AEDE Agricultural Report 2019-010

Ohio Soybean Exports to China: A Year after Implementation of Tariffs

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Published August 12, 2019
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August 2019

Abstract

Over the past year, in response to U.S. import tariffs, more than 800 food and agricultural products exported from the United States have been subject to tariffs imposed by its major trading partners. China has responded with an extensive list of retaliatory tariffs on $20.6 billion worth of imported U.S. agricultural products. Although Canada is Ohio’s largest agricultural trading partner, importing $827 million worth of agricultural, livestock, and food products in 2017, China was the largest buyer of Ohio soybeans before it implemented tariffs, accounting for 61 percent of its total soybean exports. With China’s tariff on imported U.S. soybeans in place, changes in soybean prices suggest China will diversify its soybean imports away from the U.S. and Ohio. Without assistance from the federal government, continued reduction in the share of world soybean trade held by the U.S. creates an incentive for Ohio farmers to either diversify away from soybean production or temporarily leave the sector, with knock-on effects on upstream farm input suppliers and the downstream soybean storage and delivery system. This article evaluates the impacts of Chinese soybean tariffs on U.S. and Ohio soybean production, prices, and economic opportunity.

U.S. Soybean Exports

The loss of international market-share for U.S. agricultural exports, due to changes in international relative prices, affects those commodities that are highly dependent on exports as a share of total U.S. production and which compete globally with substitutes from other major exporting countries. A report published by the Congressional Research Service (CRS) lists those U.S. commodities that have 30 percent or more of their total exports going to retaliating countries, including China, to be soybeans, sorghum, pork, cheese, apples, cherries, seafood, ginseng, and whiskey (Hopkinson, 2018). In the case of Ohio, only soybean exports exceed 30 percent of Ohio’s total exports to countries imposing retaliatory tariffs (see Table 1).

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China is the world’s largest buyer of soybeans accounting for 61 percent of world trade in 2017. By comparison, the European Union (EU) is the next largest soybean buyer at 10 percent. No importing country has a larger share of world trade in any major agricultural commodity (Hopkinson, 2018). Prior to the implementation of tariffs and the outbreak of African Swine Fever in China, the World Agricultural Outlook Board projected continued growth in Chinese soybean imports over the next 10 years (see Figure 1). At the time of the forecast, an estimated 34 percent increase in Chinese soybean imports by 2028/20 seemed likely. The forecast growth in Chinese soybean demand is attributed to increasing GDP per capita and expansion in China’s pork industry as an end user of soybean meal as animal feed.

Data Source: USDA Agricultural Projections to 2028

China’s world soybean imports expanded after their entrance into the World Trade Organization...
(WTO) in 2001. The expectation is for this growth to continue, but at a slower rate than USDA projected in 2018. The 2019 USDA estimate of Chinese soybean imports is lower than its 2018 forecast by 11 percent, largely due to weaker demand.

**Figure 2. Chinese Soybean Imports 1990-2028F**

Growth in Chinese soybean imports over the last two decades has been directly correlated with increased U.S. soybean exports and the percentage of U.S. soybean production committed to exports. While, U.S. global soybean exports minus those to China have ranged from 14 million metric tons during the 2012 drought to a record 28 million metric tons in 2017, increased exports to China are the primary reason for increased total soybean exports (see Figure 3). Exports as a percentage of production peaked at 50 percent in 2017. The increase in soybean exports as a percentage of total production has led to greater soybean use, higher prices for U.S. soybean producers and an increase in soybean acres. As a result of expansion in U.S. soybean production, the percentage of soybeans exported to total use has consistently remained between 45 and 50 percent. A simple statistical analysis of soybean prices relative to primary soybean use indicates that growth in exports is necessary to maintain U.S. soybean prices.

**Data Source:** USDA Agricultural Projections to 2028
Increasing world demand for soybeans and prices has resulted in global expansion of soybean production as net monetary returns per acre exceeded those of other commodities. Brazil has emerged as a major producer and exporter of soybeans, becoming the world’s largest producer of soybeans in 2017 and the largest exporter for the first time in 2005, and then consistently since 2012. The expectation is that there will be a continued decline in the share of U.S. soybean exports as other countries expand soybean production (see Figure 4).

