

Extended essay

Economics

Title: The impacts of the US-China trade war on US soybean prices and export volumes.

Research Question:

To what extent did the 2018 Chinese tariffs on US soybeans affect the equilibrium price and

export volume of soybeans from the United States between July 2018 and December 2024? Word

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1. Introduction

The U.S.–China trade war was an economic conflict that involved the imposition of billions of dollars in tariffs, dubbed the "2018 Tariffs". Tariffs are taxes imposed by governments upon imported goods. This was a major global conflict that happened under the administration of U.S. President Donald Trump and Chinese President Xi Jinping in July 2018. The conflict originated from the U.S. accusing the Chinese government of unfair trading practices, such as "Dumping", a practice where a country or a firm exports an item at a price which undercuts its competitors in the domestic market, and intellectual property theft. On the other hand, Chinese sources accused the U.S. of trying to undermine their rise as a global superpower*. As tensions between the U.S. and China escalated, the U.S. announced that, starting in July 2018 it would impose tariffs on Chinese products worth hundreds of billions of dollars, and China retaliated in kind.

Before the imposition of these tariffs, China was the single largest importer of U.S. soybeans, purchasing more than (US)\$12.2 billion worth of soybeans annually in 2017. This trade relationship was characterized by a stable trajectory, with soybean exports increasing steadily prior to the trade war. At the time, this made soybeans the most valuable U.S. agricultural export, and over 57% of U.S. soybeans were exported to China. (Service, n.d.) This meant that the U.S. was very susceptible to policy shocks because of China's huge slice of the pie, that is, the American soybean exports. The imposition of Chinese tariffs had an immediate effect, as U.S. soybean export volumes and prices were affected, while it also created opportunities for alternative soybean exporters, such as Brazil.

The soybean case study was chosen because, as mentioned, it was the largest U.S. agricultural export and had big consequences for U.S. politics. Furthermore, the effects of the tariffs can be examined in great detail due to extensive data on the subject, largely stemming from the United States' status as the world's largest agricultural exporter.

This essay will investigate “To what extent did the 2018 Chinese tariffs on U.S. soybeans affect the equilibrium price and export volume of soybeans from the United States between July 2018 and December 2024?” The essay will analyze both the short-term effects (2018-2019) and the long-term effects (2020-2024) of the tariffs. The data that this analysis will rely on are secondary data from sources such as the United States Department of Agriculture (USDA), UN Comtrade, and the World Bank. Supply-demand analysis, elasticity, welfare impacts and other economic theory will be used to understand the consequences of China’s tariffs better. These tariffs’ origins can be traced to the trade war between them. This essay will investigate how tariffs affected the equilibrium price of U.S. soybean exports to China by focusing on soybeans. This essay will cover the long and short term effects of these tariffs.

2. Theoretical Hypothesis

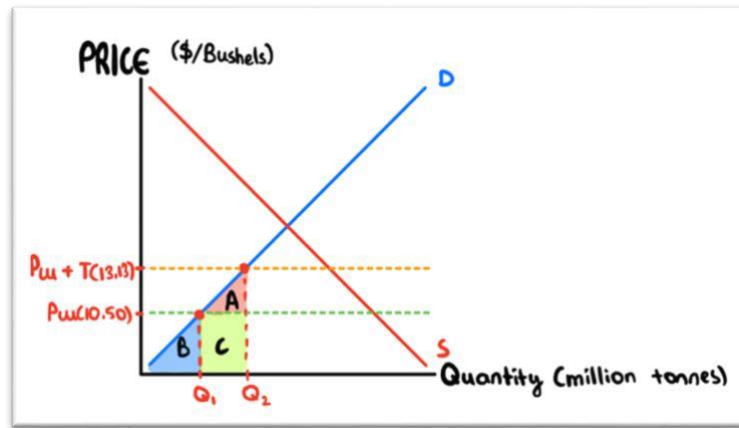
A tariff increases the domestic price of an imported good by adding a tax to the world price. This causes a contraction in the quantity demanded. Generally, tariffs are imposed to protect an infant industry, lower the consumption of foreign goods, and undermine the growth of certain sectors. As illustrated in Figure 1: Supply-and-Demand Diagram Showing Tariff Impact, the imposition of a tariff shifts the market price from the world price to the world price plus the tariff, thereby reducing imports at equilibrium. China’s 25% tariff on U.S. soybeans, which was imposed in July 2018, had this exact effect. Because soybeans were now more expensive relative to domestic and foreign alternatives, the demand for them in China fell massively. This change resulted in a decline in U.S. soybean exports to China from \$12.2 billion in 2017 to approximately \$3.1 billion in 2018. (Newton, 2018) This corresponds perfectly with the theoretical implications of a tariff as shown in the diagram, as well as its actual application.

