Logistical Competition for Corn Shipments From the United States and Ukraine to Targeted International Markets (Summary)

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WHAT IS THE ISSUE?

The global corn market has faced dramatic developments in recent years. Ukraine has quickly emerged as a major supplier of corn to China and other key markets previously dominated by the United States alone.[2] Many factors affect this competition, including supplies and capacity, ocean shipping costs, logistical functions and costs (ocean and interior), quality, and trade interventions. Analyzing these factors for major corn-exporting countries is necessary to understanding competition among international origins. Given recent significant changes in the global corn-export market—including many recent trade interventions—it is especially important to analyze how these factors will affect competition in the near future.

HOW WAS THE STUDY CONDUCTED?

The study assessed impacts of transportation and logistical functions in the United States and Ukraine as they relate to shares of the world corn-export market. An optimized Monte Carlo Simulation model was used to analyze spatial competition and determine market shares and comparative logistical advantage. Interior and exterior shipping costs were included, as well as relevant trade interventions, to reflect the competitive conditions for the base period. The total

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2 Other major exporting countries are Brazil and Argentina. The major import markets considered in the study are China, the EU, Japan, South Korea, North Africa, the Middle East, Indonesia, and Vietnam.

delivered cost included the origin's basis (Thomsen Reuters Eikon, AgriCensus); rail tariffs (BNSF, USDA-AMS); rail daily car values (Trade West Brokerage Co.) and fuel service charges (USDA-AMS); barge (USDA-AMS); and elevation costs (industry sources) at the port (to compute the cost parameter at the Freight on Board (FOB) port value). Trade flows from each route—origin to destination—are collected from UN Comtrade and AgriCensus.

WHAT DID THE STUDY FIND?

Some important general patterns in global corn-export markets are apparent based on 2015-19 data of supplies, demand, and logistical costs. The model was short term, used monthly data and results were analyzed for each month. Those summarized here are for May and November. May represents the peak of the spring shipping season for U.S. corn exports while November represents the peak of the fall harvest for the United States. Overall, variability in ocean rates and barge shipping costs were two factors that led to changing market shares. Also, from 2015 to 2019, for exporting firms as well as importing countries, diversification among origins was a key strategy for keeping costs down. Generally, most import countries diversify their origins. Optimally, they buy from multiple origins for various reasons, including sanitary and phytosanitary regulations, political issues, existing business relationships, and quality issues.

Differences Between U.S. and Ukrainian Corn-Export Trades

The study's findings identified key distinctions between advantages and disadvantages for the U.S. and Ukraine in the global corn-export market. Overall, the United States was likely the lowest cost supplier of corn exports in many markets. Costs were less volatile in shipments from the U.S. origins than from Ukraine. Thus, shipping from U.S. origins was less risky, but had slightly greater mean costs. However, rail shipping costs in Ukraine provided a substantial cost advantage over the United States and this advantage persists.

Both the United States and Ukraine had advantages in major markets. The United States had a logistical cost advantage over Ukraine in serving China and South Korea (from the U.S. Gulf) and Japan (from the Pacific Northwest (PNW)). From 2015 to 2019, there was a 0.80 probability the U.S. Gulf was the lowest-cost supplier for China and a 0.67 probability PNW was the lowest-cost supplier to Japan. Therefore, in the case of China, the U.S. Gulf and PNW should have been the dominant origins for corn shipments to China. However, for most of this period, Ukraine was the dominant supplier to China. Of the many potential reasons for China's preference for Ukrainian corn, the most important are probably (1) China's goal of diversification; (2) China's non-price preference[3] for non-U.S. origin corn; and (3) China's desire for less transparent trading mechanisms.

Ukraine had a logistical advantage over the United States in serving the European Union (EU) and Indonesia. However, Ukraine's advantage in the EU was mostly due to the EU's additional 25-percent tariff applied to corn imports from the United States, as well as due to the EU's restrictions against genetically engineered corn imports. There was a 0.80 probability Ukraine was the lowest-cost supplier for the EU.

Both the U.S. advantage in China and Ukraine's advantage in the EU are impacted by limited shipments from Brazil and Argentina to EU and Chinese markets. Brazil and Argentina had lower corn-export market shares because of China's Sanitary and Phytosanitary Standards and the EU's import restrictions on genetically engineered corn.

