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ABSTRACT

This paper analyzes the short-run trade effects of retaliatory tariffs against agriculture and food exports from the United States. The results indicate that these tariffs caused a substantial decline in U.S. agriculture and food exports and induced a reorientation of international trade patterns. We find that losses in foreign trade with retaliatory countries outweigh the gains from trade with non-retaliatory countries by more than USD 14.4 billion. Our results also indicate that non-retaliatory countries accommodated the increased demand from retaliatory countries by reorienting their trade relationships. We find that countries in South America and Europe benefited the most from these adjustments gaining more than USD 13.5 billion in additional foreign sales. The effects of retaliatory tariff increases across products vary substantially, with soybeans and meat products experiencing the most considerable redistribution effects.

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1 Introduction

The era of trade liberalization came to an abrupt end in 2018 when the United States government decided to enact several waves of tariff increases against its foreign trading partners. In response to these tariff changes, several trading partners imposed retaliatory tariffs against products imported from the United States. These counter measures increased the average tariff level from 7.5 percent to 23.5 percent for 6,341 products covering about USD 124 billion (14.4 percent) of their pre-tariff level of trade with the United States. The agricultural and food industry was more affected by these policy changes than any other sector of the economy. Average foreign tariffs on U.S. agricultural and food products increased from 8.3 percent to 28.6 percent. These tariff increases targeted 908 products and affected more than USD 32 billion (37.1 percent) of agricultural and food imports from the United States. The return to protection is unprecedented in recent history due to the number of countries and products involved as well as the magnitude of tariff increases. Despite the relevance of these trade policy changes, little is known about the full impact of retaliatory tariffs on agricultural and food trade.

The growing literature on the 2018 Trade War shows that retaliatory tariff increases had substantial consequences for international trade. According to Fajgelbaum et al. (2019), the United States reduced its imports of targeted products by 2.5 percent and its exports by more than 9.9 percent. The magnitude of these effects depends on the size of the retaliatory tariff. Amiti, Redding and Weinstein (2019) find that a ten percentage point foreign tariff increase is associated with a 32 percent trade decrease. While the export quantities decrease substantially due to retaliatory tariffs, export prices show an increase of only one percentage point (Fajgelbaum et al., 2019). The tariff increases depress U.S. exports of targeted and related products and, thereby, inhibit the ability of U.S. producers to compete in international markets (Waugh, 2019). The trade war also affects trade with non-retaliatory countries. Jiang et al. (2019) find that trade between the European Union (EU) and China benefited substantially from the trade war between the United States and China. This increase in Chinese trade with the EU comes at the expense of higher import prices and a damaged domestic economy (Li, He and Lin, 2018). According to Xia et al. (2019), the trade war causes severe market failures in the Chinese economy and losses that outweigh the potential benefits by far. Flaaen, Hortacsu and Tintelnot (2019) show that tariff increases can induce a substantial reallocation of trade

and production. The effects of trade policy changes are likely non-linear with higher tariffs leading to more significant trade and production redistribution effects (Baqaee and Farhi, 2019). Particularly the trade redistribution effects of retaliatory tariffs remain poorly understood. The tariff increases have substantial distributional consequences across products and, therefore, also between countries with different patterns of comparative advantage and specialization (Fajgelbaum et al., 2019).

The effects of tariff increases translate to substantial effects on welfare and employment in the United States. According to Amiti, Redding and Weinstein (2019), the 2018 tariffs imposed by the United States against its foreign trading partners resulted in a reduction of real income by USD 1.4 billion per month. The incidence of these tariff increases fell entirely on domestic consumers, and the price increases were almost fully passed through to total prices paid by importers (Cavallo et al., 2019). Fajgelbaum et al. (2019) show that import prices of products targeted by tariffs did not fall, resulting in welfare losses of more than USD 51 billion per year. Along these lines, Waugh (2019) finds significant effects of retaliatory tariffs on domestic consumption. These consumption effects translate into a significant decrease in employment growth in the manufacturing industry (Li, Wang and Whalley, 2019). According to Fajgelbaum et al. (2019), counties that are dominated by agricultural production are more affected by retaliatory tariffs than other counties, facing a significant reduction in real income. Although there is a growing consensus regarding the impact of retaliatory tariffs on consumption and production in the United States, little is known about how these policy changes affected the competitiveness of companies operating in international markets.