Because China is the world's largest importer of soybeans (around 60%), it has unprecedented market power over the sector. This means that changes in their purchasing behavior not only affect their domestic

market, but also the global price dynamics. After China's demand for soybeans decreased because of the tariffs, the global demand also fell. Downward pressure was placed on the prices U.S. farmers received in the markets, as a result of this decrease. The downward pressure can be clearly seen in the prices of U.S. soybean futures. The futures, declined from \$10.50/bushel in early 2018 to \$8.15/bushel after the tariffs. This is a great real world example of the "large country" effect. The effect refers to when reduced imports by a major buyer of said goods decreases global prices.

In the short run, the soybean supply will not fluctuate much. This is because, in the short run, the soybean supply is elastic because farmers can't suddenly switch crops mid-season. This would mean that, to sell the stock they already have on hand, they would have to lower prices even further to satisfy the declining demand. In the long run, these farmers might stop producing or reduce the number of soybeans they produce because, after these tariffs, they are not able to make the same profit they once did, and there are better alternatives for higher profit than soybeans. This would create an opportunity for rival producer countries to seize, as they can now capitalize on an untapped market. One of these rival producer countries is Brazil. This change in suppliers in the market hugely benefited Brazil, as its soybean exports to China increased by 15 million tonnes in 2018, from 53 million tonnes in 2017 to around 68 million tonnes, a record for Brazil. (China Soybean Industry Report 2018: Brazil was the Largest Source of Imported Soybeans to China, 2018) As a result, the price spread between Brazilian and U.S. soybeans widened, and U.S. soybeans began to trade at a discount in global markets.

2.1 Supply-Demand Diagram Showing Tariff Impact



The aim of including this graph above is to demonstrate the theoretical impact of China's 25 percent tariff on U.S. soybeans. This diagram shows how the tariff raises the price from the world price ($P_w = 10.50$) to $P_w + T = 13.13$. With this higher price, the quantity demanded falls from Q_1 to Q_2 . The loss of consumer surplus in China is represented by Area A; Area B shows the loss of producer surplus for U.S. farmers; and Area C represents the tariff revenue collected by the Chinese government. Areas A and B together shows the DWL (deadweight loss) created by the tariff.

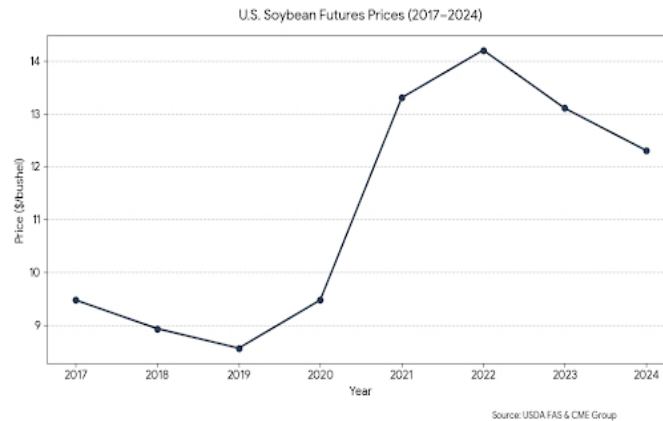
3. Correlation

To move beyond a descriptive account of the tariff's implementation, it is necessary to analyze whether U.S. soybean prices and export volumes declined in parallel, thereby providing evidence of the tariff's market impacts. Futures prices are chosen here as they are a forwardlooking indicator that captures market reactions to expected future conditions more effectively than spot (cash) or FOB prices. This allows for a more accurate assessment of the market's anticipation of the tariff's effects.

