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# Estimating Price Flexibility of Demand in Agricultural Commodities

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Selected Poster prepared for presentation at the  
2016 Agricultural & Applied Economics Association Annual Meeting, Boston, MA, July 31- Aug. 2

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## Overview

- Local agricultural supply shocks may arise due to climate change as agricultural production is very sensitive to weather condition (Nelson et. al, 2014).
- It may arise due to the adoption of innovative agricultural technologies which can change the sensitivity of aggregate farm supply to external shocks and also can change the price elasticity of supply (or demand) of both farm inputs and outputs (Alston et. al, 2014).
- Local prices are likely to respond to the local shocks mainly due to trade policies of the country; particularly, trade barriers and transportation cost.
- Adjemian and Smith (2012) estimated the price flexibility of demand for Corn and Soybeans in response to the USDA supply forecasts.
- This study estimates the price flexibility that represents demand response to the yield shocks for four major agricultural crops of the world; rice, wheat, corn and soybean.
- Yield shock represents the deviation of yield from crop specific trend and in this study yield shock precedes the harvest time cash price.

## Hypothesis

- If yields are low then cash price increases because of the demand response (shift left in supply and moving along the demand curve).

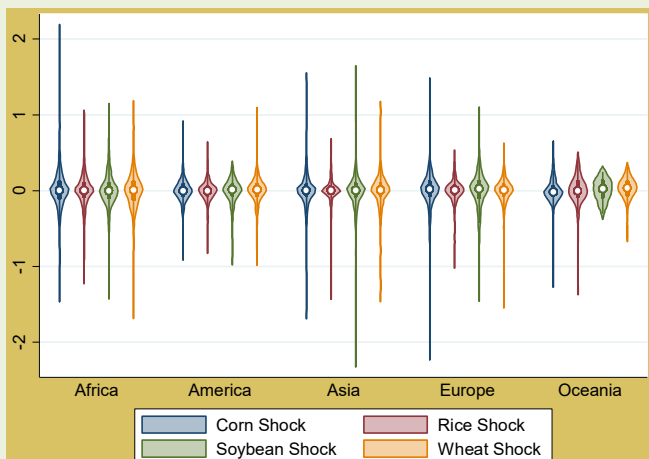


Figure: Violin Plot Showing the Probability Density of Supply Shocks in Agricultural Commodities Across Different Regions

## Objectives

- Estimate the changes in prices of agricultural commodities in response to the supply shocks across different regions of the world.
- Compare the changes in local prices in response to local supply shocks.

## Method

- Annual crop production and producer prices (1991 to 2014) at the country level is obtained from FAO dataset.
- Yield shocks in this research are calculated following Roberts and Schlenker (2013) and Hendricks et al. (2015).
- Fixed effects linear model is used to estimate how the prices of agricultural commodities response to the own and cross-commodity supply shocks.

### Effects of Changes to Supply on Harvest Time Spot Price Across Different Regions of the World

		World						America			
		Price Change						Price Change			
		C	R	S	W			C	R	S	W
Yield Shock	C	-0.08	-0.06	0.02	0.04	Yield Shock	C	-0.12	-0.06	-0.10	0.16
	R	-0.11**	-0.11	-0.12	-0.07		R	-0.18	-0.18	-0.04	-0.29
	S	0.01	0.03	-0.11**	-0.04		S	0.15	0.13	0.09	0.07
	W	-0.06	-0.01	-0.02	-0.10		W	-0.09	0.05	-0.02	-0.02

		Africa						Asia			
		Price Change						Price Change			
		C	R	S	W			C	R	S	W
Yield Shock	C	-0.08	-0.07	-0.06	-0.09	Yield Shock	C	0.20	-0.05	0.26	0.00
	R	-0.08	-0.10	-0.32**	-0.07		R	-0.29**	0.02	-0.18	0.00
	S	-0.10	0.04	-0.10	-0.04		S	0.06	0.01	-0.21	-0.03
	W	-0.02	-0.08	0.22	0.07		W	-0.31**	-0.15	-0.04	-0.28

		Europe						Oceania	
		Price Change						Price Change	
		C	R	S	W			C	R
Yield Shock	C	-0.17**	-0.08	0.11	0.02	Yield Shock	C	-0.60	-0.17
	R	-0.06	-0.25	-0.01	-0.13		R	0.06	-0.01
	S	-0.09	-0.01**	-0.22**	-0.09				
	W	-0.06	0.10	-0.24**	-0.34**				

Note: Corn, Rice, Soybean and Wheat is represented by C, R, S and W respectively. \*\*p < 0.05. The original regression failed for Oceania due to insufficient Soybean and Wheat observations. Hence, the estimated regression for Oceania includes response of Corn and Rice prices to the Corn and Rice yield shocks only.

## Results

- In the World, 10% reduction in the supply of Soybean increases the harvest time own-price by 1.1%. Additionally, 10% reduction in the Rice supply increases the harvest time spot price of Corn by 1.1%.
- In Europe, 10% reduction in the supply of Corn, Soybean and Wheat respectively increases the harvest time own-price by 1.7%, 2.2% and 3.4%. Additionally, 10% reduction in the Wheat supply increases the harvest time spot price of Soybean by 2.4%.
- In Asia, 10% reduction in the Rice supply increases the harvest time spot price of Corn by 2.9%. Additionally, 10% reduction in the Wheat supply increases the harvest time spot price of Corn by 3.1%.
- In Africa, 10% reduction in the Rice supply increases the harvest time spot price of Soybean by 3.2%.

## Conclusion

- Supply shocks on Wheat generated an own price response in Europe and cross price response in Europe (Soybean) and Asia (Corn).
- Supply shocks on Soybean generated both the own and cross price response in Europe (Rice).
- Supply shocks on Corn generated only the own price response in Europe. Whereas, the supply shock on Rice generated only the cross price response in Asia (Corn) and in Africa (Soybean).
- Region specific knowledge on price response to the local supply shocks will be helpful to mitigate the impact of climate change on agricultural market and also to promote the adoption of appropriate agricultural technologies.

## References

- Adjemian, M. K., & Smith, A. (2012). Using USDA forecasts to estimate the price flexibility of demand for agricultural commodities. *American Journal of Agricultural Economics*, 94(4), 978-995.
- Alston, J.M., W. J. Martin, and P. G. Pardey. "Influences of agricultural technology on the size and importance of food price variability." *The Economics of Food Price Volatility* (2014): 13.
- Hendricks, N. P., Janzen, J. P., & Smith, A. (2015). Futures Prices in Supply Analysis: Are Instrumental Variables Necessary?. *American Journal of Agricultural Economics*, 97(1), 22-39.
- Nelson, G.C., H. Valin, R. D. Sands, P. Havlik, H. Ahammad, D. Deryng, J. Elliott et al. "Climate change effects on agriculture: Economic responses to biophysical shocks." *Proceedings of the National Academy of Sciences* 111, no. 9 (2014): 3274-3279.
- Roberts, M.J., and W. Schlenker. "Identifying Supply and Demand Elasticities of Agricultural Commodities: Implications for the US Ethanol Mandate." *American Economic Review* 103, no. 6 (2013): 2265-2295.