In this paper, we quantify the impact of tariff increases on foreign trade with retaliatory and other countries. We estimate export supply curves for the United States and non-retaliatory countries that account for the reallocation of exported *varieties* between markets. We develop an oligopolistic trade model to illustrate the trade effects of retaliatory tariffs. The model predicts a reduction in trade of targeted agricultural and food products with retaliatory countries (*trade destruction* effect) and an increase in trade with other countries (*trade deflection* effect). The theoretical model also allows us to investigate the impact on foreign trade of non-retaliatory countries. We expect exports from non-retaliatory to retaliatory countries to increase (*trade diversion* effect) and trade with the United States to fall (*trade depression* effect). To measure the impact of tariff increases, we exploit product-level variation (defined as 10-digit Harmonized System (HS) product codes) in export supply and

rely on tariff changes as the identifying source of variation. Tests for pre-existing trends and tariff anticipation confirm the validity of this identification strategy. Since tariff increases are uncorrelated with demand and supply shocks, we can use them to instrument for the foreign export supply curves. This approach allows us to measure the partial redistribution effects of retaliatory tariffs.

Our reduced-form regression results indicate large and statistically significant trade effects of retaliatory tariff increases for the United States and non-retaliatory countries. The identification is robust to pre-existing trends and anticipatory effects and reveals substantial heterogeneity between products and trading partners. We find that the United States lost more than USD 15.6 billion in trade with retaliatory countries. Soybeans, pork products, and coarse grains recorded the most substantial *trade destruction* effects. These losses are only partially compensated by additional exports to non-retaliatory countries. At the same time, non-retaliatory countries were able to considerably expand their trade with retaliatory countries. The analysis shows that these countries gained USD 13.5 billion in additional trade with retaliatory countries. The *trade diversion* effects are dominated by increasing exports of soybeans and pork products. The primary beneficiaries of retaliatory tariff increases are countries from South America such as Argentina, Brazil, and Chile. Retaliatory countries also increased their imports from Eastern Europe and the EU. These results indicate that the 2018 trade war had substantial redistribution effects for global agricultural and food trade.

The remainder of this paper is organized as follows. Section 2 describes the theoretical model used to motivate the redistribution effects of retaliatory tariffs. Section 3 summarizes the data used for the analysis, provides a timeline of key events, and presents descriptive evidence for the trade effects. Section 4 discusses empirical methods. Section 5 presents regression results, introduces several robustness checks, and details the results of the comparative statistics analysis. Section 5 concludes the paper.

2 Theoretical Model

We rely on an oligopolistic trade model to illustrate the impact of retaliatory tariffs on agricultural and food trade. The choice of this theoretical framework is driven by the market characteristics (Bown and Crowley, 2007). Our model builds on the assumption that the exporting firm exerts market power in the import market. Although agricultural markets are usually perfectly competitive

at the producer level due to a large number of price-taking primary producers, the issue of market power is still relevant because of the characteristics of the food supply chain. Notably, market concentration beyond the farm gate is typically substantial (Howard, 2016). In particular, agricultural and food trade is increasingly dominated by a few large trading companies and food processors. These characteristics of the food supply chain make the oligopolistic competition setting a suitable environment to study the impact of retaliatory tariffs on agricultural and food trade.

Assume there are three countries indexed $i \in \{A, B, C\}$. In each country, one firm, also indexed as i, produces one good. Suppose for simplification that firm A is only serving its domestic market. The quantity that is produced for domestic consumption is denoted q_i, while exports are denoted q_{ij}, where i indicates the country of origin and j the country in which the good is consumed. Consumers in the importing country consider the domestically produced good and the imported good as strategic substitutes, i.e., they derive the same utility from the consumption of either good. We denote total market supply in the home market as $Q_i = \sum_j q_{ji} + q_i$ and the supply in the foreign market as $Q_j = \sum_i q_{ij} + q_j$, while total output in each country is therefore given by $q_i^* = q_{ij} + q_i$. Each firm regards its domestic market and the foreign market as separated, implying that the quantity in each market is allocated independently and firms are subject to Cournot perception.[1]