**Figure 4. U.S. Soybean Export Projections**

Realized weekly U.S. soybean exports during the 2018/19 marketing year support USDA’s
forecast decrease in total exports from the preceding year, and also the record quantity exported in 2016/17. USDA has estimated that U.S. soybean exports will fall to just over 56 million metric tons in the current marketing year and that exports will not reach pre-2017/18 quantities until the 2024/25 marketing year (see Figure 4).

Destination market concentration of U.S. soybean exports has grown substantially, with exports to China representing 61 percent during the period 2013-2017, an increase from 18 percent for the period 1998-2002, (see Figure 5). A similar market concentration has appeared for China as an importer, and their apparent desire to diversify their sources of imports is a significant threat to future U.S. exports.

Figure 5. U.S. Soybean Export Concentration 1998-2017
To understand the effect of the Chinese tariff on Ohio soybean producers it is important to understand the relationship of Ohio soybean exports to U.S. soybean exports. Using USDA state-level export and production quantity reports for the last 18 years, Ohio’s exports as a share of statewide production has tracked the U.S. relationship with the exception of 2008 and 2011 (see Figure 6). In both years, the Ohio magnitude of change was larger than the U.S. change, a result that should not be surprising given that most Ohio cropland experiences the same growing conditions, whereas the values for the U.S. represent a larger geographical average. Ohio soybean exports as a percentage of total production have grown since 2000 reaching a peak in 2014 when soybean prices were adjusting from relatively high prices due to the 2012 drought having proportionally large price impacts on already tight soybean stocks.

Ohio’s location in the Eastern Corn-Belt and its proximity to high quantities of feed consuming animal units likely has partially insulated it from the export shock due to China increasing its tariff, but there is considerable uncertainty as to the future direction of state-level soybean exports. A large percentage of soybeans produced in the Upper Plains leave the U.S. via the Pacific Northwest in transit to China. Consequently, soybean acreage grew in this region during the expansion of Chinese soybean imports with major investment in transportation including rail. With reduced

**Data Sources:** U.S. Census Bureau and the USDA-ERS
exports to the Chinese market and high transportation costs to move those soybeans to other international markets, it is likely the U.S. may see relocation of soybean production to other soybean producing regions. Shifting supply chains away from soybean production in the Upper Plains may decrease the economic incentive to produce soybeans to the point that acreage reductions in North Dakota, South Dakota and Minnesota increase dependence on U.S. soybeans produced in the Eastern Corn-Belt and Ohio to meet soybean demand in Europe and the Middle East. However, until U.S. supply adjusts or there is a resolution to the trade dispute with China, it is expected that large differences in local price will continue to exist across the country as soybeans move based on storage and transportation costs.

**Adjustments in Global Soybean Supply and Prices**

With Brazil and the U.S. accounting for 83 percent of world soybean trade in 2016, the two countries heavily influence the world price of soybeans as well as the port prices in both countries. Figure 7 shows the per bushel price of soybeans for Paranagua, New Orleans, and Cincinnati. Until March 1, 2019, the correlation between the Brazilian and U.S. port prices was 89 percent, indicating a high degree of competition between the two countries. Note that the Cincinnati soybean price was also highly correlated with these port prices, but varied due to local basis values as discussed later.

![Figure 7. Soybean Export Spot Prices Through July 9, 2019](image)

**Data Sources:** CEPEA and USDA-AMS
China’s 25 percent tariff discriminated against U.S. soybeans, increasing the price of U.S. soybeans to Chinese buyers relative to the price of Brazilian soybeans. International economic logic suggests that with the tariff, the U.S. soybean price would decrease and the Brazilian soybean price would increase as Chinese buyers shifted demand to Brazilian soybeans. As shown in Figure 7, when the Chinese tariff went into effect on June 1, 2019 there was an immediate divergence between the Brazilian and U.S. soybean price. In addition, the Cincinnati price followed the U.S. Gulf price. The divergence in prices lasted only six months as the market eventually accounted for three factors: the size of the Brazilian soybean crop became known, weakening soybean demand by China’s pork industry due to African Swine Fever, and trade with other soybean importing countries shifted away from Brazil to relatively cheaper U.S. soybeans. At the trough of the decline, there was a 25 percent reduction in U.S. soybean prices as compared to February 2018, the month before the tariff was announced. The premium for Brazilian soybeans over U.S. Gulf prices peaked at 29 percent on September 18, 2018, just above the effective tariff of 28 percent (see Figure 8). Effectively, the Brazilian price premium made U.S. soybeans relatively cheaper and there were reported soybean sales to China at that time by USDA’s Foreign Agricultural Service (FAS).

