Evaluating the Impact of Retaliatory Tariffs on U.S. Soybeans in China

Andrew Muhammad, Professor and Blasingame Chair of Excellence
S. Aaron Smith, Assistant Professor
Department of Agricultural and Resource Economics

Introduction

On March 8, 2018, President Donald Trump signed proclamations to impose tariffs on steel and aluminum imports. The proclamations were based on a Department of Commerce report that indicated that the current level of aluminum and steel imports have the potential to threaten U.S. national security (White House, Office of the Press Secretary, 2018a; 2018b). On March 22, 2018, President Donald Trump also signed a memorandum to impose tariffs on Chinese goods of $50 billion, which was based on an investigation by the Office of the U.S. Trade Representative on China's laws, policies and practices related to intellectual property rights, innovation and technology transfer (White House, Presidential Memorandum, 2018).

The proposed steel and aluminum tariffs are based on Section 232 of the Trade Expansion Act of 1962 (White House, Office of the Press Secretary, 2018a). The proposed $50 billion in tariffs on Chinese goods are based on Section 301 of the Trade Act of 1974, which gives the U.S. broad authority to respond to unfair trade practices (Leonard, 2018). Accordingly, the proposed tariffs are often referred to as 232 and 301 tariffs (we use this terminology in the report).

The Chinese government responded to the 232 and 301 tariffs by threatening its own tariffs on U.S. goods, including soybeans (Caporal, 2018). Although, as of April 16, 2018, nothing has been implemented, concerns have been raised by the U.S. soybean industry about potential negative impacts (Huffstutter, 2018). If the Chinese government retaliates by imposing tariffs on U.S. soybeans, how could this impact U.S. soybean exports? In recent years, Brazil has significantly increased soybean exports to China. Could retaliatory tariffs against the U.S. result in gains for Brazil? Based on ongoing research of China's soybean import market, we present findings of how retaliatory tariffs could impact U.S. and Brazilian soybean exports to China. This issue is particularly important because the U.S. soybean sector is very dependent on global markets, with China being the primary destination.

U.S. and Tennessee Soybean Sector

Soybean planted acreage in the U.S. has increased from 76.8 million acres in 2013 to 90.1 million acres in 2017. In the past five years (2013-2017), farm-level production has been estimated at $40 billion annually, ranging from $35.2 to $43.6 billion (USDA-NASS, 2018).

Average annual farm-gate prices have ranged from a high of $13.00/bu in 2013 to a low of $8.95/bu in 2015.

In Tennessee, soybeans are the largest crop (by acreage and value), with a five-year average planted acreage of 1.66 million acres and production value of $796 million. Tennessee ranks 16th in the country in soybean production (USDA-ERS, 2016); soybeans were the highest-valued agricultural commodity produced in Tennessee in 2016. In 2016, soybeans were estimated to be 29.5 percent of all Tennessee agricultural exports ($422 million of soybean exports, compared to $1.427 billion in total agricultural exports) (Murray et al., 2018).[1]

Importance of the Export Market

U.S. soybean production, imports and exports are reported in Table 1. U.S. soybean production has steadily increased over the last five years from 91.4 million metric tons (MMT) in 2013/2014 to 119.5 MMT in 2017/2018. With the exception of the 2017/2018 marketing year, U.S. soybean exports have also increased and have consistently accounted for about half of total U.S. production, ranging from 46.9 percent in 2014/2015 to 50.6 percent in 2016/2017.

Table 1. U.S. soybean production, imports and exports: 2013/2014 – 2017/2018

Production Year	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018*
	1,000 metric tons				
Production	91,389	106,878	106,857	116,920	119,518
Imports	1,953	904	641	605	680
Total Supply	97,167	110,286	112,686	122,879	128,406
Exports	44,594	50,143	52,860	59,157	56,200
Exports (% of production)	48.8%	46.9%	49.5%	50.6%	47.0%

*2017/2018 values are projections.
Source: USDA, Foreign Agricultural Service, PSD Online

Importance of China to U.S. Exports

U.S. agricultural exports (including food exports) to China in 2017 are reported in Table 2. China is a major market for U.S. agricultural exports and was the leading market until 2017. Note that of total agricultural exports to China in 2017 ($19.6 billion), soybean exports ($12.4 billion) exceeded all other commodity or product categories. For instance, at $927 million, cotton is the second largest export, which is less than a tenth of soybean exports.

