How the United States Lost Its Lead in the Global Soybean Trade

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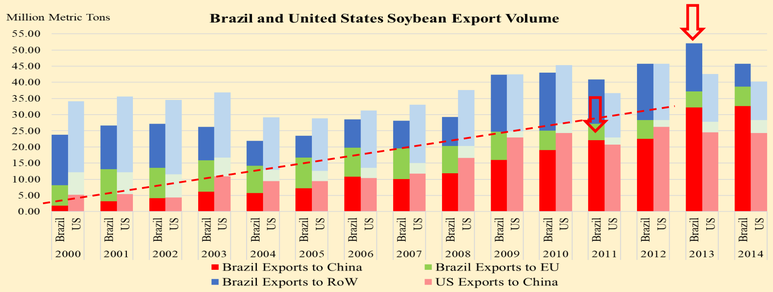
INTRODUCTION

- In 2011, Brazil overtook the US and became the largest soybean supplier for China.
- After 2013, Brazil became the largest soybean exporter in the world.
- The US "loss" in its lead mainly comes from its lost market share in China.
- We focus on US-Brazil supply competitiveness and investigate the major drivers of the US "loss".
- The existing literature compare costs in the US and Brazil on a one-by-one basis without a comprehensive assessment of their overall impacts and interactions.
- We employ the historically-validated and well-tuned GTAP-BIO model in Yao, Hertel, and Taheripour (2018).
- Two indices are investigated:
  - ***USA/Brazil production index***
  - ***USA/Brazil soybean exports to China index***
- We decompose these two indices for more detailed investigation.

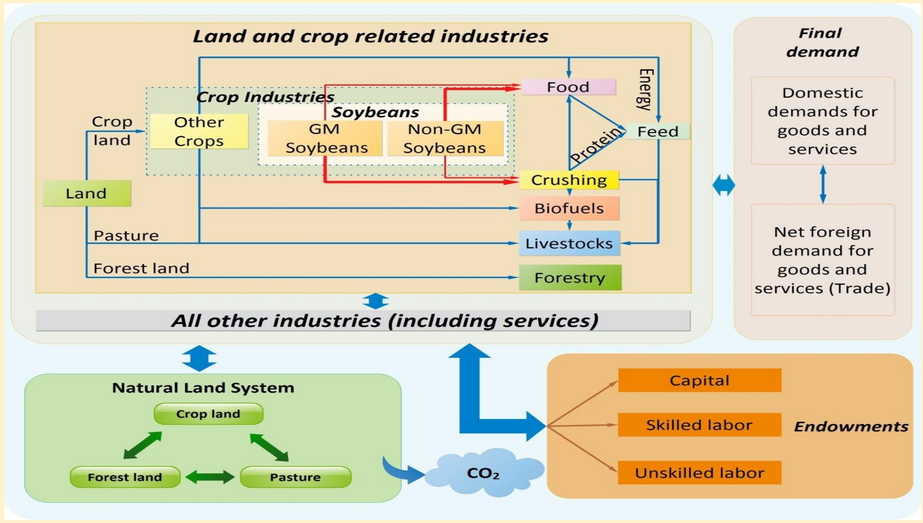


THE DECOMPOSITION APPROACH

- We adopt the same decomposition approach in Yao, Hertel, and Taheripour (2018), where they decompose historical percentage changes in soybean trade, production, and land use into five groups of drivers shown below.
- In this paper, we decompose the production and export indices into greater details.
- This decomposition approach has desirable attributes:
  - The sum of each driver's contribution equal to the total changes
  - It allows for the aggregation and disaggregation of different combinations of drivers for analyses purposes.
  - It can successfully pinpoint the negative and positive drivers for a given trade flow.

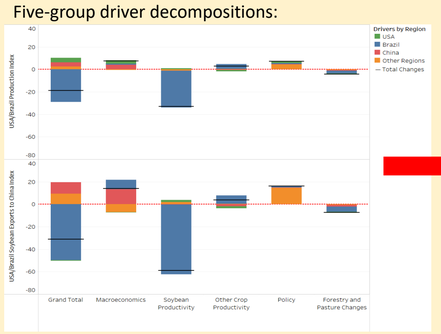
Macroeconomics	GDP growth	World Development Indicators, World Bank (2016)
	Population growth	World Development Indicators, World Bank (2016)
	Labor accumulation	Global Bilateral Migration Data Base (GMig2 database), (Walmsley *et al.*, 2013)
	Capital accumulation	Penn World Table (PWT), (Feenstra, Inklaar and Marcel, 2013)
	Investment growth	World Development Indicators, World Bank (2016)
	Feed industry restructure in China	USDA (2016a), Gale (2015)
Soybean Productivity	GM soybean productivity growth	GMO Compass (2015), FAO (2015)
	Non-GM soybean productivity growth	GMO Compass (2015), FAO (2015)
Other Crop Productivity	Other Crop labor, capital and fertilizer productivity	Fuglie and Rada (2013)
	Other crop land use productivity (including multiple cropping)	FAO (2015)
Policy	Domestic agricultural policies	Producer Support Estimates (PSEs), OECD (2016a)
	Trade border policies (tariffs)	Tariff Analytical and Simulation Tool for Economists (TASTE), Horridge and Laborde (2008)
	Biofuel policies	Taheripour et al. (2007)
Pasture and Forestry Changes	Productivity and regulations in pasture and forest land	FAO (2015)

