US-China Trade War: Safeguarding or Damaging Domestic Industries?

by

Winston Zhao

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Professor Marti G. Subrahmanyam	Professor Robert Engle
Faculty Adviser	Thesis Advisor

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Abstract

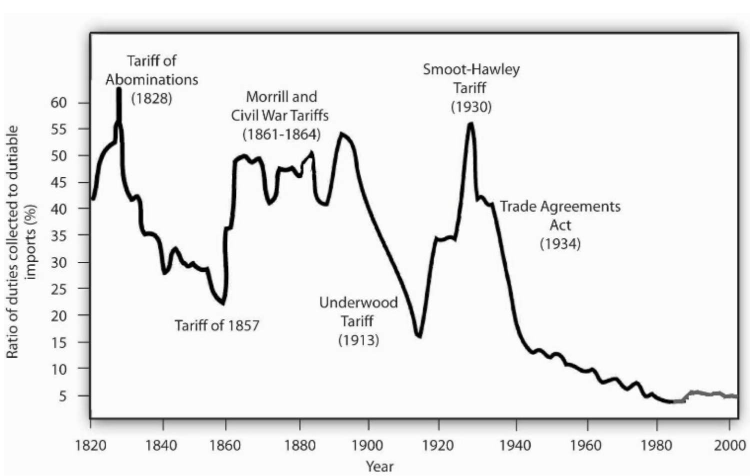
After nearly a century of consistent trade liberalization, the US government has implemented a series of significant protectionist policies beginning early 2018. Most notably, steep tariffs have been placed on imports from China across products in agriculture, manufacturing, and materials. While the benefits of free trade are frequently touted and analyzed, it is unclear how this recent reversal in foreign policy will impact consumers, producers, and governments all over the world. The aims of this study were to quantify the impact of two waves of tariffs in mid-2018 and estimate the timing of changes in import values and export prices in China. Subsequent to this, the paper explored which countries had been affected by these bilateral policies and the industries that experienced the greatest change. With a 20% to 45% contraction in US imports of products subject to the tariffs, US businesses began to shift their purchases from other major trading partners. The EU, Mexico, Japan, South Korea, South East Asia, and Taiwan were the most significant beneficiaries of the tariffs, especially with their exports of vehicles, industrial machinery, and electrical components. Overall, both the US and Chinese economies are negatively impacted by these tariffs. While US consumers and Chinese exporters have suffered losses, select industries in other countries have benefitted.

Introduction

Globalization is under siege. For nearly a century, the major economies of the world have continuously integrated and merged their means of production and consumption, generating unprecedented economic growth and interdependence. However, a sharp reversal of attitudes towards free trade has emerged in the last five years, particularly from major governments that once spearheaded free market treaties. The United States' protectionist stance towards trading partners and the United Kingdom's precarious departure from the European Union ("EU") have threatened global supply chains and embroiled financial markets in unfamiliar levels of uncertainty and volatility. At the center of global shifts, the US has taken a hardline stance towards China and their growing bilateral trade deficit. This paper will examine the economic impacts of trade restrictions on China and seek to identify how trade has shifted.

Before outlining the purpose of this paper, it is helpful to provide a brief history of trade restrictions. *Figure I* presents the ratio of tariff payments to dutiable imports to the US over the past 200 years.

Figure I. US Tariff History



For much of this time, tariff collections were the greatest source of income for the US government (Census Bureau, 1960). When a federal income tax was introduced in 1913, tariff revenue began to be a declining percentage of government income. After World War II, the US spearheaded discussions around trade liberalization and reciprocal tariff rates. In 1947, 23 capitalist countries, including the US, agreed to promote international trade and signed the General Agreement on Tariffs and Trade ("GATT"). This unprecedented shift in attitudes lowered average tariff rates worldwide from 22.0% in 1947 to under 5.0% in 1986 (Bown, 2015). The GATT later led to the creation of the World Trade Organization ("WTO"), which is now made up of 164 member countries. Alongside the International Monetary Fund and the Organization for Economic Cooperation and Development, the WTO has played a crucial role in driving globalization, global economic expansion, and poverty alleviation.

