



Food & Agricultural
Policy Research Institute
University of Missouri

*California Air Resource Board
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Research on macro-scale domestic and international biofuel and feedstock trade dynamics

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Purpose

Request (emphasis added)

“LUC concerns or lack thereof based on *forward-looking biofuel demand, supply, and current LUC research*; recent empirical and/or satellite data and their uses (including in determining *crop area change elasticities*); suggested methodological improvements or challenges in modeling global land use change. ”

“the *ability of projected feedstock supplies to meet demand for biofuel, and inputs/elasticities/assumptions* that could use further alignment and/or research across LUC models”

My role

FAPRI-MU: objective analysis of markets and policies, not recommendations

Focus on forward-looking feedstock market conditions

Ambiguity

Scope of responses

Focus on changes in California policy or fuel use?

Consider market and policy
responses in rest of US?

And rest of the world?

Time frame of responses and context

Time frame of responses

Short-run with constraints? Or long-run?

How far into the future to define context

Relevance of past food-versus-fuel studies
in near, medium, or far future?

Focus on forward-looking context

Motivation

- ❑ We know the context matters

 - Reviews of biofuel impact literature published ten years ago

 - Lesson from studying other policies

- ❑ Context has changed – and will change

 - Example: +17% Corn and soybean average global yields from 2005/06-10/11 to 2020/21-24/25

 - implication for number of hectares per unit of biofuel?

Inputs

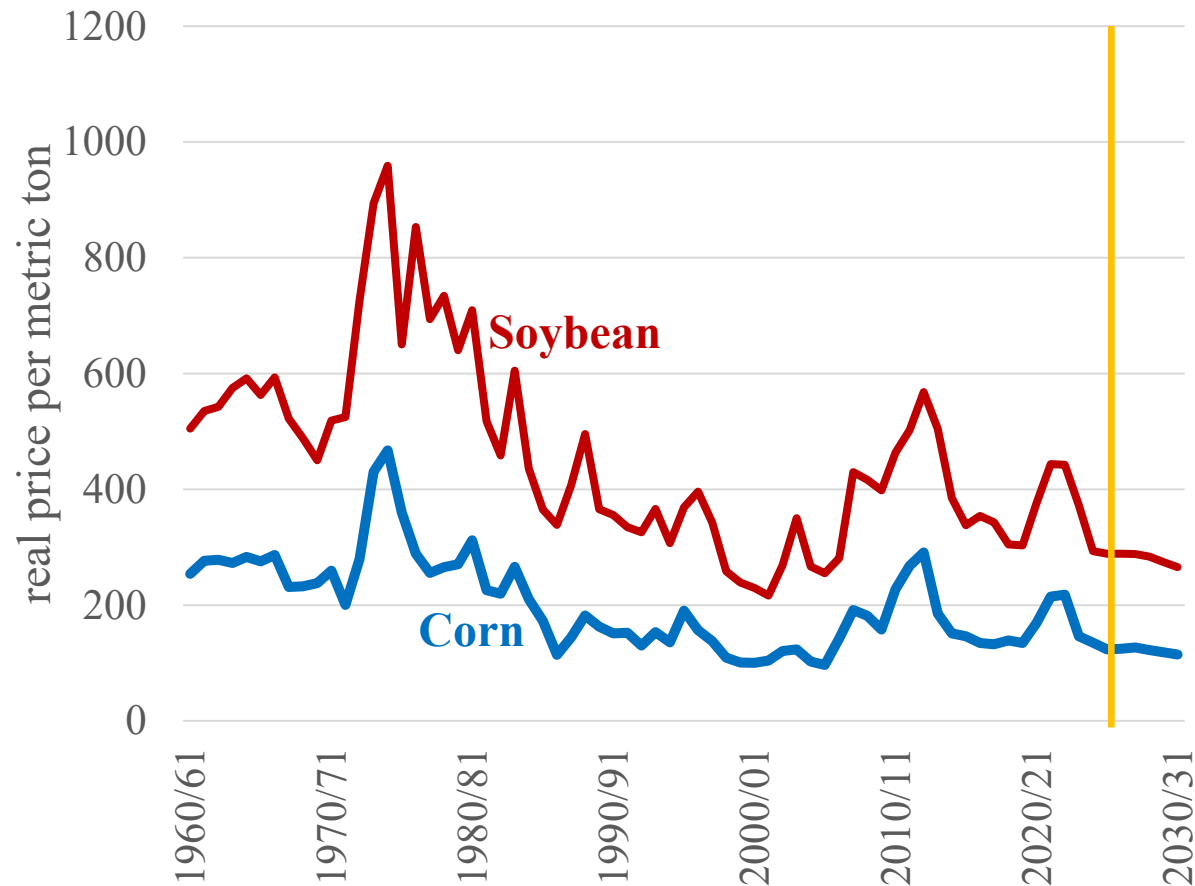
- ❑ Literature on interactions of demands, supplies, prices, and policies