U.S. soybean exports in 2017 and the share of total exports by destination country are shown in Figure 1. In 2017, U.S. soybean exports were nearly $22 billion. That year, China accounted for 57.3 percent of U.S. exports. Note that the second (Mexico) and third (the Netherlands) largest markets for U.S. soybeans were markedly smaller. Mexico only accounted for about 7.4 percent of exports and the Netherlands 5.1 percent of exports. China has accounted for at least half of all U.S. soybean exports since 2008.

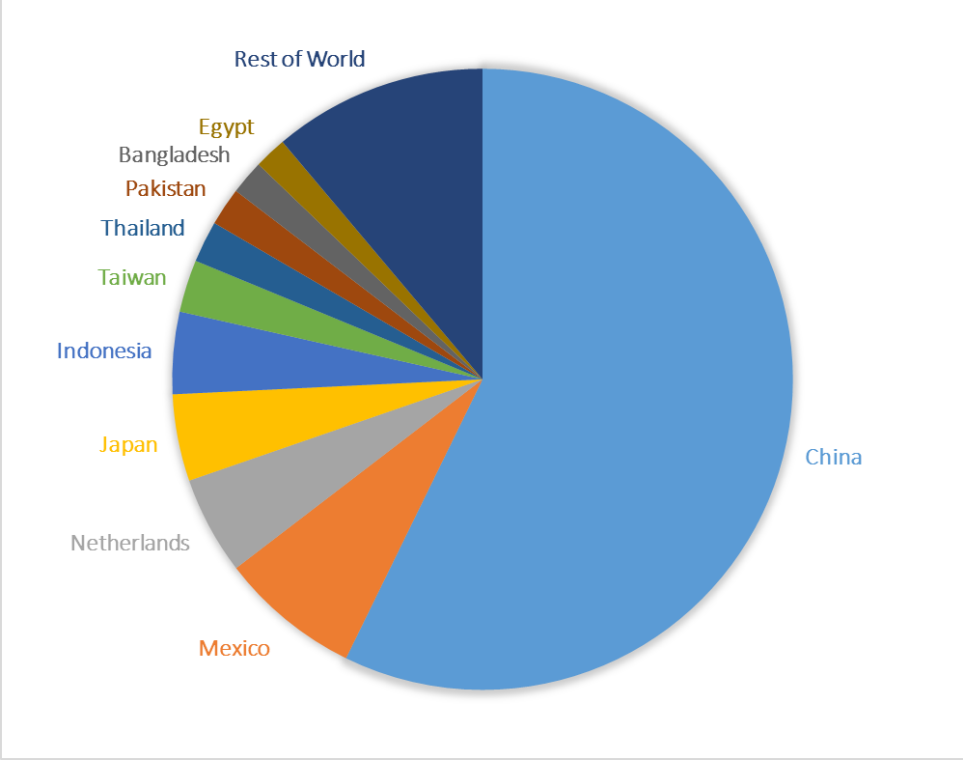
[1] USDA's Economic Research Service (ERS) estimates state exports of total and selected commodities based on U.S. farm-cash-receipts data. State shares of U.S. farm receipts are updated annually in calculating state-level export values to foreign countries (USDA-ERS).

Table 2. U.S. agricultural exports to China in 2017

Product	Value ($1,000)
Total Agricultural Product Exports	$ 19,612,135
Bulk Products	
Soybeans	12,355,952
Cotton	976,417
Coarse Grains (e.g., corn)	835,688
Wheat	348,727
Tobacco	162,297
Corn	142,036
Other Bulk Commodities	56,511
Pulses	25,056
Oilseeds (e.g., soybean)	5,056
Rice	759
Consumer-Oriented Total	2,428,719
Intermediate Total	2,274,919

Source: USDA, Foreign Agricultural Service, Global Agricultural Trade System (GATS)

Figure 1. U.S. soybean exports by destination market: 2017 (total exports = $21.6 billion)



Source: USDA, Foreign Agricultural Service, Global Agricultural Trade System (GATS)