Today's picture of international trade relations is starkly different from that of just a decade ago. Since early 2018, the US government has imposed tariffs ranging from 7.5% to 25.0% on nearly $400 billion of tariffs, representing approximately 16.0% of the total value of US imports in 2019 (Varas, Jacqueline, et al, 2020). Many countries have retaliated with equivalent trade restrictions on US exports, further disrupting trade flows and worsening relations. While the sweeping benefits of trade liberalization have been continuously touted for almost the past century, the recent actions of global superpowers like the US and China run counter to conventional economic trade theory. Since it has been several decades since tariffs of this degree were implemented, policymakers around the world are now questioning how the global economy will respond. Economists and researchers have already played a key role in estimating the directional impact of these trade restrictions. While existing literature has begun to quantify the effects of these tariffs on GDP, more detailed studies of the effects of these tariffs across industries and other countries is needed.

Literature Review

Existing research has quantified the economic, price-level, and sector-specific impacts of US and retaliatory tariffs by other countries. An early study in 2019 estimated a GDP contraction of $51 billion or 0.27%, due to all tariffs imposed the previous year (Fajgelbaum, Pablo, et al, 2019). With regards to the timing of these impacts, few analyses exist to understand how quickly businesses responded. Furthermore, 2018 tariffs were stretched over more than six months and it is unclear which policies had the most significant impacts. Thus, the first question posed by this paper is to what extent and when have US tariffs impacted import values and prices from China? Only two sets of tariffs will be explored in this paper, as they were implemented in quick succession and were bilateral policies, as opposed to tariffs on imports from all other countries over the course of a year. The paper also investigates the effect these two tariffs had on export prices in China. A number of studies have found nearly complete passthrough of tariffs to the price paid by importers, suggesting that the tariff burden has largely fallen on the US (Cavallo, Alberto, et al, 2019; Amiti, Mary, et al, 2019). While tariffs may fully passthrough in the short-term, they may become incomplete in the long-term due to exporters lowering their prices after contracts have expired. For this reason, the paper uses export prices from China to explore whether exporters bear any cost.

After studying bilateral effects, the next half of the paper considers the question to what extent have US tariffs increased imports from other countries? Currently, there is limited research exploring which players have benefitted from these protectionist policies, as its likely that US businesses have begun to purchase from other countries. Some work has been done to explore the effect of retaliatory tariffs from Canada, the EU and China, specifically, but primarily to understand the change in stock returns for those countries (Frímannsson, 2019). By taking data from major trading partners to the US, the magnitude of positive trade impacts to these players will be computed. The specific products targeted by these tariffs can also be grouped into overarching sectors to understand which countries have substituted for China in which industries. The American agricultural industry has been studied in depth, finding that the majority of US farmers have been negatively impacted (Qu, et al, 2019). To complement those results, this paper will look broadly at a number of sectors, including manufacturing and automobiles, to provide a comprehensive picture.

Data & Methodology

Timeline

Figure II presents the series of tariffs imposed by the US on imports from a variety of countries. The tariffs of interest are “China1” and “China2”, referred to in this paper as Wave 1 and Wave 2, respectively. Wave 1 was implemented on July 6th, 2018, and Wave 2 on August 8th, 2018.