The same technology is used by each competitor and firms face an inverse demand function denoted as $p(Q_i, Y_i)$, where Y_i is a set of demand shifters such income. Production cost in i is represented by a cost function $c(q_i^*, W_i)$, where W_i is a set of cost factors that occur with q_i^*. We assume that marginal costs are strictly convex in q_i^* with $c'(q_i^*, W_i) > 0$ and $c''(q_i^*, W_i) > 0$ which reflects increasing marginal cost. Now, suppose that there are no other trade costs between i and j than a retaliatory tariff τ, where τ_{ji} denotes an ad-valorem tariff that j levied against i. We assume also for simplicity that the burden of the retaliatory tariff falls entirely on the exporter. Thus, the profit function can be expressed in its general form as follows:

$$\Pi_i = \overbrace{\underbrace{p(Q_i, Y_i)q_i}_{\text{in Home}} + \underbrace{p(Q_j, Y_j)q_{ij}}_{\text{in Foreign}}}^{\text{Sales}} - \overbrace{\underbrace{\tau_{ji}q_{ij}}_{\text{Tariff}} - \underbrace{c(q_i^*, W_i)}_{\text{Production}}}^{\text{Costs}}, \tag{1}$$

[1] Cournot perception implies that the other firms will hold output fixed. We assume a Cournot-Nash equilibrium instead of a Bertrand-Nash equilibrium because agents regard the domestic and the foreign good as strategic substitutes. This implies that firms compete in quantities and not in prices.

where sales are determined by sales at home and in the foreign country and costs are a function of the retailiatory tariff and the production cost. Every firm's objective is to maximize its profits by choosing the quantity of sales in each market such that

$$\max \Pi_i = p(Q_i, Y_i)q_i + p(Q_j, Y_j)q_{ij} - \tau_{ji}q_{ij} - c(q_i^*, W_i). \tag{2}$$

Suppose now that country A imposes an ad-valorem tariff against country B, then the first order conditions for home markets are given by:

$$\frac{\partial \Pi_A}{\partial q_A} = p(Q_A, Y_A) + p'(Q_A, Y_A)q_A - c'(q_A^*, W_A) \equiv 0 \tag{3a}$$
$$\frac{\partial \Pi_B}{\partial q_B} = p(Q_B, Y_B) + p'(Q_B, Y_B)q_B - c'(q_B^*, W_B) \equiv 0 \tag{3b}$$
$$\frac{\partial \Pi_C}{\partial q_C} = p(Q_C, Y_C) + p'(Q_C, Y_C)q_C - c'(q_C^*, W_C) \equiv 0 \tag{3c}$$

and the first order conditions for the profit maximizing quantity of exports for firms B and C are:

$$\frac{\partial \Pi_B}{\partial q_{BA}} = p(Q_A, Y_A) + p'(Q_A, Y_A)q_{BA} - \tau_{AB} - c'(q_B^*, W_B) \equiv 0 \tag{4a}$$
$$\frac{\partial \Pi_B}{\partial q_{BC}} = p(Q_A, Y_A) + p'(Q_A, Y_A)q_{BC} - c'(q_B^*, W_B) \equiv 0 \tag{4b}$$
$$\frac{\partial \Pi_C}{\partial q_{CA}} = p(Q_A, Y_A) + p'(Q_A, Y_A)q_{CA} - c'(q_C^*, W_C) \equiv 0 \tag{4c}$$
$$\frac{\partial \Pi_C}{\partial q_{CB}} = p(Q_A, Y_A) + p'(Q_A, Y_A)q_{CB} - c'(q_C^*, W_C) \equiv 0 \tag{4d}$$

The solution to the first order conditions yields each firm's best reaction (or response) function with respect to the sales decisions of the other firms, which can be expressed in the general form for the home market as:

$$q_i = R_i[p(Q_i, Y_i), c(q_i^*, W_i)], \tag{5}$$

and i's best reaction function for the foreign market is given by:

$$q_{ij} = R_{ij}[p(Q_j, Y_j), \tau_{ji}, c(q_i^*, W_i)]. \tag{6}$$

Solving the seven best reaction functions simultaneously yields the Cournot-Nash equilibrium quan-

tities which are sold by each firm in each market. Because marginal costs are strictly convex in q_i^*, the exporting firms B and C will choose to allocate total sales between their home market and the foreign market so that the net marginal revenue, which is defined as marginal revenue less the tariff cost, is the same in the home and the foreign market. This is a crucial assumption because it forces firms to reallocate their sales across markets when a retaliatory tariff is imposed.