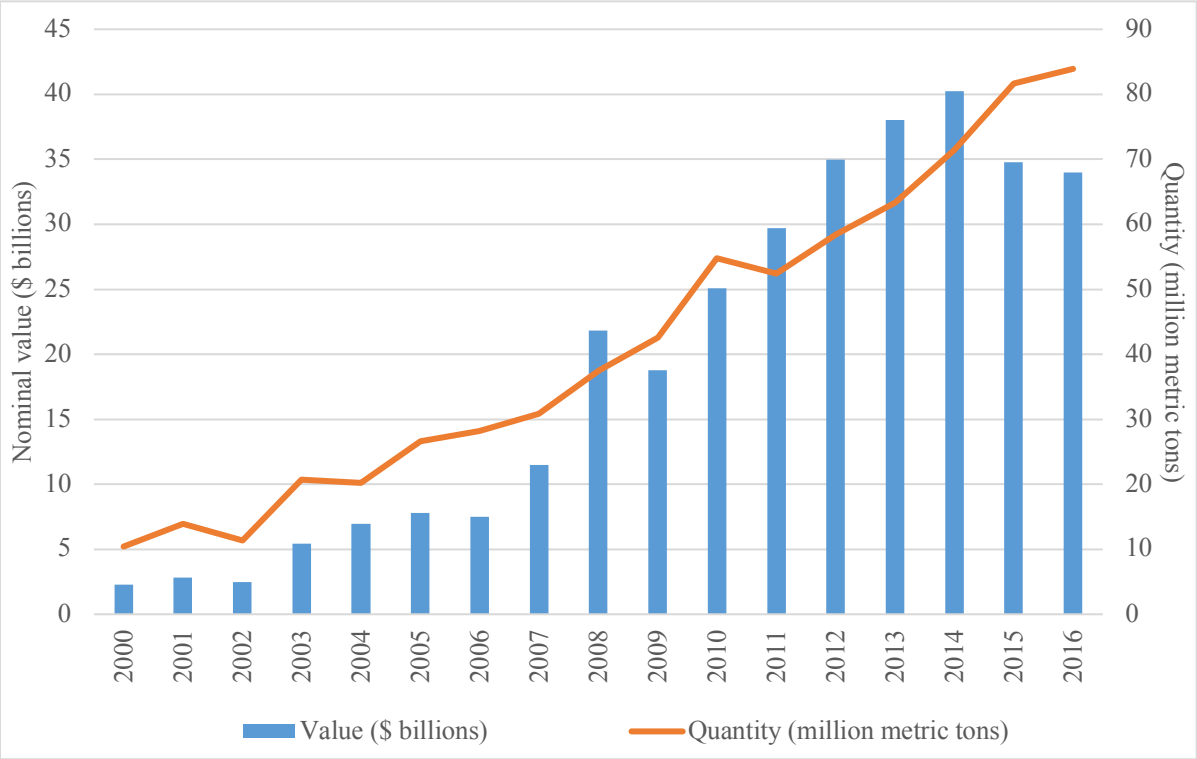
Note: Percentages by country: China 57.3%, Mexico 7.4%, Netherlands 5.1%, Japan 4.5%, Indonesia 4.3%, Taiwan 2.7%, Thailand 2.2%, Pakistan 2.0%, Bangladesh 1.8%, Egypt 1.7%, and Rest of World 11.2%. In terms of quantity, China accounted for 57.6% of total U.S. exports (55.5 million metric tons).

China's Soybean Imports

China plays an important role in global agricultural trade. Its accession to the World Trade Organization (WTO) in 2001, gradual economic liberalization, rising living standards, and changing consumption patterns have been the main forces driving its demand for agricultural imports (Gale, Hansen, and Jewison, 2015). The growth in China's soybean imports since 2001 have been extraordinary. As a result of this growth, China is now the largest market for imported soybeans (Chen, Marchant, and Muhammad 2012).

China's soybean imports (in value and quantity) are shown in Figure 2. According to the United Nations, China imported over 80 MMT of soybeans in 2016, accounting for almost two-thirds of global soybean trade. From 2000–2016, Chinese soybean imports increased from $2.3 billion to a high of $40.0 billion in 2014, an increase of more than 1,600 percent. In terms of quantity, imports increased from 10.4 MMT in 2000 to 83.9 MMT in 2016, an increase of more than 700 percent. This growth largely reflects China's growing demand for livestock and feed products. Soybean imports are primarily used to produce soybean meal, a high-protein ingredient in animal feed (Gale, Hansen, and Jewison, 2015).