It is important and needed to analyze if the U.S. soybean prices and export volumes decreased parallelly. To visualize the evidence of the tariff's market impacts. Futures prices are used here because they are accurate

indicators. The futures prices capture market reactions to expected future conditions relatively more effectively than other indicators. A more accurate assessment of the market's anticipation of the tariff's affects can be captured.

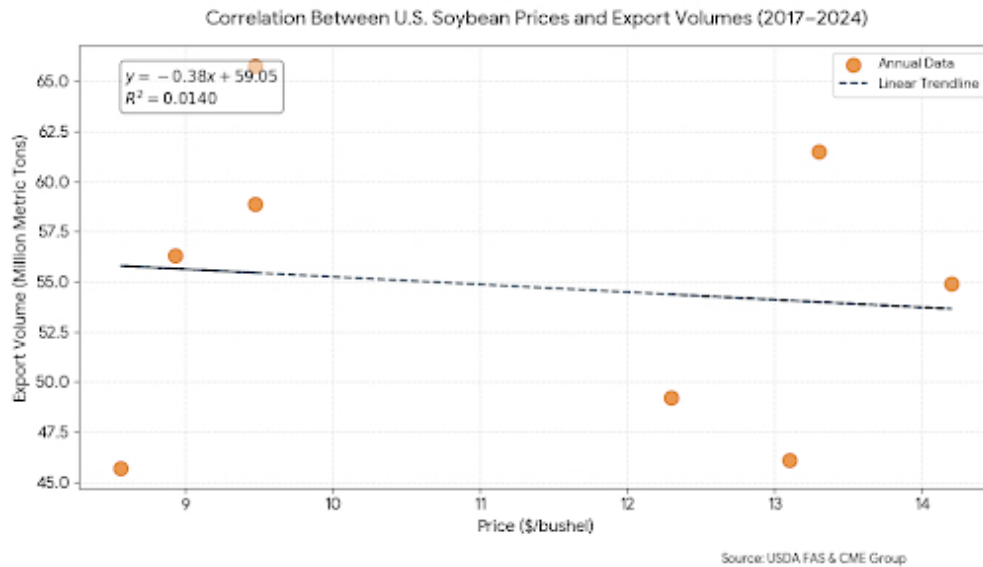
3.1 U.S. Soybean Price Time-Series Graph



This graph shows the changes in U.S. soybean futures prices from 2017 to 2024. The prices remained constant and stable, around 10.50, prior to July 2018. After July 2018, the tariff caused a sharp fall to approximately 8.15. Prices remained low through 2019-2020, only recovering during the Phase One Agreement period and the supply shock in 2023. (Estimating the market effect of a trade war: The case of soybean tariffs, 2021) While this supports the argument that the tariff created a negative demand shock for U.S. soybeans, whose effects were observable immediately after its enforcement, it is also essential to consider the role of seasonal harvest patterns in these price changes. Recognizing the seasonality, I have seasonally adjusted the series to ensure that the observed price variations primarily reflect the impact of the tariffs, rather than seasonal fluctuations.

If it fell simultaneously, it would support the idea that the tariff created a negative demand shock that affected both of the market outcomes. An analysis of the market clearly shows not only the immediate fall in both export volumes and domestic prices after July 2018, but also how that relationship changed between 2020 and 2024.