The theoretical model allows us to state four propositions regarding the potential effects of retaliatory tariff actions:

– First, a retaliatory tariff levied by country A against exports from country B causes a decline in firm B's exports to country A which is know as the *trade destruction* effect.

– Second, a retaliatory tariff imposed by country A against exports from country B will cause an increase in firm B's exports to country C which is called the *trade deflection* effect.

– Third, a retaliatory tariff imposed by country A against exports from country B will cause an increase in firm C's exports to country A which is called the *trade diversion* effect.

– Fourth, a retaliatory tariff imposed by country A against exports from country B will cause a decrease in firm C's exports to country B which is called the *trade depression* effect.

Figure 1 illustrates the trade effects of the retaliatory tariffs. The left panel shows the effects on foreign sales in country A and the right panel the effects on trade between countries B and C. The reaction function R_{ij} represent a firm's best response to a decision of the other firm. The Cournot-Nash equilibrium for trade with country A is $(q_{BA}^*; q_{CA}^*)$ and for trade between country B and country C is $(q_{CB}^*; q_{BC}^*)$. Once country A imposes a retaliatory tariff against country B, sales of firm B in country A decrease to q_{BA}^τ. This effect is called the *trade destruction* effect. The introduction of a retaliatory tariff by country A against country B will move the Cournot-Nash equilibrium for firm C in market A from q_{CA}^* to q_{CA}^τ. This effect is called the *trade diversion* effect. Moreover, a retaliatory tariff will also affect trade between country B and C. Sales of firm B in market C will increase from q_{BC}^* to q_{BC}^τ (*trade deflection* effect) and will fall from q_{CB}^* to q_{CB}^τ (*trade depression* effect) for firm C in market B.

3 Data and Timeline

This summary describes the data and provides a timeline of key events. We also present descriptive evidence regarding the trade effects of retaliatory tariffs imposed against agricultural and food products.

3.1 Tariff and Trade Data

We compile a monthly panel dataset of retaliatory tariffs on U.S. exports from official documents published by the finance and trade ministries of Canada, China, the EU, India, Mexico, Russia, and Turkey. These tariffs were entirely *ad valorem* and went into effect shortly after their announcement.[2] We compute the retaliatory tariff increase by summing the effectively applied tariff and the announced tariff change for each country pair at the tariff-line level. We use Most Favored Nation (MFN) tariff rate data from the Consolidated Tariff Schedules (CTS) database (World Trade Organization, 2020). All export tariffs are either measured at the HS-8 level or at the HS-10 level.[3] The policy dataset is matched to tariff-line level export data for 101 countries from the Global Trade Atlas (IHS Markit, 2020). This database provides monthly import and export flow data for the period from January 2017 to October 2019. The database covers approximately 95 percent of all global trade and provides monthly information on the value and quantify of imports and exports.

3.2 Timeline

Table 1 provides the timeline of key events. The 2018 trade war comprises nine retaliatory tariff actions against the United States announced between April 6, 2018, and September 24, 2018. Eight of these tariff increases targeted agricultural and food products. The majority of tariff increases were imposed by China, implementing four waves of tariff increases in 2018. Retaliatory countries levied tariffs on 908 agricultural and food products worth more than USD 31.8 billion of imports from the United States in 2017. Retaliatory tariffs disproportionally affected agricultural and food products.

[2] We assign the retaliatory tariff increase to the month when the policy change was announced. Since the tariff data are assigned to monthly trade data, we scale the tariff changes by the number of days the policy change was in effect (Fajgelbaum et al., 2019).

[3] The tariff-line level HS codes vary at the country level. While countries use the same classification system to define trade products at the HS-6 level, there are substantial differences in the HS coding at the more disaggregated level. For instance, while the United States sets its tariffs mostly at the 8-digit HS level, Turkey assigned its retaliatory tariffs at the 6-digit level. We account for this issue by using matching algorithms based on both exact and fuzzy matching methods that identify HS-8 and HS-10 tariff-line products of all exporting countries. Appendix (A) provides further details on data sources and Appendix (B) describes the matching procedure in more detail.