Figure 2. China's soybean imports: 2000-2016



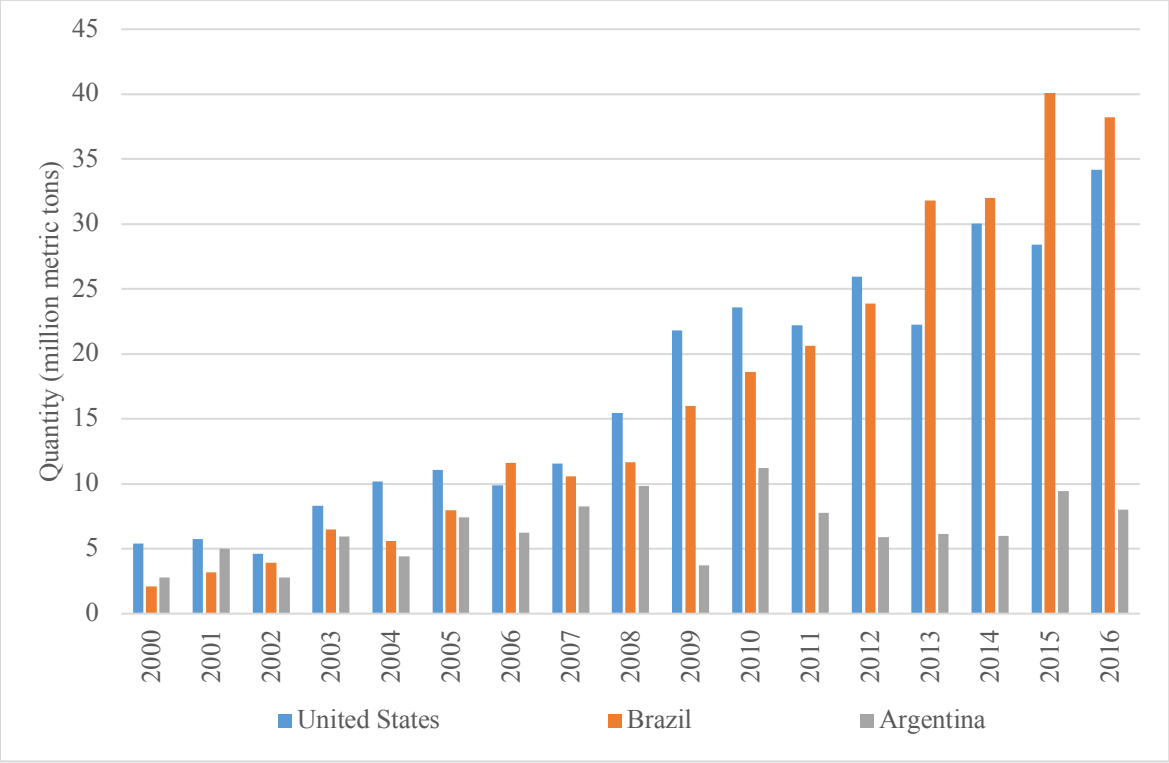
Source: UN Comtrade Database

U.S. soybeans face significant competition from South American soybeans in China, particularly from Brazil. While the U.S. faces some competition from Argentina, Argentina primarily exports soybean oil and meal, which accounts for a relatively smaller share of

soybean-product exports to China. Five-year (2013/14 to 2017/18) average imports of soybeans, soybean meal and soybean oil were 84.5 MMT, 38,600 MT and 781,000 MT, respectively. Figure 3 shows China's soybean imports from the U.S., Brazil and Argentina. From 2000–2016, imports of U.S. soybeans increased from 5.4 to 34.2 MMT (533 percent increase). However, imports of Brazilian soybeans increased by more than 1,700 percent during this period from 2.1 to 38.2 MMT. Throughout most of this period, the U.S. was the leading supplier of soybeans to China, until being surpassed by Brazil in 2013. Brazil's increased production and long-term growth potential coupled with infrastructure investment in partnership with numerous Chinese companies have facilitated the gradual transition from the U.S. to Brazil as the largest source of China's soybean imports.