3.2 Price-Export Correlation Scatter Plot Diagram



This scatter plot compares U.S. soybean export volumes with U.S. soybean prices. Before the tariff (represented by the blue points), the relationship shows a clear positive correlation, indicating that during that period, prices and export volumes moved together. After July 2018 (shown by the red points), export volumes fall sharply, and the correlation becomes much weaker. Even though prices rose again in 2023/2024 due to the Phase One agreement and supply shocks, export volumes remain low. The tariff, led to a long lasting decline in the demand for soybeans which were produced in the U.S., as seen here.

New and upcoming researchers can use methods like synthetic control and difference in differences in their research. This would make sure that the analysis is strengthened and it will also help show cause. These methods would help compare them to what might have happened if not for the tariffs. Therefore helping distinguish the effects of tariffs on soybean exports and prices.

In the years that can be seen on the graph, prices partially recovered. This was because of global supply shortages. Global supply shortages were caused by droughts in South America, and higher demand for soybeans. After all of this, the demand for U.S. soybeans still did not recover. How the tariffs changed U.S. export patterns overall were demonstrated by this long term effect.

U.S. soybean prices and export volumes were heavily reliant on a stable and constant demand from China before the tariffs. After the tariffs were imposed in 2018, both of these dropped steeply. The decline did not stop in 2019. This was because the Chinese were building stronger business relation with Brazil. It may seem that prices began recovering from 2020, however exports stayed low all the way through 2024. The tariffs led to a drop in export volumes, which was long lasting, as seen here.

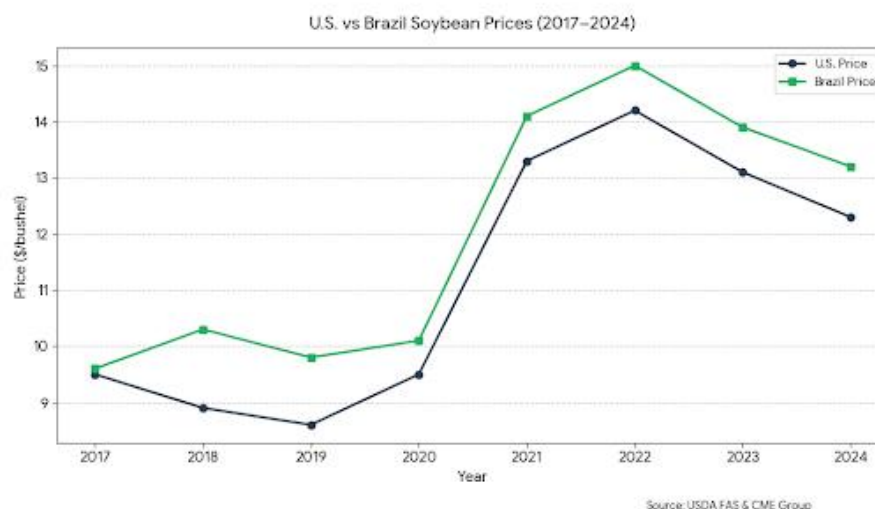
4. Economic Analysis

Brazilian soybeans are close substitutes for U.S. soybeans, so the 2018 tariff made them more appealing to Chinese importers. This positive cross-price elasticity caused Brazilian exports to China to rise in 2018 and 2019. There are other possible reasons for Brazil's larger market share. For example, the Brazilian real weakened against the U.S. dollar, making Brazilian soybeans cheaper for buyers. Changes in biofuel policies may have also increased demand for Brazilian soybeans. While these factors likely played a part, they do not fully explain the large change in trade patterns. Ultimately, the long-lasting nature of the

substitution points towards the tariffs as the primary catalyst reshaping commercial relationships beyond the initial shock.