**Figure 8. Brazil and U.S. Soybean Prices- 2018**

- **Brazilian Premium**
- **Paranagua (BR) Price**
- **U.S. Gulf Price**

**Data Sources:** CEPEA and USDA- AMS
Futures prices reported daily by the Chicago Board of Trade (CBOT) are one of two required inputs to calculating cash prices received by Ohio producers. Futures prices are a function of world supply and demand modified by the flow of money held by speculators. As world conditions and the sentiment of traders changes, futures prices adjust to reach equilibrium. The second component of local cash prices received by producers is known as basis. There has been extensive economic research on basis, which is the difference between prices at two locations, including transportation, storage, and production. Basis can exist in three forms: quality, spatial and temporal. Quality basis refers to versions of the same commodity receiving different prices, higher quality receiving a higher price. Spatial basis accounts for transportation costs between two locations. All else equal, the price between two locations should be equal to the transportation costs of moving a commodity from one location to the other. When spatial basis exceeds transportation costs, a commodity will move from the lower to the higher price location. Temporal basis refers to the storage costs of holding a commodity until contract maturity. Storage costs include physical storage, interest opportunity cost, and loss of commodity due to spoilage. When temporal basis exceeds storage cost, producers have an incentive to store a commodity. The majority of agricultural markets use a combination of spatial-temporal basis where transportation and storage costs are a function of the basis. Local elevators transfer physical storage loss to the producer, when supply exceeds local demand, by weakening the basis.

Ohio’s record 2018 soybean production of 289 million bushels, along with decreased exports increased local stocks, both on-farm and in commercial storage. Estimated Ohio stocks on hand in June 2019 were 40 million bushels higher than the previous year with a higher percentage of soybeans held on farm. As local soybean stocks have built up, local grain elevators have weakened basis, thereby incentivizing on-farm storage. Ohio experienced weak soybean basis in the fall of 2018 from prior years, but normal given the build-up of local stocks (see Figure 9). Weak soybean basis has increased risk to Ohio producers and only started to strengthen when planting delays and acreage abandonment were realized in 2019. Figure 9 illustrates the wedge between basis in Ohio’s West Central Crop Reporting District for the current marketing year and the three previous marketing years. Considering only changes in the futures prices of soybeans would not represent the full price effect experienced by Ohio producers due to China’s tariff. While current basis levels show a return to normal for West Central Ohio, basis would likely be stronger with normal exports.
of Ohio soybeans.

**Figure 9. Nearby Soybean Basis in West Central Ohio**

![Figure 9. Nearby Soybean Basis in West Central Ohio](image)

**Data Source:** Authors calculation using DTN Ohio Basis Data

**Impact of Tariffs on Ohio Soybean Trade and Farm Income**

The close relationship between U.S. and Ohio soybean exports was noted earlier, however, a high degree of uncertainty exists about the relationship between U.S. and Ohio exports to China. The full 2018/2019 marketing year has not finished and state-level export data are not available prior to the close of the marketing year. However, there has been a shift of U.S. soybean exports to other markets, with countries such as Egypt, Iran and the Netherlands making large purchases of U.S. soybeans outside of their normal patterns, encouraged by lower prices and availability. A question remains concerning the extent to which these countries are stockpiling soybeans in anticipation of a resolution of the trade dispute between the United States and China. Understanding the degree to which these countries require soybeans is important for knowing the future of U.S. and Ohio soybean exports. Figure 10 shows the current distribution of U.S. soybean exports and commitments to China, unknown destinations and the rest of the world through the end of June 2019. Two months remain in the current marketing year, but traditionally low weekly net sales during the second half of the marketing year will not support enough purchases of U.S. soybeans to equal previous marketing years. The reduction in soybean exports to China has partially been offset with exports to the rest of the world, but continued growth in imports by these countries will be required to support the economic conditions necessary for current U.S. soybean production.
While growth in exports to the EU has been strong since implementation of tariffs, it is not clear that this will continue (see Figure 11). It is likely that there has been substitution of soymeal in...
animal feed rations due to the lower price of U.S. soybeans, but there has been no structural shift in demand for livestock products as the EU is already a very mature market in terms of its overall meat consumption.