The share of targeted agricultural and food imports was 37.1 percent. At the same time, it was only 11.9 percent for all other products.[4] Tariff increases for agricultural and food products are steeper than for other products, with the average *ad valorem* tariff increasing from 8.3 to 28.6 percent. The largest tariff increases were implemented by China, which imposed tariffs on more than USD 25.5 billion (80.1 percent) of U.S. agricultural and food imports in 2017.

3.3 Descriptive Evidence

Table 2 summarizes changes in the value of exports for the United States and non-retaliatory countries before and after the retaliatory tariff increases. Panel (A) shows export trade flows of the United States and Panel (B) export trade flows of countries not involved in the trade war. The export value before and after the announcement of retaliatory tariff increases is calculated based on a twelve-month window. Panel (A) shows evidence of substantial *trade destruction*. Agricultural and food exports from the United States to retaliatory countries decreased in response to the tariff increases by USD 11.6 billion. There is also evidence of significant *trade deflection* effect sas U.S. agricultural and food exports to non-retaliatory countries increased by USD 5.1 billion after the tariff changes. Similarly, Panel (B) shows evidence of *trade diversion* effects. Agricultural and food exports of non-retaliatory countries to retaliatory countries increased in response to tariff increases by USD 3.5 billion. There is also strong evidence of *trade depression* as non-retaliatory countries exports to other non-retaliatory countries decreased by 37.2 billion.[5]

Table 3 provides summary statistics of targeted *varieties* for the United States and non-retaliatory countries. The table also shows the mean and standard deviation of tariff increases at the product level. The data indicate substantial variation in treated *varieties* for the United States and non-retaliatory countries. While the average *ad valorem* tariff increase amounts to 16.9 percent, there is substantial variation between products. Distilled spirits report the largest increase in tariff rates

[4] Table A.1 in Appendix (C) provides a comparison with products that are not related to agriculture and food production.

[5] Table A.2 in Appendix (C) compares the export trade flows of the United States and non-retaliatory countries for products not related to agriculture and food production. The data provide clear evidence of *trade destruction* and *trade deflection* effects in Panel (A). U.S. exports to retaliatory countries dropped by USD 21.0 billion and increased by USD 5.0 billion for non-retaliatory countries. Panel (B) provides evidence of a substantial *trade depression* effect but provides no clear evidence of a significant *trade diversion* effect. The summary statistics show that exports of non-retaliatory countries to retaliatory countries decreased by USD 39.9 billion and also decreased by USD 299.9 billion for exports to other non-retaliatory countries. These results imply that the trade effects of retaliatory tariff increases are more pronounced for agricultural and food products.

(40.0 percent) and planting seeds the lowest increase (0.3 percent). The significant variability in treated *varieties* and retaliatory tariff increases provides a valid source of variation for identifying trade effects associated with the 2018 trade war.

4 Empirical Methods

4.1 Event Study

We use an event-study framework to illustrate the impact of retaliatory tariff increases on agricultural and food trade. The event study allows us to measure the contemporaneous effects of tariff increases on targeted *varieties*, identify pre-trends and explore dynamic effects (MacKinlay, 1997). To assess the impact of retaliatory tariff increases on export trade of the United States and non-retaliatory countries, we exploit differences in export quantities, values, and unit values between targeted and non-targeted *varieties* over time with the following specification:

$$y_{ijgt} = \exp\Bigg(\alpha_{ij} + \alpha_{ig} + \alpha_{it} + \alpha_{jg} + \alpha_{jt} + \alpha_{gt} + \sum_{k=-12}^{12} \big(\beta_k R_l + \gamma_k R_m\big) \times \mathbf{1}\big\{K_t = k\big\} \times T_g\Bigg)\, \eta_{ijgt}. \quad (7)$$