Before the tariffs, the U.S. held a competitive advantage over other manufacturers because of its wellorganized logistics, large-scale farming systems, and established trading relationship with China. However, because of the tariffs, the U.S.'s competitive advantage was not enough to maintain its position as one of the largest exporters of soybeans to China, and Brazil captured the majority of the market. Furthermore, as trade with Brazil increased, China further invested in trade routes, relationships, and other factors that contributed to Brazil becoming a long-term supplier. Throughout 2020-2024, even though the U.S. was exporting more soybeans than before, Chinese imports remained in favour of Brazil. This is evidence of the competitive advantage being transformed not temporarily, but structurally. The tariffs widened the price gap between U.S. and Brazilian soybeans. By late 2018, U.S. exporters were offering soybeans at discounts of over \$1.50/bushel compared to Brazilian suppliers.

4.1 U.S. – Brazil Price Gap Graph



This graph compares U.S. and Brazilian soybean export prices from 2017 to 2024. After the tariffs were imposed in July 2018, U.S. prices fell, while Brazilian prices remained consistently higher. The shaded gap between the two lines shows that U.S. soybeans were discounted by around \$1.50 per bushel in 2018-2019.

This price gap, which persisted throughout 2024, indicates that China increasingly preferred Brazil as a supplier. (Estimating the market effect of a trade war: The case of soybean tariffs, 2021) This, in turn, forced U.S. exporters to lower prices in order to compete with their Brazilian counterparts. This supports the argument that the tariff created long-lasting structural disadvantages for U.S. soybeans in the Chinese market.

This shows their attempts to remain competitive in a market where the Chinese demand had contracted. Brazil's market share has continued to grow over time, while U.S. exports have not recovered through 2024, which is in line with what we would expect. Tariffs tend to push buyers to look for cheaper or easier-to-access suppliers. Here, China kept buying soybeans from Brazil, even as the global market changed.

5. Hindering Factors

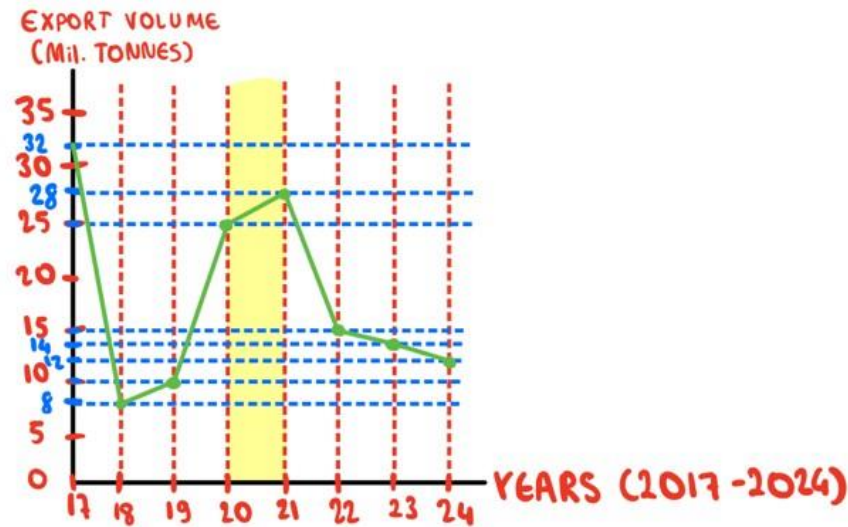
Exporters of U.S. soybeans faced challenges that effected their operation in a very major way. Some of these challenges include longer shipping routes, higher freight costs, and a less favorable dollar to yuan exchange rate. For instance, shipping U.S. soybeans to China costed about 50 cents more per bushel than shipping from Brazil. Brazil's weak real made its soybean exports relatively less expensive in global markets compared to U.S. soybeans.

After the tariffs, China pursued an approach to diversify away its imports from U.S. Even as the soybean supply globally tightened due to the factors mentioned earlier. Chinese importers remained loyal to Brazil. This limited the U.S.'s recovery because China was the biggest importer of soybeans. To sum it up, the U.S. simply couldn't return back to the pre-tariff era because of the large country effect mentioned before.