MODEL STRUCTURE

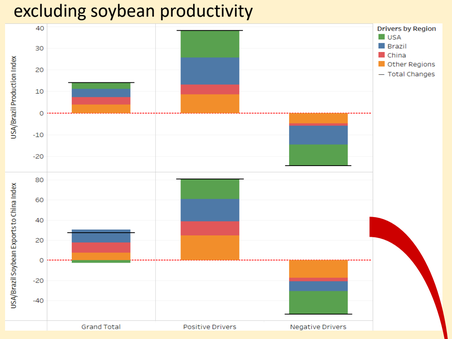


DECOMPOSITION RESULTS

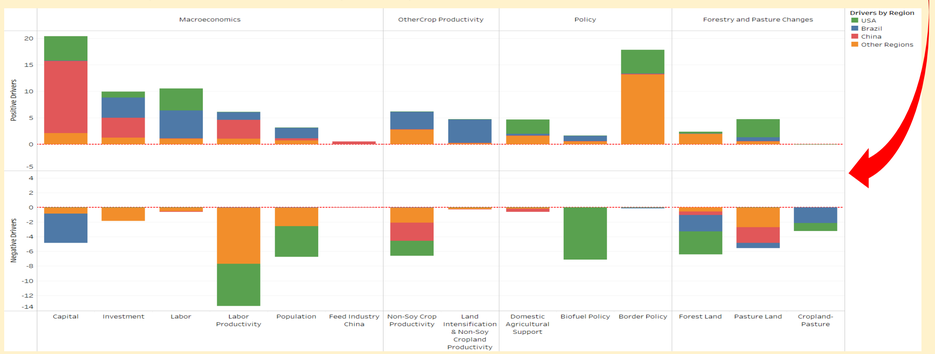
Five-group driver decompositions:



Decompositions of positive and negative drivers, excluding soybean productivity



A detailed decomposition of USA/Brazil soybean exports to China index



RESULT HIGHLIGHTS

Five-group driver decompositions:

- Brazilian soybean productivity was the major driver responsible for the US "loss".

Decompositions of positive and negative drivers, excluding soybean productivity

- Excluding soybean productivity, the net effects of all other drivers to the US production and export competitiveness are positive.
- All regions have both positive and negative impacts.
- Except for the US, all other regions have greater positive impacts than the negative impacts on the US competitiveness of exporting to China.

A detailed decomposition of USA/Brazil soybean exports to China index

- The US biofuel policies were the major negative drivers for the US soybean export competitiveness: corn-ethanol production incentivized corn production, and soy-biodiesel production increased domestic production.
- Strict forest regulations and reforestation efforts restrict potential expansion of the US soybean expansion.
- Brazilian negative drivers to the US "loss" in trade competitiveness mainly compose Brazilian agricultural capital investment and flexible forest land policies. Brazilian agricultural capital investment boosted Brazilian soybean production and depressed the US soybean production. Brazilian flexible forest land policies enabled its aggressive cropland expansion.
- Other regions mix net soybean suppliers (e.g., EU) and consumers (e.g., other South American countries).
- EU's labor productivity reduction was the major contributor to the US "loss". It reduced EU's total demands for soybeans and livestock products and thus declined its soybean and livestock imports. EU's declined demands for livestock products helped Brazil release more pasture land for soybean production. Thus Brazil's soybean production was harmed less than the US soybean production.

FUTURE IMPLICATIONS

China

- China has caught up US feed formulations.
- China's economic growth will be slower.
- China's soybean imports has already slowed down in recent years, but continues to be the largest soybean importer.
- China continues higher subsidies for soybean production than those for corn production.
- A possible tariff increase due to the potential US-China trade war may harm both the US and China.

Brazil

- Brazil will have slower soybean productivity.
- Brazil will benefit from potential domestic transportation efficiency improvement.
- Stricter land policies may restrict its further cropland expansion.

US

- The US may benefit from Brazil's slower soybean productivity but lose due to the China's tariffs.

Other factors

- More US and Brazilian farmers are eyeing the non-GM soybean market – as long as price premium exists.
- China's attitudes towards GM soybeans are uncertain.
- Emerging markets, such as India and Middle East, and competing suppliers from other regions (e.g., Africa).

Yao, G., Hertel, T.W., Taheripour, F., 2018. Economic drivers of telecoupling and terrestrial carbon fluxes in the global soybean complex. Global Environmental Change 50, 190–200. doi:10.1016/j.gloenvcha.2018.04.005