- ❑ USDA and other data relating to past and current conditions

- ❑ FAPRI-MU September 2025 outlook

Commodity prices

Real US corn and soybean farm prices



Trends and conditions

Real prices over time

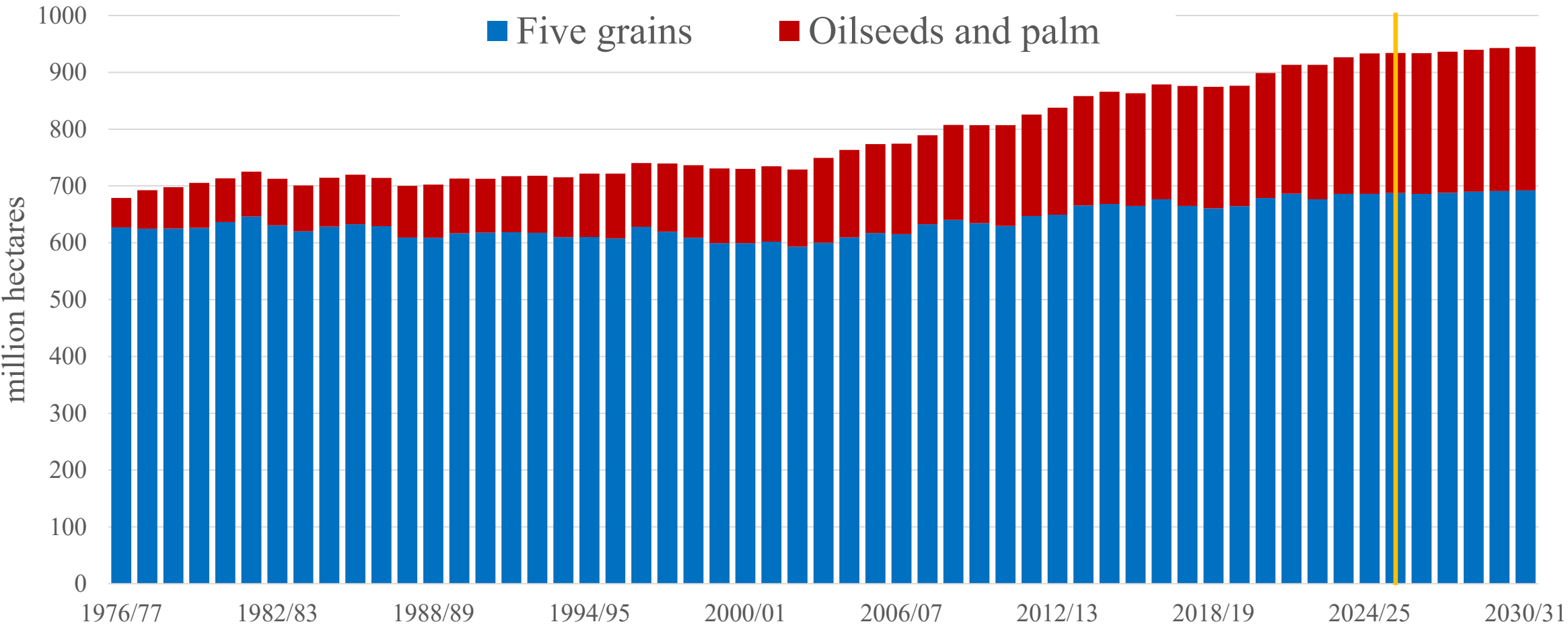
- Long-run negative trend
- Periods with spikes