6. Contributing Factors

In January of 2020, the signing of the Phase One Agreement led to a temporary spike in soybean exports. This contradicted with the effects of the tariffs.

6.1 Phase One Agreement Impact Graph



When this temporary spike is compared with [chart 4.1](#), it becomes clear that the Phase One Agreement did not reverse the structural shift caused by the tariff. Even during the Phase One period, Brazil remained China's dominant supplier. When the agreement expired, U.S. exports immediately fell again. Taken together, the two graphs show that the spike was artificial and short-lived, compared to that of Brazil's, whose expansion became the long-run outcome.

This was a short-lived spike; however, because this agreement did not remove the Chinese tariffs on U.S. soybeans, it only prompted China to commit to buying significantly more U.S.-made agricultural goods, including soybeans. This commitment served as a positive policy shock, partially offsetting the earlier negative demand shock from China's July 2018 tariffs.

USDA FAS's weekly export sales data and GATS's annual reports indicate that U.S. soybean shipments to China rose significantly in the last quarter of 2020 and again during 2021's peak export window. (2021 United States Agricultural Export Yearbook, n.d.) The Phase One agreement essentially forced Chinese importers to buy more U.S.-origin soybeans, which seemed to bring the U.S.'s exports to China back to normal levels. However, this boost was clearly artificial, as the structural determinants of trade (costs, logistics, freight, seasonality, and foreign exchange movements) remained in Brazil's favour.

A major factor affecting the U.S.-China soybean trade is that, after the tariffs, significant cost differences emerged in transporting soybeans from the U.S. to China versus from Brazil to China. According to the USDA ERS, Brazil's expanding export infrastructure, including new ports in São Luis and Barcarena and the expansion of Santos ports, has reduced Brazil's export costs to China in particular. (Salin, 2025)

Meanwhile, U.S. soybeans must travel via the Mississippi River to the Gulf ports or over to the Pacific Northwest. Seasonal problems in the Mississippi River, like the water level, high barge rates, and occasional port congestions, have increased the U.S.'s landed costs.

Even though U.S. soybeans became significantly cheaper from the former prices, they couldn't compete with Brazil's soybean exports because Brazil; invested heavily in their logistics, lowering their internal transport and port costs; The Brazilian real (BRL) weakened significantly relative to the U.S. dollar (USD), making Brazilian exports even cheaper in dollar terms; and Chinese businesses negotiated multi year contracts with Brazilian exporters, enabling contract based lower pricing. Thus, even though U.S. soybeans became significantly cheaper than in 2018, they couldn't compete with Brazilian soybeans, not only because of their price but also because of logistics and the hidden operating costs. Another important reason for the persistent decline in U.S. soybean exports was China's long-term shift in its procurement strategy, which became even more significant in 2020 and 2024. The tariffs showed the risks of relying on a single supplier. China diversified its import portfolio even after agreeing to the Phase One Agreement. This meant

that, although China temporarily raised purchases of U.S. products to meet the agreement's standards, it did not abandon its recent ties with Brazil. Instead, China preferred to balance the two to create a diversified soybean supply, using At first, U.S. suppliers met the agreement's needs, but Brazil gradually became the After the agreement ended, China's soybean imports in 2022-2024 shifted back to Brazil. This shows that the tariffs led to long term changes in how China buys soybeans.

Global supply shocks during this time helped U.S. prices recover, which made it seem like trade with China was improving. For example, severe droughts in southern Brazil during the 2020-2021 harvest lowered Brazilian soybean yields, reduced global supply, and raised prices. This caused U.S. soybean futures to go up, even though U.S. exports to China stayed much lower than before. The same thing happened in 2023, when bad weather in South America pushed prices up again. These price increases were mostly due to global supply problems, not stronger Chinese demand for U.S. soybeans. To really understand the impact of the tariffs, it is important to look at both price and volume. U.S. prices went up because of global factors, but exports to China stayed low. This shows the tariffs led to lasting changes in trade, not just short-term effects. Brazil benefited more from its relationship with Chinese buyers, while U.S. exports fell because of the tariffs.

