Estimating Price Flexibility of Demand in Agricultural Commodities

Madhav Regmi (mregmi@ksu.edu)
Department of Agricultural Economics
Kansas State University, Manhattan, KS 66506

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Department of Agricultural Economics, Kansas State University
Email: mregmi@ksu.edu

Overview
- Local agricultural supply shocks may arise due to climate change as agricultural production is very sensitive to weather conditions (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).

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 Hendrick 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.

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