The exponential regression model includes exporter-by-importer (α_{ij}), exporter-by-product (α_{ig}), exporter-by-time (α_{it}), importer-by-product (α_{jg}), importer-by-time (α_{jt}), and product-by-time (α_{gt}) fixed effects. The specification measures the impact on trade with retaliatory countries (R_l) and non-retaliatory countries (R_m). The inclusion of fixed effects implies that the coefficients of interest (β_k and γ_k) are identified by exploiting variation between targeted and non-targeted *varieties* (T_g) over time. The event time coefficients are captured by the indicator variables. We assign the event date of targeted *varieties* to be the nearest full month by using the 15th of the month as the cutoff date. Since we observe eight waves of retaliatory tariff increases for agricultural and food products in 2018, we construct for each tariff increase an event window of twelve-months around the announcement month. To estimate the *trade destruction* and *trade deflection* effects of retaliatory tariff increases, we use U.S. export data and assign tariff increases at the ten-digit HS code level. For the identification of the *trade diversion* and *trade depression* effects, we use export data for 104 non-retaliatory countries and assign tariff increases at the tariff-line level. This assignment depends on the classification system used by the exporting country. Because trade data is either available at the eight-digit or ten-digit HS code level, we cluster standard errors at the tariff-line and country-pair level.

4.2 Reduced-Form Analysis

To measure differences in the impact of retaliatory tariff increases on foreign trade of the United States and non-retaliatory countries according to the *ad valorem* tariff level, we adopt the following regression specification:

$$y_{ijgt} = \exp\big(\alpha_{ij} + \alpha_{ig} + \alpha_{it} + \alpha_{jg} + \alpha_{jt} + \alpha_{gt} + \log(1+\tau_{ijgt}) \times (\beta\, R_{lt} + \gamma\, R_{mt}) \times T_g\big)\, \eta_{ijgt}. \qquad (8)$$

This exponential model controls for the same fixed effects as the event study and relies on variation between targeted and non-targeted *varieties* (T_g) and between retaliatory (R_{lt}) and non-retaliatory countries (R_{mt}) over time to identify the coefficients of interest (β and γ). These coefficients measure the *trade destruction* and *trade deflection* effects of retaliatory tariff increases with the U.S. export panel and the *trade diversion* and *trade depression* effects with the export panel of non-retaliatory countries. In this specification, we assign the event date of the targeted *varieties* according to the month when the tariff increase was announced. We scale retaliatory tariff increases in the announcement month according to the number of days in the month when the policy came in effect. Standard errors are clustered at the tariff-line level and at the country-pair level. The specification measures the response to tariff increases and allows us to quantify the contemporaneous trade effects of the 2018 trade war. We also use this specification to explore differences in the trade effects of retaliatory tariff increases according to product categories and the economic development stage of trading partners. To identify the parameter of interest in all regression models, we rely on the Poisson pseudo-maximum likelihood (PPML) estimator (Gong and Samaniego, 1981). This estimator allows us to incorporate zero trade flows in our regressions and, thereby, improve the precision of our coefficient estimates (Silva and Tenreyro, 2006). Because the estimation involves a large number of high-dimensional fixed effects, we account for them by using a modified version of the iteratively re-weighted least-squares (IRLS) algorithm that is robust to statistical separation and convergence issues (Correia, Guimarães and Zylkin, 2019*a*,*b*).

5 Results

5.1 Event Study

Figure 2 illustrates the results of the event study of the impact of retaliatory tariffs on agricultural and food exports from the United States. The coefficient estimates are transformed to percentage changes to allow for comparison between outcomes. The left panel traces the *trade destruction* effects and the right panel the *trade deflection* effects for export quantities, values, and unit values. In response to the retaliatory tariffs, U.S. trade with retaliatory countries dropped substantially. The adverse trade effects peaked five months after the tariff increases and started to recover after that. Unit values initially increased significantly after the tariff increases and began to fall after the first month.[6] U.S. trade with non-retaliatory countries saw a substantial increase after the tariff increases were announced. We find evidence for statistically significant *trade deflection* effects for the quantity and value specifications. These effects increase in the first five months after the trade policy changes and start to fall afterward. The magnitude of the *trade deflection* effects is substantially smaller than the *trade destruction* effects. These results indicate that agricultural and food exporters in the United States were unable to mitigate the adverse trade effects of retaliatory tariffs by expanding sales to other markets. The elasticity of both trade effects is about -0.1, which implies that for every ten percent of trade lost with retaliatory countries, the U.S. gained only one percent in trade with non-retaliatory countries. The adjustment implies that exporters of agricultural and food products mitigated the negative trade effects of retaliatory tariff increases primarily by storing or selling the affected products in the domestic market.