Food-versus-fuel debate context

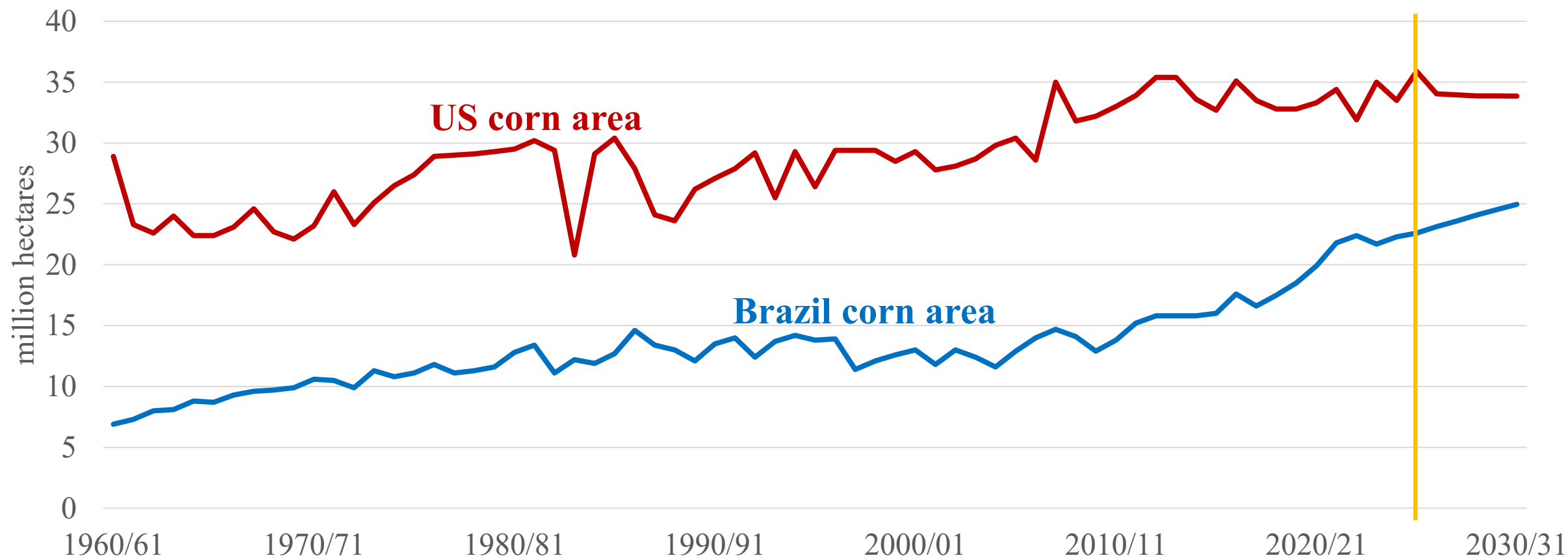
- US policy: RFS, MTBE, tariff, credits
- Rising petroleum prices
- Growing use in China
- Strong demand overall

Relevance in future context?

Global area harvested



Brazil's rising corn area harvested



Crop supply questions

Area response

> Measurement

- Producer expectations?
- Area harvested or planted? Prevent plant?