Results of Scenarios on Logistical Competition and Trade Interventions

The study modeled various scenarios to analyze how market shares would shift in response to changes in logistical competition and trade interventions. Results on logistical competition showed the following:

- **Ocean rates.** PNW has a substantial ocean-rate advantage to the Asian destinations. Increases in ocean rates increase market shares for PNW and Ukraine, while decreasing them for the U.S. Gulf and Argentina.
- **Barge rates.** Increased barge rates do not affect U.S. market shares. However, reductions in barge rates result in significant increases in U.S. market shares.
- **Rail Daily Car Values (DCV).** Increasing daily car values lower the U.S. market share and decreasing daily car values raise the U.S. market share.
- **Export capacity.** As exports increase, shipments will more often be diverted from the least-cost origin because of export-capacity constraints at ports. The greatest demand is for more supply capacity at PNW, Ukraine, and Brazil.

3 Non-price preference refers to the willingness to pay a premium for non-US origin corn. There are a number of potential reasons for this, typically related to perceptions of quality and/or GM content, in addition to the lesser transparency of transactions from non-U.S. exporters.

- **Mississippi River dredging.** The United States has a project underway to dredge the Mississippi river to 50 feet. This improvement will allow ships to be loaded to a greater depth, and potentially lower shipping costs on a per metric ton basis. Results show dredging's greatest impact would be to increase U.S. Gulf shares to China and South Korea and to decrease shares (mostly from PNW).

Although this study focused on logistical functions and costs, trade interventions were included in the analysis because they affect trade flows and relative logistical advantages. Results of these trade interventions were as follows:

- **Eliminating EU import tariffs on U.S. corn.** The most dramatic trade intervention affecting corn trade is that of the EU import tariff on U.S. corn. Eliminating this duty would substantially reduce Ukraine market share to the EU, and most of the EU replacement shipments would originate at the U.S. Gulf. As a result, some of Ukraine's exports would shift to Japan and Indonesia, and U.S. Gulf shipments to China would decrease.
- **Increasing Ukraine exports to 24 million metric tons (mmt) per year.** If Ukraine's exports increased to 24 mmt per year, Ukraine would gain market shares to Indonesia and Japan and U.S. PNW would lose shares to those destinations.
- **Removing genetically engineered (GE) corn restrictions by the EU.** If the EU removed restrictions on GE corn, Ukraine would lose the most EU market share, while Argentina would gain the most.
- **Raising China tariff rate quotas (TRQ).** A key trade intervention in China is that of TRQs. As a result of a 65-percent over-quota tariff from all origins to China, Ukraine would gain the most, while the U.S. Gulf would lose most. However, administration of TRQs was difficult to document and/or implement in the study's aggregated model.
- **Removing Chinese sanitary and phytosanitary (SPS) restrictions on Brazil and Argentina.** Removing the Chinese SPS restrictions on Brazilian and Argentine corn would have major impacts on corn flows. Specifically, Argentina would gain a sizable market share of China, while both the U.S. Gulf and PNW would lose shares. The results show Brazil would gain the most in November (U.S. peak harvest time), while the United States would lose most of the Chinese market.
- **Sustaining increased China imports at 30 mmt per year.** One of the important shifts in the global corn trade during the past year was the rapid increase in imports by China. In the baseline case (2015-19), the average imports were about 3.8 mmt per year, but in 2020-21, average annual imports appear to have increased to 30 mmt. Results suggest that—if this level were sustained into the future—most of the increased exports would be from the United States and capacity restrictions would arise more frequently.

Supply-Chain Disruptions Since 2019

Since the 2015-19 period—the baseline period for this study—commodities trading has experienced major supply-chain disruptions. In part, the turmoil is driven by the pandemic and post-pandemic recovery. Although the pandemic has affected all commodities—particularly, in international freight shipping—the U.S. grain-export industry has been resilient.[4] Notably, similar if not more drastic disruptions occurred in competitor countries.

In all countries, supply-chain disruptions have had major impacts on logistics in the grain and oilseeds trade. The most important effects have been increases in ocean shipping costs, interior basis, secondary rail market values, and escalated demand for corn by China. Both ocean shipping and demurrage costs more than doubled. These steep rises increased the advantage to origins that offered lower cost ocean shipping—notably, PNW.

The impacts show the U.S. Gulf and PNW gained market share for most destinations, and Ukraine increased its shares in the EU, North Africa, and Middle East. These changes have mostly been due to lower ocean shipping costs from the United States and a re-alignment of trade flows, which mainly favor U.S. exports.

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4 This resilience owes to the importance of grains and oilseeds in producing foods, as well as to the designation of export handling as an "essential work" function.