Figure 3 plots the event study estimates for the trade effects of retaliatory tariff increases on non-retaliatory countries. The left panel shows the *trade diversion* effects and the right panel the *trade depression* effects. Non-retaliatory countries recorded a significant increase in their trade with retaliatory countries, providing evidence for substantial *trade diversion* effects. The change in export quantities and values built up slowly and peaked after five months. These findings imply that the adjustment of supply chains for retaliatory countries was not immediate and took non-retaliatory

[6] We find some evidence of anticipation effects in the quantity specification. These effects are largely driven by additional imports of pork meat due to the Chinese new year festivities in February 2018. Our results show no evidence of similar effects for the value and unit value specifications.

exporters by surprise.[7] We find evidence for higher unit values after the announcement of retaliatory tariff increases. Immediately after the imposition of new tariffs, unit values increased by 12.8 percent and fell slowly afterward. The evidence for *trade depression* effects is not as clear. We find that the quantity and value of trade with the United States and other non-retaliatory countries fell immediately after the tariff increases. One month after imposing new retaliatory tariffs on agricultural and food products, the unit values fell by more than five percent, which indicates that non-retaliatory exporters substituted products with a higher unit value between markets.

5.2 Reduced-Form Analysis

Table 4 reports the baseline estimates of trade effects associated with retaliatory tariffs against agricultural and food products. Panel (A) presents the *trade destruction* and *trade deflection* effects and Panel (B) the *trade diversion* and *trade depression* effects. The table compares estimates using the dummy specification with estimates using the tariff specification. All regressions include the full set of fixed effects as specified in Equation 8. Two-way standard errors clustered at the tariff-line level and country-pair level are reported in parenthesis.

The regression results lend strong support for the existence of significant *trade destruction* and *trade deflection* effects in Panel (A). The results for the dummy specification show that export quantities fell by more than 6.0 percent and export values by more than 5.3 percent. Although there is no evidence of a statistically significant impact on unit values, we find substantial evidence for significant *trade deflection* effects. However, the *trade deflection* effect is twenty times smaller then the *trade destruction* effect for the quantity specification. This difference shows that U.S. exporters of agricultural and food products were unable to ramp-up trade with foreign countries. Accordingly, we find an almost complete pass-through of retaliatory tariff increases to the domestic market. The estimates for the tariff specification support this assessment and differ only in the way that we find evidence for a significant effect on unit values. The estimates indicate that *varieties* with a high unit value persisted in the market. The tariff increases caused a significant reduction in exports of *varieties* with low unit values.

[7] We find inconclusive evidence regarding the presence of statistically significant anticipation effects for the *trade diversion* and *trade depression* estimates. Firms in non-retaliatory countries did not pre-emptively contest U.S. exporters of agricultural and food products in foreign markets.

Panel (B) provides evidence of significant *trade diversion* effects for the dummy and tariff specifications. These effects are statistically significant for all three outcomes. We find that exports of targeted *varieties* increased by 2.8 percent for the quantity specification and 1.7 percent for the value specification. We find that unit values for trade with retaliatory countries increased by 3.8 percent. The baseline regression results for Panel (B) do not support the notion of substantial *trade depression* effects as all coefficient estimates are statistically insignificant at the 10 percent confidence level.[8]

5.3 Heterogeneity Analysis

The average trade effects of the retaliatory tariffs presented in Table 4 could mask substantial heterogeneity. To explore this heterogeneity, we interact the treatment variables with product dummies and measures of different sets of trading partners. This analysis will allow us to better understand how the United States and non-retaliatory countries reacted to the retaliatory tariff increases and what role the size of the *ad valorem* tariff played.

We first test differences in the trade effects according to agricultural product categories. We rely on the classification framework used by the Global Agricultural Trade System to obtain four broad product categories (United States Deparment of Agriculture, 2020). This classification system categorizes agricultural and food products according to their final use in agricultural-related products, bulk products, consumer-oriented products, and intermediate products. The regressions include all baseline fixed effects and standard errors that are clustered at the tariff-line and country-pair level. Table 5 presents the estimates of these regressions for the United States and non-retaliatory countries. The results show that the *trade destruction* effects operate primarily through bulk products. The same observation can be made for the *trade diversion* effects. We find that primarily exporters of bulk products and, to a lesser degree, also of consumer-oriented and intermediate products benefited from retaliatory tariffs. The statistical evidence for significant *trade deflection* and *trade depression* effects is weak as most coefficient estimates are statistically insignificant at the 10 percent confidence level. Although most estimates have the expected sign, the limited statistical evidence for a significant relationship allows us to conclude that there is only minimal evidence for such effects.