> Relevance of past studies

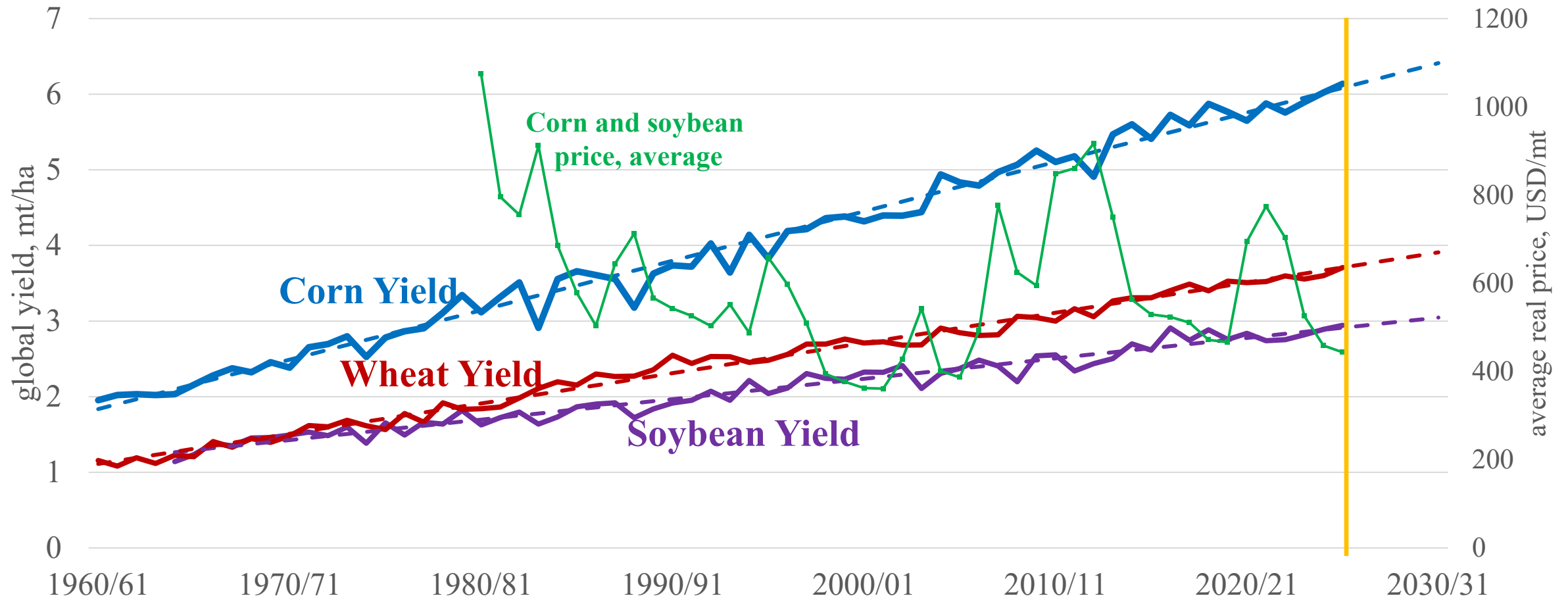
- Area of farm, region, or country?
- Existing cropland use or new cropland?
- Context of rising or falling total area?