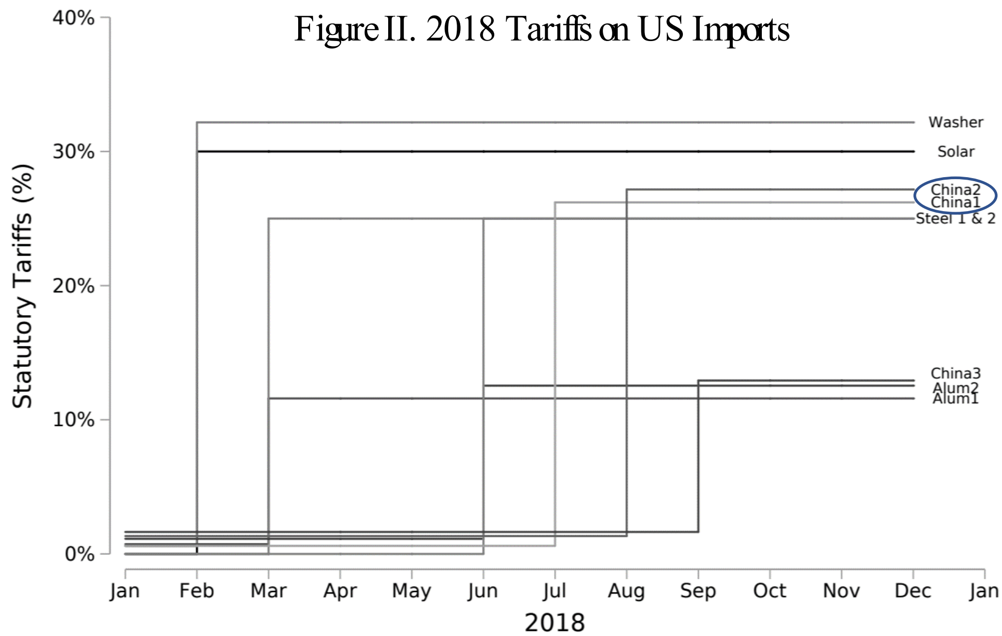


Figure II. 2018 Tariffs on US Imports

With respect to the data needed for the paper, the period from January 2018 to June 2019 was used. This time frame provides more than 6 months of data before the tariffs were implemented to understand the unaffected period. It also includes up to a year of data for the affected trade, which captures the delayed effects of any tariffs. Data beyond June 2019 was not used because by then the US had implemented policies to reverse tariff rates on a portion of the initial commodities.

Data

The trade data used in this paper was accessed from the US Census Bureau's USA Trade Online, an online data tool for all imports and exports. This tool tracks all commodities that enter through US Customs and Border Protection on a few dimensions, including customs value, quantity, country of origin, and month of entry. The commodities in this database are organized under the Harmonized System ("HS"), an international nomenclature for the classification of products, used by all countries. This is the classification used by governments to impose tariffs on specific products or groupings of products. The HS system uses a total of 10 digits for each commodity, with each 2-digit pairing increasing in specificity for classifying a commodity. For example, 8201 records trade of Agricultural Tools, and 82011000 of Spades and Shovels. This paper primarily utilizes trade data at the 4-digit and 8-digit levels.

The second data source has been kindly maintained by the Center for Agricultural and Rural Development at Iowa State University (Li, 2018). Their researchers have compiled information from government documents relating to the trade war to create lists of all tariff increases from the US and retaliating countries. The data includes commodities categorized using the HS system, tariff increases in percentage terms, and implementation dates. According to this database, a total of 1097 commodities at the 8-digit level were targeted in Wave 1 and Wave 2 of tariffs. These commodities can be matched with the trade data provided the US Census Bureau to derive insights.

Methodology

Using the aforementioned data sets, the subsequent analysis is divided into two parts to address the paper's two key questions.

Firstly, to assess the impact of tariffs on trade value and prices, a series of regressions were run to capture any changes before and after Wave 1 and Wave 2. The trade model below regresses our variable of interest, either import value or prices, on a binary variable that toggles in the presence of tariffs:

$$y_i = c + \beta_1 * ROW_i + \beta_2 * T_i^1 + \beta_3 * T_i^2 + SectorFixedEffects_i + \varepsilon_i$$

y_i is the percentage change in the value of US imports or the percentage change in prices from China. T_i^1 and T_i^2 are dummy variables indicating whether commodity i is subject to tariffs in Wave 1 and Wave 2. ROW_i controls for changes in the dependent variable in relation to the rest of the world. β_2 and β_3 measure the average impact of tariffs. Their values can be interpreted as the average percentage change in imported values relative to the value of similar goods that are not subject to tariffs. $SectorFixedEffects_i$ is a constant parameter at the HS 4-digit reflecting sectors. The inclusion of this variable restricts the estimation to within sectors of similar commodities. c is a constant measuring changes in import values of commodities not subject to tariffs.