Neither Brazil (73.1 MMT projected for 2017/18) nor the U.S. (56.2 MMT projected for 2017/18) have sufficient amounts of soybeans available for export to exclusively meet China's import demand (97 MMT projected for 2017/18) for soybeans. Strong domestic crushing industries in the U.S. and Brazil, primarily to provide feed for domestic livestock, limit the quantity of soybeans available for export to approximately 50 percent of total soybean production in the U.S. and 60 percent of total soybean production in Brazil.

Figure 3. China's soybean imports by exporting country: 2000-2016



Source: UN Comtrade Database

Impact of Retaliatory Tariffs

The following analysis is based on a modeling framework that assumes exporter-specific competition in the Chinese market. Put differently, we are assuming imperfect substitutability across exporting countries such that U.S. soybeans, Brazilian soybeans and Argentinean soybeans are modeled as competing products.[2] The modeling framework allowed for deriving price elasticities of demand (relationships between Chinese soybean imports and exporter prices), which can be used to forecast the impact of price-changing trade barriers such as tariffs. The modeling framework was based solely on Chinese import demand for soybeans and soybean oil. Chinese imports of soybean meal are negligible and were not included in the model (Chen, Marchant, and Muhammad 2012).

We project how tariffs could impact U.S. and Brazilian soybean exports to China. Our projections are primarily driven by the import price relationships for U.S. and Brazilian soybeans in China. Estimates indicate that for every 1 percent increase in the price of U.S. soybeans, Chinese imports of U.S. soybeans decrease by 1.3 percent, while imports of Brazilian soybeans increased by 1 percent.

We consider three possible Chinese tariffs on U.S. soybeans: 10 percent, 25 percent and 50 percent. Trade projections based on the three hypothetical tariff rates are reported in Table 3. The projections assume three-year averages as baseline or reference values and constant import prices. Given a 10 percent tariff on U.S. soybeans, U.S. exports to China are projected to fall by $1.8 billion but could fall as much as $3.1 billion when accounting for statistical error. To be expected, higher tariffs result in even greater losses for the U.S. Given a tariff rate of 50 percent, U.S. exports to China are projected to fall by $9.0 billion (as much as $15.3 billion when accounting for statistical error). Projected losses for the U.S. would be offset by almost equal gains for Brazilian soybean exports to China. At the farm-level, a 25 percent tariff could result in a $0.33 to $1.76 per bushel loss. Long-term production and price changes were not considered in the analysis.

Table 3. The potential impact of retaliatory tariffs on soybean exports to China

	U.S. soybean exports to China	
Tariff	Projected change	Projection range*
10%	-$1.8 billion	-$0.6 billion to -$3.1 billion
25%	-$4.5 billion	-$1.4 billion to -$7.7 billion
50%	-$9.0 billion	-$2.7 billion to -$15.3 billion
	Brazil's soybean exports to China	
Tariff	Projected change	Projection range*
10%	$1.8 billion	$50 million to $3.5 billion
25%	$4.4 billion	$0.2 billion to $8.8 billion
50%	$8.9 billion	$0.4 billion to $17.4 billion

Note: Projected changes assume three-year averages (2014-2016) as starting values: $14.17 billion for the U.S. and $17.05 billion for Brazil, and assume constant prices.
Projections for Argentina were negligible and insignificant and are not reported.
*Projection ranges are 95 percent confidence intervals.

[2] The model also included soybean oil imports from Argentina, Brazil, and the rest of the world.

Conclusion

U.S. soybean producers are reliant on foreign markets as a source of demand for their production, with approximately 50 percent of production being exported. China is responsible for nearly two-thirds of global soybean imports. As such, if China places retaliatory tariffs on U.S. soybeans, there could be profound implications for U.S. soybean exports and farm-level losses for U.S. soybean producers. Our analysis indicates that exports could drop by $1.4 to $7.7 billion if a 25 percent tariff is applied to U.S. soybean exports to China, resulting in a potential farm-level loss of $0.33 to $1.76 per bushel. With higher tariffs, the U.S. could experience even greater losses. Tennessee soybean producers already face tight margins, and a reduction in farm-gate prices would add to their current financial strain. Overall, Chinese retaliatory tariffs on U.S. soybeans would have a considerable negative impact on U.S. and Tennessee soybean farmers.

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