Competition in Japanese Genetically Modified Soybean Import Market

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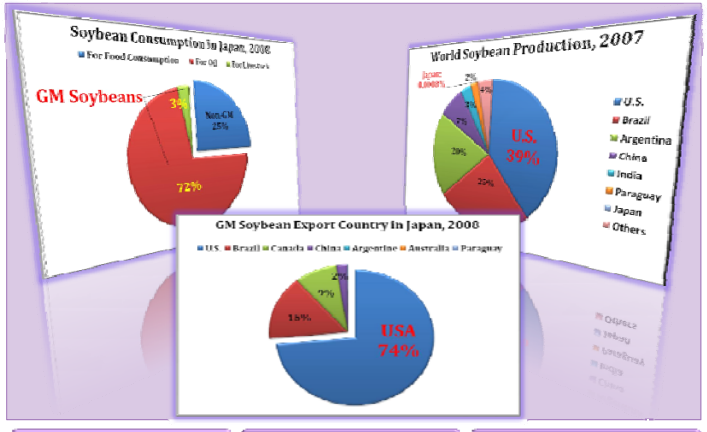
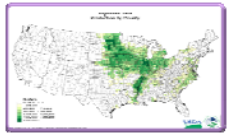
Background

- The Japanese soybean market is very unique. Japan is the third largest importing country of GM soybeans. Only non-GM soybeans are used for direct human consumption such as Tofu, Miso and Natto, while GM soybeans are used for oil and feedstuffs.
- 22% for human consumption, 75% for oil, and 3% for feedstuffs in the Japanese soybean market .
- GM soybeans are all imported with 74% from U.S., 15% from Brazil, and 8% from Canada.
- Goldberg and Knetter (1999) estimated residual demand elasticities as a measure of market power of exporters in the cases of German exports of beer and US exports of linearboard paper.
- Carter et al. (1999) assumed that each country was a single firm and interpreted the parameters for cost shifters and demand shifters of the inverse residual demand function as the share-weighted industry average for all firms within one country. They estimated the simultaneous solution of the maximization problem in the Japanese wheat import market.
- Song (2006) used a two-country partial equilibrium trade model that was developed from inverse residual demand and supply functions.

Objectives

- The purpose of this study is to determine which side has more potential market power: U.S. exporters vs. Japanese importers in the Japanese GM soybean import market.
- Analyze the price effects and welfare implications of the market power in the Japanese soybean import market.





Model

- Maximize U.S. GM soybean exporters' profits,

$$\max_{Q_{US}^E} \Pi_{US} = P_{US}^E(Q_{US}^E)Q_{US}^E - (P_{US}^{Farm} + C_{US})Q_{US}^E$$

- Obtain and rearrange F.O.C.,

$$\frac{P_{US}^E - (P_{US}^{Farm} + C_{US})}{P_{US}^E} = -\frac{\partial P_{US}^E}{\partial Q_{US}^E}\frac{Q_{US}^E}{P_{US}^E}$$

Adjusted Lerner Index for U.S. → Market power of U.S. exporters

Price flexibility for inverse Japanese residual demand from U.S., η_{JP}^{US} → The price flexibility can be used as an indirect measure to evaluate market power of U.S. exporters.

- Similarly, the price flexibility for U.S. inverse residual supply is an indirect measure for market power of Japanese importers.
- U.S.–Japan two country partial equilibrium model is used to estimate market powers.

$$\begin{cases} lnP_{JP,t}^{US,I} = \lambda_{JP} + \eta_{JP}^{US} lnRD_{JP,t}^{US} + \alpha_1 lnP_{JP,t}^{CO} + \alpha_2 lnP_{JP,t}^{CL} + \alpha_3 lnDPI_{JP,t} + \alpha_4 lnP_{JP,t}^{SO} + \alpha_5 lnP_{JP,t}^{SM} \\ \qquad + \beta_1 lnIM_t^{CH} + \beta_2 lnIM_t^{BR} + \beta_3 lnIM_t^{CA} + \beta_4 BP_{JP,t} + \epsilon_{JP,t} \quad (1) \\ lnP_{US,t}^{E} = \lambda_{US} + \eta_{US}^{JP} lnRS_{US,t}^{JP} + \gamma_1 lnP_{US,t}^{CO} + \gamma_2 lnP_{US,t}^{CL} + \gamma_3 lnDPI_{US,t} + \gamma_4 lnP_{US,t}^{SO} + \gamma_5 lnP_{US,t}^{SM} \\ \qquad + \delta_1 lnEX_t^{CH} + \delta_2 lnEX_t^{EU} + \delta_3 lnEX_t^{ME} + \delta_4 lnSTK_{US,t} + \epsilon_{US,t} \quad (2) \\ lnRD_{JP,t}^{US} = lnRS_{US,t}^{JP} \quad (3) \\ lnP_{JP,t}^{US,I} = \varphi_0 + \varphi_1 lnP_{US,t}^{E} \quad (4) \end{cases}$$

- (1) is the inverse Japanese residual import demand from U.S.
- (2) is the inverse U.S. residual supply for the Japanese market
- (3) is the equilibrium condition
- (4) indicates the relationship between the Japanese GM soybean import price and the U.S. GM soybean export price to Japan

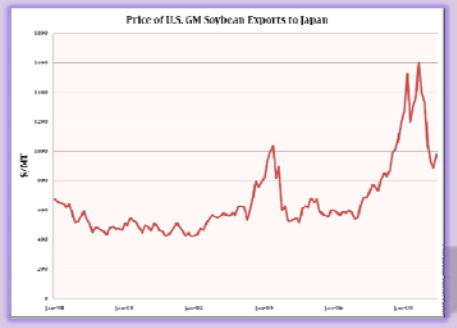
- The data set is for the period from January 2003 to December 2008, 72 observations.
- The models were estimated using the Three-Stages Least Square in SAS.

Results

- The estimated coefficient, η_{JP}^{US}, of the Japanese residual demand for the U.S. GM soybeans is -0.091.
- Thus, the profit margin of the U.S. GM soybean exporters is 9.1%.
- The estimated coefficient, η_{US}^{JP}, of the U.S. residual GM soybean supply to Japan is -0.048.
- However, the estimated coefficient, η_{US}^{JP}, is insignificant so that the profit margin of the Japanese GM soybean importers is zero.

Conclusions/Discussions

- The analysis using a U.S.-Japan partial equilibrium trade model shows that U.S. GM soybean exporters have relatively stronger market power than Japanese GM soybean importers.
- The profit margin for U.S. GM soybean exporters was estimated to be 9.1% of the export price. This estimate is consistent with those in previous studies.
- The Japanese GM soybean importers were price takers during the time period under study.
- It is also likely that Japanese importers may have to pay a higher price to purchase GM soybeans in the future.
- The long term implication of the difference in market power for Japanese GM soybean importers is that they will purchase more GM soybeans from Brazil and Canada, or seek a new partner that can exports GM soybeans to Japan, such as Argentina.



- Several future research issues:
  - Estimate and compare the market power in Japanese GM soybean import market during various time periods (i.e. the period when crop prices were high, the one before the period of high crop prices, and the one after the period of high crop prices).
  - Estimate the market power in markets of other major crops and compare the results in these markets with the results in the Japanese GM soybean import market.

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