This equation is separately estimated for six quarters between January 2018 and June 2019. The trade data was aggregated at the quarterly level because overall trends were difficult to discern given the noise and fluctuations in the monthly data.

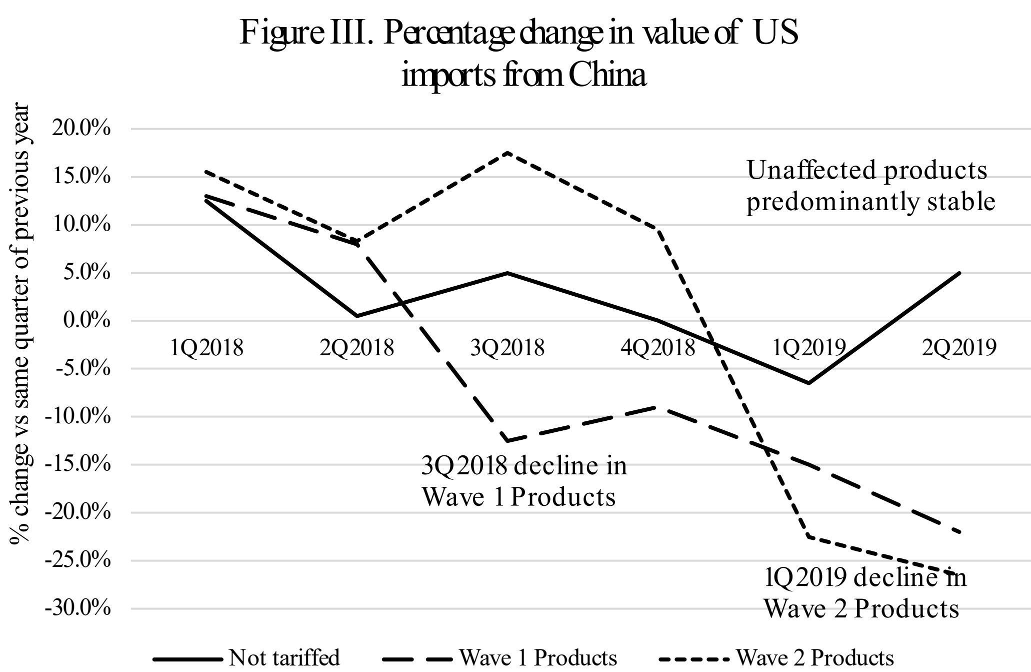
Secondly, to address the question of trade diversion and specific sector impacts, data from eight US trading partners was analyzed, including the EU, Mexico, Canada, and Japan, among others. Although US imports are not limited to these eight regions, countries in South America, Africa, and Oceania were excluded from this portion of the paper because they contribute less to the trade of affected commodities. Additionally, only data relating to the 1097 affected commodities was used.

When looking at impacts across sectors, the 1097 commodities at the HS 8-digit level were grouped into 14 sectors at the 4-digit level. These sectors include vehicles, industrial machinery, and electronic components, among others. The naming of these 14 sectors was deduced from descriptions provided by the US Census Bureau, and are generally accurate given that a sector can have hundreds of commodities that are difficult to group into one sector. Once grouped by sector and country of origin, the data was analyzed to identify where trade has been diverted and which industries experienced the most significant change.

Results & Discussion

Initial Observations

Before formally analyzing the effects of two waves of tariff it is helpful to understand and contextualize the trade impact with high-level data. In 2018, US imports from and exports to China totaled an estimated $534 billion and $120 billion, respectively. By 2019, both figures had fallen more than 10% to $449 billion and $107 billion (US Trade, 2020). When comparing the import values of affected commodities with unaffected commodities, a similar trend is observed. Below, *Figure III* compares the import values of commodities subject to Wave 1 and 2 tariffs with those that are unaffected.



Wave 1 products, targeted on July 6th, 2018, experienced a significant decline in imports in the third quarter of 2018 and through to 2019. Wave 2 products, targeted on August 8th, 2018, unexpectedly experienced an increase for the second half of 2018. This may have occurred due to frontloading, where importers increased their purchases in anticipation of further import restrictions. At the time, the US government's stance towards trade suggested that future tariffs on China were likely. Moreover, the US had begun targeting many of its major trading partners, further incentivizing US importers to frontload and stockpile purchases.