Farm income is expected to be low in Ohio again in 2019, but conditions may change that provide support to farm income such as another round of the federal government’s Market Facilitation Program (MFP), or an increase in prices from delayed planting in other parts of the United States reducing soybean production. Large amounts of unpriced 2018 grain remain in on-farm storage and could move onto the market if prices provide enough incentive, and current estimates treat this unpriced grain at market value. In addition, lower than expected yields are possible for Ohio due to late planting and poor growing conditions in June and early July. Overall, reduced production in 2019 will tighten supplies and soybeans available for export.

**Figure 12. Ohio Grain Farm Income Baseline vs Income Under Tariffs**

Data Source: Representative Farm Panels and the Ohio Farm Business Analysis Annual Report

In a previous study (Brown and Sheldon, 2018), Ohio farm income for the a representative grain
farm illustrated in Figure 12 was forecast to be slightly under $40,000 for 2018. Market returns nearly matched forecast values on higher than expected yield through most of the state and a slightly lower soybean price. However, the authors did not account for the sizable government payment through the Credit Commodity Corporation (CCC), a Great Depression Era federal program designed to stabilize farm incomes and prices. Represented in the purple bar in Figure 12, government support through MFP accounted for 55 percent of the representative grain farm’s income for 2018. Ohio received 449 million dollars in federal support for soybeans as of May 6, 2019. Also supporting income in 2018 were the multiple opportunities to market grain early in 2018 at above $10.00 per bushel. The November 2019 futures contract has not settled above $10.00 since before China’s soybean tariff was implemented. Rallies in soybean prices during the late spring and early summer are associated with delayed planting and abandoned acres due to weather as mentioned previously. Another round of government payments has been announced for 2019, but uncertainty remains on payment rates, eligibility and timing. The expectation is for Ohio producers who planted a crop in 2019, to receive a similar sized payment as they did in 2018. Another year of government payments will support the farm financial balance sheet for producers who were able to plant a crop; however, future dependability of these payments is uncertain.

A persistent reduction in soybean prices would suggest diversification to other types of agricultural production. Net returns to land between corn and soybean production did not favor one strongly over the other; however, increases in corn prices do favor late-planted acres to leave soybean for corn production. Total 2019 prevented planting acres is also unknown, but expected to be near the record set in 2011. As a result, large reductions in both corn and soybean acres increase the possibility of higher output prices later in 2019 and early 2020. Even without the planting troubles seen so far in 2019, both crops have seen returns to land that were below land rental prices. Without government assistance, it is likely that some operations would have left the industry given their low working capital and increasing debt.
Outstanding Questions Related to the Ohio Soybean Industry

At present, it is not clear whether and at what rate Ohio’s soybean sector will recover from the tariff imposed by China on U.S. imports. As noted earlier, USDA forecasts it will take at least until 2024/25 for soybean exports to return to their pre-2017/18 level, but this likely ignores the extent to which China continues to pro-actively diversify their import supply and the prospects of growth by other exporting countries. A real concern is that there will be a long-term loss of market share in China for both the U.S. and Ohio, particularly to Brazil.

If there continues to be downward pressure on the income of Ohio corn and soybean farmers, there is real risk of either temporary or permanent exit from the sector, which has potential for knock-on effects to the rural economy. Ohio’s agricultural economy is vertically integrated with impacts traveling through the supply chain from upstream input suppliers to downstream grain elevators and local small town economies. Therefore, uncertainty remains as to the final impact of China’s soybean tariff on agriculture-related jobs within Ohio.

Statewide studies of the effect of China’s tariffs have already been conducted for other states including Iowa and Missouri (Balistreri, 2018; Milhollin, 2018). These studies were conducted using historical production data, market shares, sectoral data from the Bureau of Economic Analysis, and measures of the responsiveness of commodity supply to price changes. Similar to the studies for Iowa and Missouri, a two-step approach could be adopted for Ohio: first, calculate the direct impact of tariffs on income for Ohio’s soybean, pork and corn sectors, and, second, estimate the full effect of tariffs on the broader Ohio economy. The first part of this approach examines individual commodities, but does not take into account any long-run feedback effects across the Ohio economy. Short-run effects are easier to calculate than long-run effects given that the agricultural economy is expected to adjust to meet the new market conditions in a way that has not happened for some time. The latter approach will require an evaluation of the input-output relationship(s) in the agricultural value chain, and calculation of employment multipliers, along with a calculation of any indirect effects on other sectors of the Ohio economy due to reductions in agricultural income.
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