Yield response

> Technology & induced innovation

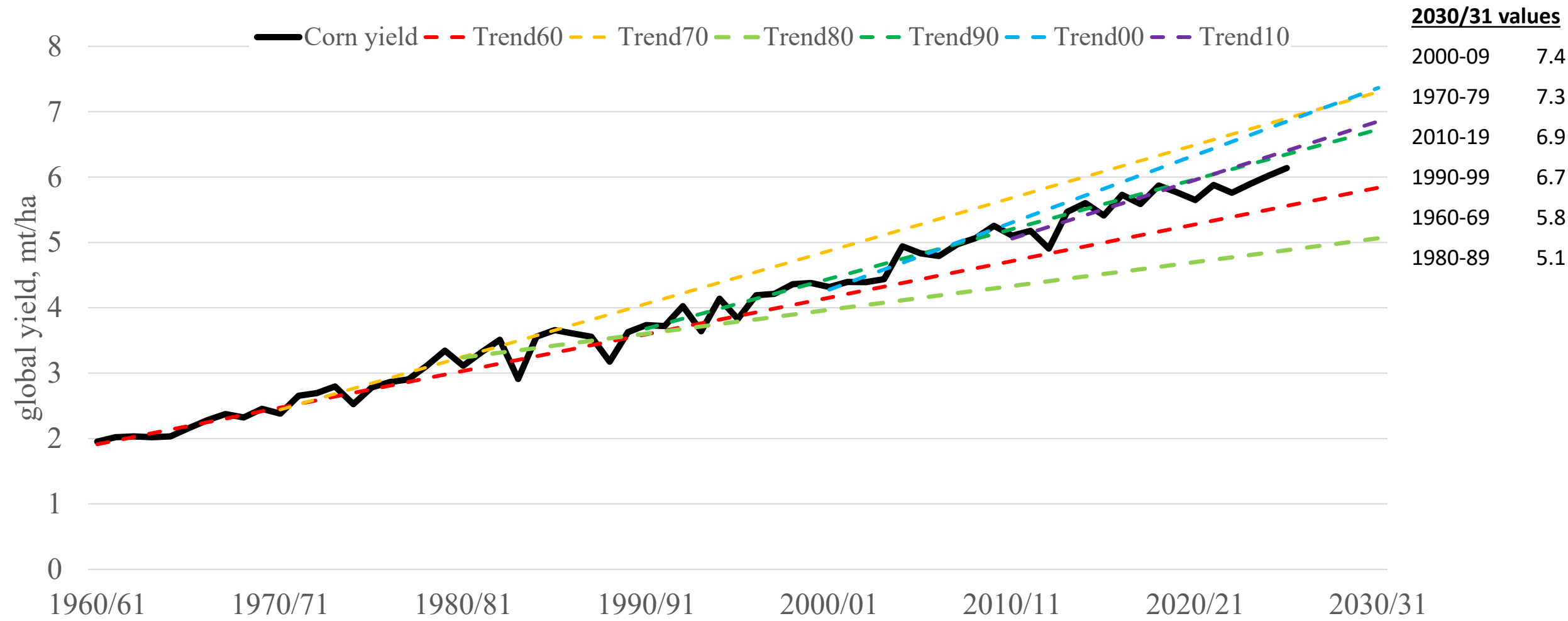
- Schultz : disdain for unexplained “technical change” (1968) ; “land is overrated” to emphasize that yield matters (1979)
- Empirical challenges! 20 years to peak impact (Baldos et al., 2019) and 35-50 years for full effect (Alston et al., 2011; Huffman and Evenson, 2006)

Global corn, soybean, and wheat yields



Sources: USDA FAS PSD and ERS; GDP deflator from St. Louis Federal Reserve FRED database.