Impact of Import Tariffs on Imports from China

In *Table 1*, the paper found evidence of a decline in US imports from China estimated using a series of cross-sectional regressions. β_2 and β_3 can be interpreted as the percentage changes in import values compared to that of similar goods not subject to tariffs.

Table 1. US Tariffs on China Import Values

	1Q2018	2Q2018	3Q2018	4Q2018	1Q2019	2Q2019
%Δ in import values from ROW (β_1)	-0.00049	-0.00506**	-0.00188	0.00998	-0.00162	-0.00117
Wave 1 tariffs (β_2)	0.0210	0.0499	**-0.219*** **	**-0.393*** **	**-0.375*** **	**-0.492*** **
Wave 2 tariffs (β_3)	0.0055	0.0620**	0.0170	-0.0338	**-0.204*** **	**-0.294*** **
Constant	-0.00101	**-0.0874*** **	**0.0585*** **	0.0397*	-0.0256	**0.0426** **
R-squared	0.225	0.220	0.216	0.260	0.254	0.275

Note: *** p<0.01, ** p<0.05, * p<0.1

The results indicate that Wave 1 tariffs significantly affected imports by 3Q2018, the same quarter that tariffs were implemented. Because the constant in this regression measures the change in import values of goods not subject to tariffs, to accurately estimate the percentage impact of Wave 1, we add β_2 and c for all quarters. Thus, commodities targeted by Wave 1 decreased by approximately 16% in 3Q2018 and the contraction worsened to approximately 45% by 2Q2019.

Commodities targeted by Wave 2 did not experience a decline in imports for all of 2018. Rather, the first two quarters of 2019 both experienced a contraction between 20-25%. These results portray a similar trend as described in *Figure III*, however, there is no evidence of frontloading. While β_3 remained relatively flat in 3Q2018 and 4Q2018, this still provides evidence that commodities targeted by Wave 2 did not experience an immediate decline in imports. While the results relating to Wave 1 imply an immediate response from US importers, the same is not observed with Wave 2. Therefore, whether importers had frontloaded in 3Q2018 or were simply unable to shift trade elsewhere for the remainder of 2018 is still inconclusive. Note that β_1 did not fluctuate in the periods before the tariffs were implemented, further suggesting that Wave 1 and Wave 2 tariffs were the cause of these trade reductions.

Impact of Import Tariffs on Chinese Export Prices

In *Table 2*, the paper found evidence of a delayed reduction in export prices from China in 2Q2019. Using the above regression model, with the variable of interest changed to export prices, β_2 and β_3 can be interpreted as the percentage changes in export prices compared to that of similar goods not subject to tariffs. In this analysis, a decline in prices suggests that Chinese exporters are bearing the cost of the US tariffs by lowering their prices.

Table 2: US Tariffs on China Export Prices

	1Q2018	2Q2018	3Q2018	4Q2018	1Q2019	2Q2019
%Δ in import prices from ROW (β_1)	0.0689*	0.0180	0.110*	**0.178*****	**0.163*****	**0.105*****
Wave 1 tariffs (β_2)	0.00780	0.0472	0.0360	0.0215	0.00774	**-0.0724****
Wave 2 tariffs (β_3)	0.0310	0.0120	-0.0213	-0.0167	-0.0470	**-0.0879****
Constant	-0.0139	-0.0161	-0.0145	-0.0345	-0.0322	-0.00156
R-squared	0.272	0.231	0.284	0.285	0.277	0.284

Note: *** p<0.01, ** p<0.05, * p<0.1

The results indicate that while both Wave 1 and Wave 2 were implemented early in 3Q2018, export prices from China did not decline for nearly a year. In 2Q2019, export prices fell by approximately 7% and 9% for Wave 1 and Wave 2, respectively. This indicates that the tariff burden eventually fell on Chinese exporters, albeit almost a year later. This finding is in line with the results in *Table 1*, because a reduction in demand due to a tariff should eventually force prices downwards. A possible explanation for the delayed response is that import contracts signed months before have agreed upon prices that cannot be adjusted. As such, prices only approach equilibrium once these outstanding agreements have concluded.

