

International Spatial Forecasting of Grain Flows

Presenter: William Wilson

This presentation reported on the preliminary findings of a study that is analyzing the major changes in international grain trade to 2025 and beyond and the implications for transportation infrastructure planning. The study uses a spatial equilibrium model to forecast future grain flows. Some of the motivations for the study included interest in the general outlook of the industry, the reliability of longer term world grain flow forecasts, impacts on Upper Mississippi grain flows, impacts of consumption, competition and uncertainty/risk over time.

A review of the world grain trade shows that there have been many long term large scale transportation infrastructure projects that have relied on long term projections of grain flows. These projections have focused on areas such as export trade, barge traffic growth and have been based on past history. Such projection studies often assume constant proportions of trade flows over time. A general observation of these historical studies reveals that most of these studies have generally over-projected future grain flows. Most of the studies have also ignored risk or may have incorporated risk using a scenario based analysis but have failed to define what the risks are.

There are three main issues that are impacting world grain trade: China consumption (amongst others), Ethanol, and Brazil. Import demand for grains in China is forecasted to grow significantly in the next 10 to 25 years. A dramatic increase in the U.S. domestic corn demand for ethanol is also forecasted in the next 10 to 25 years. Most models have underestimated the impact of Brazil. Infrastructure investment in Brazil is significantly reducing shipment costs from Brazil.

Questions and Issues

- During the presentation one participant pointed out that there are things that influence the forecast that have distributions (i.e., can be considered random variables). This was acknowledged in the affirmative.
- Another participant cautioned that when dealing with forecast error, one needs to be very careful because the real phenomenon one may be trying to predict may be influenced by distributions that are really unknown.
- One participant was concerned about one study conclusion suggesting that corn production is shifting west and north of the existing Corn Belt. Such a trend would mean that corn production was being moved into regions with shorter growing seasons and lower rainfall. Plant breeders will face a real challenge with the introduction of new significant uncertainties. The participant thus suggested checking with plant breeding and production specialists.
- With regards to the spatial equilibrium model that looks at cost minimization and long-run competitive equilibrium, a question was raised about who's costs are being minimized? The presenter indicated that the study was looking at world costs of all shipping countries i.e., all actors in the industry.

- Commenting on the use of cost reductions as a way of simulating investment cost in infrastructure, participants wondered whether using a profit maximization approach would offer similar results. One participant suggested that the use of profit maximization, rather than cost minimization may be more applicable for modeling purposes. The presenter was more of the opinion that such would be true if there was only one actor in the industry.
- In consideration of the amount of land that can be brought into crop production, a question was raised on whether land is interchangeable. The presenter indicated that land is interchangeable, subject to technology.
- Is agricultural production sustainable in poor lands? It was noted that much of Brazil's land is poor, and agricultural production on those lands may not be sustainable (slight difference, but 'poor lands' may connote lands in poor countries).

Other Questions and Issues Not Directly Addressed

- An issue was raised on whether the study considers alternate mode/route substitution.