In summary, the Phase One agreement, improved logistics, strengthened Brazil-China ties, a weaker Brazilian Real, and China's push to diversify all led to long-term results that favored Brazil over the U.S.. Even when U.S. soybeans cost less, China still picked Brazilian suppliers.

This distinction between price and volume dynamics is very important to understanding the impact of the tariffs. While U.S. domestic prices improved due to global conditions, export volumes to China remained low. This contrast highlights that tariffs were not temporary shocks but long-term changes in trade flows. Brazil benefited disproportionately from its relationships with Chinese buyers, while U.S. exports fell disproportionately due to the tariffs.

Overall, the combination of the Phase One agreement, Brazil's upgraded logistics and relationships with China, the weakening of the Brazilian Real, and China's diversification tactics resulted in long-term outcomes that favored Brazil over the U.S. in almost every aspect of the soybean trade. Even when U.S. soybeans were discounted, Chinese importers had little response because Brazil was a cheaper, better, and more reliable exporter. They became even further integrated into the Chinese supply chain and created a positive feedback loop for themselves, which rendered the U.S. out of the playing field. These factors contribute considerably to the decline in U.S. export volumes through 2024, despite a partial recovery in global soybean prices.

7. Conclusion

To conclude, the 2018 trade war between the U.S. and China, which led to the 2018 Chinese tariffs, had both short- and long-term effects on the equilibrium price and export volumes of U.S. soybeans. In the short run, the tariffs led to a clear negative demand shock, causing U.S. soybean prices and export volumes to fall simultaneously. This matched with the theoretical anticipations of how a tariff imposed by a major importing country, a country that holds a lot of power in that import market, is supposed to affect international markets traditionally. The U.S. prices dropped from above \$10/bushel to below \$8/bushel, and exports to China fell by more than 70% in a single year. (Soybeans and Oil Crops - Related Data & Statistics, 2024)

In the long run, however, the consequences of these tariffs became even more significant, as global soybean prices later recovered due to droughts in Brazil and rising global feed demand. Yet U.S. export volumes never recovered to pre-tariff levels before 2018. This therefore shows that while prices are affected by global supply Structural trade ties, such as the one the U.S. lost during the trade war, are difficult to rebuild. China formed stronger and more lasting connections with Brazil, helped by currency benefits, lower

shipping costs, better infrastructure, and long-term agreements between Chinese importers and Brazilian exporters. Even short-term policy measures like the Phase One Agreement in 2020 and 2021 did not change the overall direction of trade.

Therefore, it can be concluded that the tariff disrupted U.S. soybean exports not only temporarily but also permanently, altering the global soybean market. The U.S. never regained its dominance in the Chinese soybean market, and the effects of the tariff continued to limit export volumes through 2024. This means that the 2018 tariff had a longstanding substantial effect on both the price and the export volumes of U.S. soybeans, affecting market forces well beyond the current period of the trade war.

8. Research Limitations

While this paper identifies clear patterns, there are some limitations to note. First, the analysis uses secondary data from the USDA, UN Comtrade, and global price indexes. These sources are reliable, but differences in how often and how consistently they report data may affect the accuracy of month-to-month comparisons. Second, the soybean market is influenced by outside factors like weather, exchange rates, oil prices, and global livestock cycles. These can overlap with the timing of the tariffs, making it hard to measure their full impact. Third, the Phase One Agreement temporarily affected U.S. export data for 2020 and 2021. Although this was considered in the essay, the exact size of this short-term boost cannot be fully measured. Finally, political and strategic factors, such as China's long-term food security plans and investments, also play a role. and investment decisions in Brazil, are not fully captured by traditional economic models. Nevertheless, despite the limitations mentioned, the overall evidence strongly confirms the conclusion that the tariff had significant long- and short-term effects on U.S. soybean exports.

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