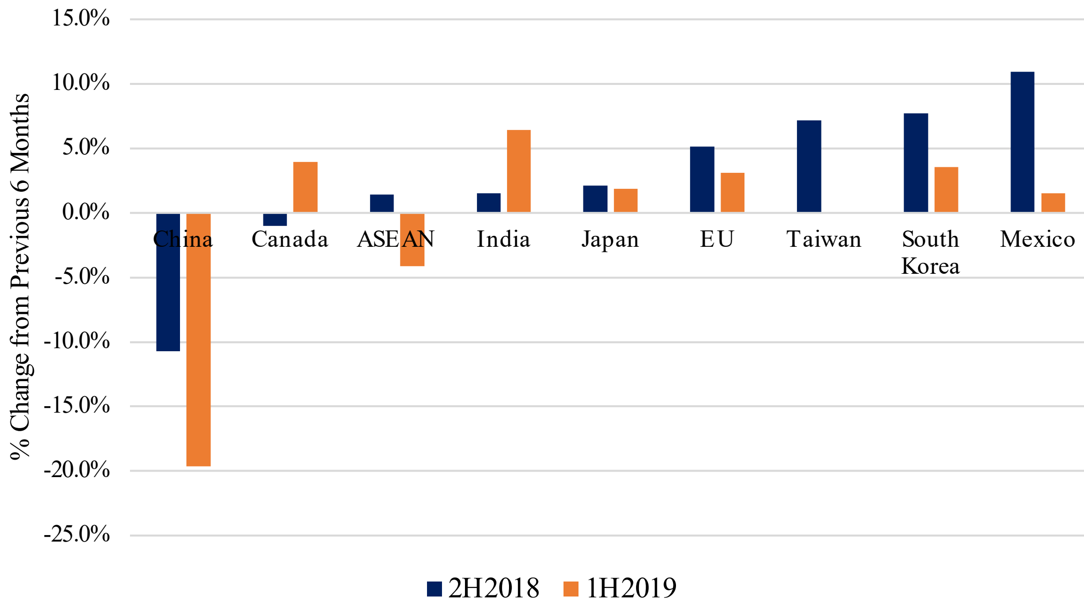
Thus far, the paper finds conclusive evidence that tariffs have reduced imports of targeted commodities and eventually a decline in export prices for Chinese companies. Whether other countries have substituted for China in exporting products from various industries is a question explored below.

Trade Diversion Effects

With US prices of import from the rest of the world rising, the most likely explanation is that demand for the same products from other countries is increasing. The top six largest trading partners of the US as of June 2018 in descending order are: China, EU, Mexico, Canada, Japan, and South Korea, collectively contributing approximately 75% of all US imports. It is likely that any increases of US imports from other countries due to tariffs on China will predominantly come from these other five regions. This section analyzes which regions and sectors have benefitted most from Wave 1 and 2.

Figure IV presents the percentage change in imports of commodities targeted by the tariffs. The regions included have experienced the most significant changes in trade, while other countries in South America and Africa have experienced marginal changes and have been excluded.

