USDA Agricultural Marketing Service
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REPORT SUMMARY

A Study of Grain and Soybean Export Flows: Uncovering Their Determinants and the Implications for Infrastructure Investment (Summary)

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This is a summary of "A Study of Grain and Soybean Export Flows: Uncovering Their Determinants and the Implications for Infrastructure Investment," by Tobias Sytsma and Wesley W. Wilson.[1] This research and analysis received funding from USDA's Agricultural Marketing Service (AMS) through cooperative agreement number 18-TMTSD-OR-0009. The opinions and conclusions expressed are the author's and do not necessarily reflect the views of USDA or AMS. The full paper is available at: https://ageconsearch.umn.edu/record/310904.

WHAT IS THE ISSUE?

Port infrastructure in the United States supports extensive global trade of agricultural commodities. According to USDA's Foreign Agricultural Service, U.S. agricultural producers export more than 20 percent of their production annually.[2] U.S. exports have tripled over the past two decades, and domestic ports have competed for these growing freight volumes. Various port attributes, such as channel depth and berthing length, may grant some ports a competitive advantage in the market for agricultural freight. Such features affect costs borne by importers and exporters of U.S. agricultural goods, as well as regional economies that depend on port traffic.

The study from the University of Oregon models two facets of export flows to better understand port infrastructure: (1) the importing country's choice of port in the United States, and (2) the inland U.S. shipper's choice of export port. The researchers focused on shipments of corn, soybeans, and wheat to determine how transportation costs and port characteristics affect port choice.

1 Sytsma is a former graduate student, and Wilson is a professor in the Department of Economics (College of Arts and Sciences) at the University of Oregon.

2 USDA Foreign Agricultural Service, "Percentage of U.S. Agricultural Products Exported," May 30, 2018.

WHAT DID THE STUDY FIND?

The researchers analyzed how port attributes and shipping costs affected demand from and to U.S. port locations. Importers and exporters across commodities were found to prefer ports with favorable attributes, such as deep channels and long total berthing lengths, which allowed for lower per-unit costs.[3] Shippers also favored proximate port locations to more distant locations.

Ports in the United States compete for freight traffic, and a port's share of total traffic is generally determined by several factors, including how cheaply it can move freight. To that end, the researchers conducted a sensitivity analysis to explore how port choice responded to changes in transportation costs and attributes. Cost increases at a port reduced the likelihood the port was chosen, decreasing the volumes that shippers choose to buy or sell through the port. For example, a 1-percent increase in a port's shipping costs corresponded to a 6- to 8-percent reduction in the port's traffic and a slight increase in traffic at each nearby port. In general, volumes of corn and soybeans were more sensitive to changes in transportation costs than those of wheat. They also found a 1-percent increase in channel depth resulted in a port gaining 1 to 3 percent more business, and a 1-percent increase in berthing length resulted in about 1 percent more traffic.

Other factors were found to influence a port's likelihood to be chosen by shippers, such as proximity to major trading partners and barge access. Shippers preferred ports with a barge option, given barge rates are generally lower compared to rail. Additionally, global trade dynamics influenced port shares; for example, ports in Western States have gained market share in recent years as the United States has increased trade with countries in Asia.

HOW WAS THE STUDY CONDUCTED?

To examine the importing country's port choice, the researchers relied on ocean rate data from O'Neil Commodity Consulting and trade data from the U.S. Census Bureau from 2003 to 2017. They gathered data on port attributes (corresponding to 2016) from a variety of sources, including the World Port Index, U.S. Army Corps of Engineers, and port websites. The researchers used and adapted two models: one model to estimate the probability that a shipper would choose a port, and another model to estimate the trade intensity or volume between two countries.

To investigate the shipper's choice of export port, the researchers assembled rail data from the Surface Transportation Board's Carload Waybill Sample and barge data from the USACE's Waterborne Commerce Statistics from 2014 to 2018. They used a random utility model, where shippers selected the port that provided the highest payoff. From the estimates, the researchers simulated how the probability a port would be selected changed with increases in transportation costs. They also calculated shippers' port elasticities with respect to rail rates.

PREFERRED CITATION

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3 Importing countries and inland shippers of agricultural products may not place direct importance on the channel depth of a port, for example, but the channel depth factors into the port choice decision through its effect on the port-level price.