Global corn yield trends by decade – to 2030/31



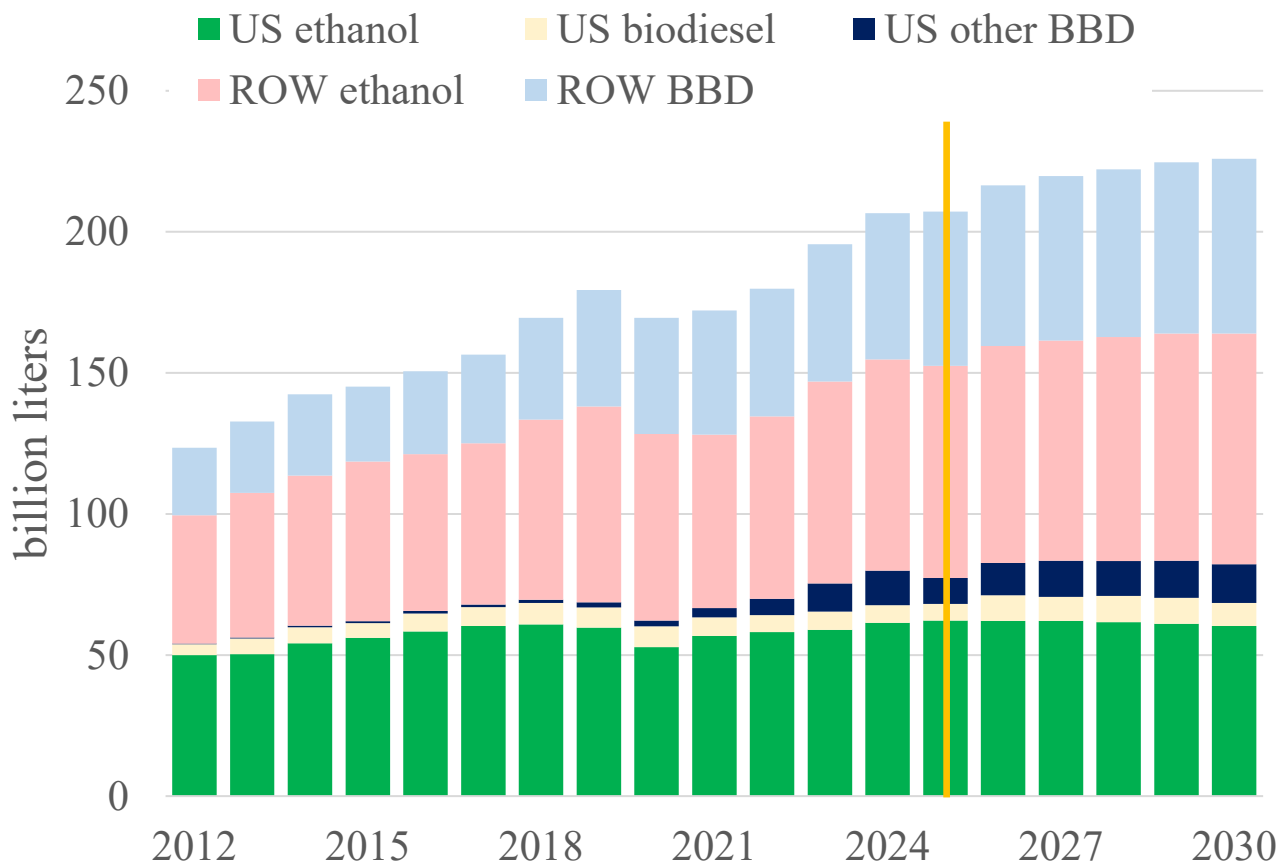
Future demand

Final demand - biofuels

Short-run or long-run? Automatic and discretionary policy responses?

Renewable fuel production

Global renewable fuel output



Drivers and implications

Market fundamentals

Demand: preferences, income, population, petroleum price

Supply: inputs, technologies

Policy

US RFS, credits

Brazil mandate & RenovaBio

Canada Clean Fuel Regulations

EU renewable energy directive

Mandates in Indonesia, China, elsewhere

Trade policies?