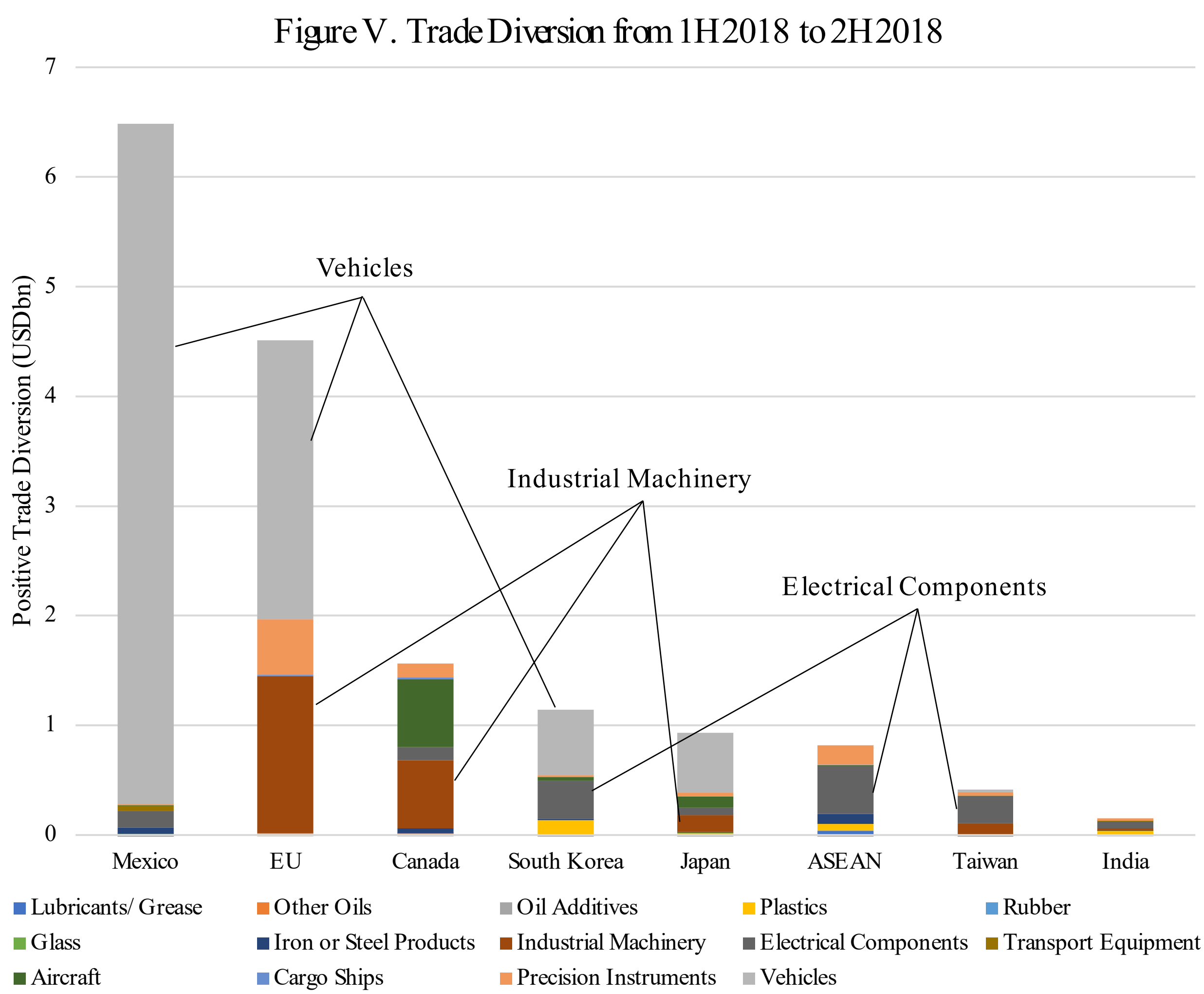
Figure IV. Trade Diversion by Geography



While imports of targeted commodities from China have fallen significantly, almost all major trading partners experienced a surge in exports to the US for both time periods. Four countries increased exports to the US by more than five percent, especially in sectors where they had already dominated global supply chains. Importantly, average trade increases in 2H2018 were larger than that of 1H2019, suggesting that US importers were quick to establish new contracts with alternative countries. Within six months of tariffs' imposition, US imports from Taiwan, South Korea, and Mexico had increased by 7%, 8%, and 11%, respectively. At the same time, the contraction in imports from China is more pronounced in 1H2019, in line with the results of our prior estimation. All evidence points to a decline in trade in 2018 primarily caused by Wave 1 and significant contraction in the first half of 2019 due to Wave 2. To understand how trade was diverted to other countries in more detail, it is useful to segment the data by sector to visualize which industries have been most affected.

Trade Diversion Effects by Sector

Figure V presents trade diversion statistics by sector, with the same major trading partners. Values reflect the difference in import values from the first half and second half of 2018 and are presented in billions of USD.



