to 5

Spend the rest of our time

choose the three constraints and the corresponding time periods that you believe hindered farm growth