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Sources of Bias in the USDA International Baseline Projections

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Presentation at NC1177 2022
October 18th, 2022

Background and Motivation

- Annually released, 10-year projection series for a number of agricultural commodities and over 30 countries
- The baseline projections present a neutral policy scenario assuming a specific macroeconomic situation
- Aid in preparing Farm Bills and annual Presidential budgeting

- But various USDA projections and forecasts suffer from bias which limit their informativeness ([Bora, Katchova, and Kuethe, 2022,0](#); [Regmi et al., 2021](#); [Isengildina-Massa et al., 2021](#); [Kuethe, Hubbs, and Sanders, 2018](#))

Research Objectives

- 1 Do the projections for various regions tend to be herded together?
 - ▶ **Dynamic time warping distance algorithm** is used to measure similarity among projections of different regions \implies herding.
 - ▶ We measure similarity in realized data to assess the rationality of herding.

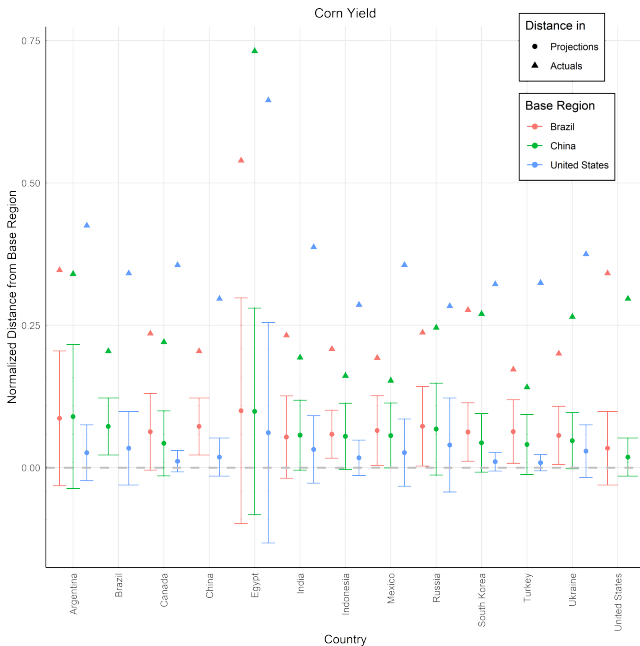
- 2 Does herding behavior contribute to bias?
 - ▶ Regression analysis is used to map the relationship between the degree of herding and the scale of bias in the projections.

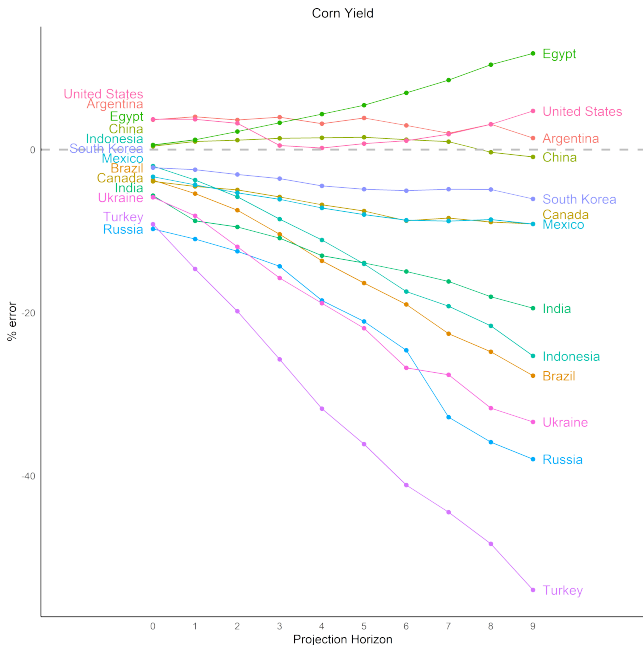
Data: USDA International Baseline Projection reports from 2002 to 2021.

Where can herding come from?

- Herding: investors and experts with private information align their choices and decisions with others as a risk management strategy.
 - ▶ Rational \implies choice is made using superior private information.
 - ▶ Irrational \implies private information is ignored to adopt similarity ([Devenow and Welch, 1996](#)).

- Herding in the USDA Baseline Projections can occur at
 - ▶ Stage 1: Country-specific models and teams
 - ▶ Stage 2: Commodity meetings for Interagency committee finalizing all the projections





Parametric Analysis

- We estimate the relationship between herding and bias in the baseline projection using the following regression:

$$\begin{aligned} \text{LoggedError}_{rh} = & \beta_0 + \beta_1 \log(\text{DistanceFromBase})_{rh} \\ & + \beta_2 \text{DistancelsRational}_r + \epsilon_{rh} \end{aligned} \quad (1)$$

- $\text{DistanceFromBase}_{rh}$ = computed DTW distance of country r 's projections from the US for each projection horizon.
- $\text{DistancelsRational}_r$ = an indicator variable that takes a value of 1 if the distance in the realized series lies within the confidence interval of the average distance in the projections of country r from the US.

Estimation results for equation (1) using distance from base region as a measure of herding.

Variable	Yield	Area Harvested	Imports	Exports	Total Consumption	Ending Stocks
Corn						
Distance from Base _r (logged)	0.0106* (0.0061)	-0.0617 (0.0551)	-0.7131*** (0.1654)	0.152 (0.1344)	0.0023 (0.0161)	-0.4544*** (0.1024)
Distance is Rational _r	0.407*** (0.0644)		1.3221*** (0.3034)	-0.208 (0.1950)	-0.1079*** (0.0322)	0.366 (0.2273)
Soybeans						
Distance from Base _r (logged)	3e-04 (0.0113)	0.2593** (0.1284)	-0.7046** (0.3282)	0.0913 (0.1464)	-0.2282 (0.1544)	-0.1836* (0.1110)
Distance is Rational _r	-0.0628*** (0.0238)	-0.8825*** (0.1490)	-0.4732 (0.8614)	0.3019* (0.1684)	-0.0191 (0.1899)	-1.1144* (0.5812)
Wheat						
Distance from Base _r (logged)	-0.046*** (0.0112)	-0.0734*** (0.0263)	0.0676 (0.0658)	-0.4631*** (0.1245)	-0.0205** (0.0087)	-0.1793*** (0.0341)
Distance is Rational _r	0.0753*** (0.0216)	0.0243 (0.0553)	0.053 (0.1588)	0.4419* (0.2350)	-0.0275* (0.0150)	

- Soybean imports and ending stocks, and wheat area harvested \implies similarity in projections with the US is associated with more accurate projections for the other countries.
- Corn total consumption, soybeans exports & total consumption, and wheat exports & total consumption \implies correlation in projection trends is significantly associated with lower accuracy of the projections.

Thank you!
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