Future demand

Final demand - biofuels

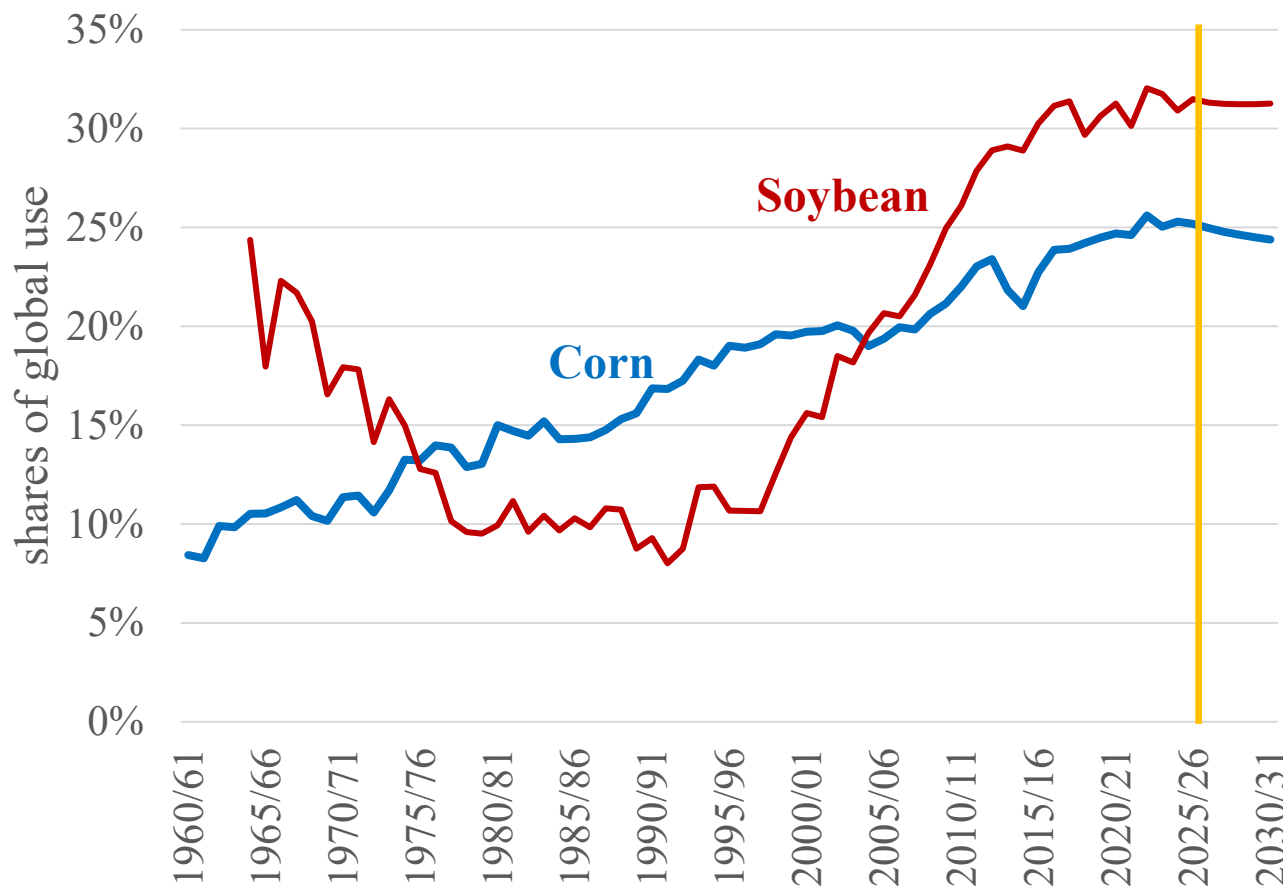
Short-run or long-run? Automatic and discretionary policy responses?

Final demand - food

Future income, population, preferences

Demand drivers of past and future

China total use as a share of world use



Drivers and implications

China: past \neq future

Past: rising use even as prices surged
Changing income & population effects?

Future global food demand?

Population
Income - falling demand impact?
Preferences

Future demand

Final demand - biofuels

Short-run or long-run? Automatic and discretionary policy responses?

Final demand - food

Future income, population, preferences

Crop demands are input demands

Input into processes, so affected by technologies and other input prices

Demand elasticities in the literature

Most useful if elasticity estimation reflects the decision we want to represent, but can work to adapt other elasticities

Thanks!

FAPRI-MU website:



www.fapri.missouri.edu



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