Mexico's exports to the US increased by 11% in 2H2018 due to strong economic ties, close proximity, and relatively tame trade disputes. Increased vehicle exports contributed by far the largest proportion of this change, as Wave 1 tariffs specifically targeted transportation goods from China. The specific groupings of commodities that experienced a surge in imports from Mexico are passenger vehicles and commercial motor vehicles.

The EU experienced the second highest increase in trade, primarily due to vehicle and industrial machinery exports, as well as precision instruments. As the US's second largest trading partner, the EU plays a global role in the capital-intensive manufacturing of highly technical equipment. Industrial machinery includes turbojets, aircraft turbines, and bottling equipment, and precision instruments includes Xray, medical, and temperature control equipment.

As one of the US's closest allies, Canada is vitally important to the US economy across all sectors. Tariffs on China saw slight benefits for Canada, especially in aircraft and industrial machinery exports to the US. With respect to specific groupings of commodities, like the EU, Canada increased exports of technical equipment including turbojets, boring and oil machinery, air pumps, and military and non-military aircraft.

The remaining five trading regions are all based in Asia and are situated close to China. Due to significantly lower labor costs in these regions, these economies have a comparative advantage in producing labor-intensive, technical products, such as precision instruments, electrical components, and vehicle parts.

For South Korea and Japan, both countries increased their exports of electrical components and vehicles to the US. Due to operating efficiency and robust infrastructure, there are many notable brands, such as Toyota, Honda, and Hyundai, manufacturing automobiles out of factories in East Asia. As these brands are pervasive in North America already, car imports from Japan and South Korea likely increased quickly in response to tariffs on China. South Korea also experienced a surge in electrical component exports, specifically processors and controllers used in integrated circuits. Samsung, one of the world's largest electronics companies based in Korea, is the biggest beneficiary of the shift in trade for the electronic components sector.

For the Association of Southeast Asian Nations ("ASEAN"), Taiwan, and India, increased exports of electrical components dominated the commodities that surged in trade. These regions benefit from even lower labor costs and are beginning to replace China as key manufacturers of various electronics. South East Asia is growing substantially due to increased flows of goods from Vietnam, a country with similar economic characteristics to China. Vietnam has increased their exports of communication equipment and electronic goods, particularly mobile phones and computers, as many Asian companies have shifted their factories out of China to the country.

By far the smallest economy of those analyzed, Taiwan is a notable case due to its close economic ties to China. Many Taiwanese firms with manufacturing facilities in both China and Taiwan are beginning to shift production back to their home country to avoid the US tariff rates, according to the local Ministry of Economic Affairs (CRS, 2019). Taiwan Semiconductor Manufacturing Co is the world's largest microchip manufacturer by far and has likely shifted production to its home country, leading to an increase in exports of electrical components and industrial machinery to the US depicted in *Figure V*. The specific commodities experiencing the most significant increase are amplifiers, motorcycles, semiconductors, and thermostats.

Conclusions

Overall, this paper has found a significant reduction of imports from 20% to 45% in the year following the implementation of two tariffs on China. While numerous studies have indicated that US businesses initially took the full incidence of these tariffs, Chinese exporters had lowered their prices by nearly 10% by mid-2019. As a result of these bilateral disruptions, US businesses shifted a portion of their imports to other major trading partners, such as the EU, Canada, Mexico, Japan, South Korea, and Taiwan. As a result, imports of these targeted commodities from these trading partners had increased by approximately 5% over the course of the year. While positive trade diversion effects were experienced across many targeted industries, the trade of vehicles, industrial machinery, and electrical components were most impacted, with billions of trade diverted away from China. Future studies should analyze the aggregate effects of the numerous protectionist policies imposed from 2018 to 2020. There are undoubtedly broader effects not explored in this paper, such as the impact on the stock and commodity derivative markets. Lastly, the trade war has incentivized businesses to traffic their exports through different countries to avoid tariffs at the US border. While this paper’s simplified analysis of trade diversions does not take this into account, it is worthwhile to investigate whether this phenomenon is having any material impact.

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