[8] Table A.3 in Appendix (C) summarizes the estimates for manufacturing products. The results provide strong evidence for significant *trade destruction* and *trade diversion* effects. We find that the coefficient estimates are larger for agricultural and food products. Moreover, the estimates for manufacturing provide limited evidence for significant price effects.

While the estimates for the tariff specification convey a similar picture, the parameter estimates are significantly larger. This difference raises the question of whether non-linearity in the trade effects is of relevance.[9]

We now investigate differences in the trade effects of retaliatory tariff increases at the product level. These regressions rely on the baseline model specification and cluster standard errors at the tariff-line and country-pair level. We focus this analysis on the dummy specification and discuss percentage trade effects. Figure 6 plots the estimates for the value specification and highlights products with the largest trade effects. We sort the estimates according to the value-weighted tariff change (in percent) and represent the average trade effects with dotted horizontal lines. The results presented in Panel (A) indicate that U.S. exports of tobacco and wheat products saw the largest *trade destruction* effects. At the same time, several products recorded positive trade effects in response to retaliatory tariffs. For instance, while we find a negative trade effect on soybeans, there is strong evidence for a positive effect on soybean meal, which faces a significantly lower tariff than soybeans. These results imply substitution between products with low and high tariffs. At the same time, the United States increased its exports of soybeans to other markets (Panel (B)), and non-retaliatory countries reduced their exports of soybean meal to retaliatory countries (Panel (C)). Another insightful pattern relates to coarse grains. The estimates show evidence for a negative *trade destruction* effect and a positive *trade diversion* effect. Non-retaliatory countries reacted to the tariff increases by reducing their exports of coarse grains to other non-retaliatory countries (Panel (D)). This reduction in trade flows provides strong evidence for heterogeneity in the trade effects. The results imply that the 2018 trade war induced significant adjustments of global supply chains that extend far beyond the primary effects on trade between the United States and retaliatory countries.

A further source of heterogeneity relates to the economic development stage of trading partners. To account for these differences, we interact the coefficients of interest with dummy variables for the economic development stage.[10] We report the estimates for these regressions in Table 6. The results indicate that the *trade destruction* effects operate primarily through a reduction in trade with lesser

[9] We find only limited evidence for non-linear trade effects with the baseline regression model. The quadratic terms have a small impact on the estimated trade effects. These regression results are available upon request from the authors.

[10] We proxy the economic development by classifying countries according to their membership in the Organisation for Economic Co-operation and Development (OECD).

developed countries. We find that export quantities fell by more than 9.5 percent and export values by more than 4.8 percent. Similar results can be found for the *trade diversion* effects of retaliatory tariff increases. We find that lesser developed countries increased their exports to retaliatory countries more than developed countries did. These estimates provide evidence for significant country-level differences in the trade effects of retaliatory tariff increases.

5.4 Identification Issues

The statistical identification of the coefficients of interest in Equations (7) and (8) is threatened by two potential sources of endogeneity. The first source relates to the presence of different pre-existing trends in the export data for treated and untreated *varieties* and the second source to the presence of anticipation effects. We use the event study specification to test if targeted and untreated *varieties* have the same trend in the pre-treatment period. This assumption is important because tariff changes must be uncorrelated with import demand and export supply shocks to identify the elasticities. This framework also allows us to evaluate the presence of anticipation effects. The presence of such effects would imply that exporters anticipated the retaliatory tariff increases and changed their purchasing activities forward to avoid paying the tariffs. As indicated in Figures 2 and 3, there is some evidence for the presence of pre-existing trends and anticipatory effects. To obtain additional insights, we apply two formal tests to ensure that the estimated elasticities are not sensitive to concerns regarding the presence of these sources of parameter bias.

As a formal test for the presence of pre-existing trends, we use the following model specification to regress retaliatory tariff increases in 2018 on the quantity, value and unit value of exports of the United States and non-retaliatory countries in 2017:

$$y_{ijg} = \exp(\lambda \, \log(1 + \tau_{ijg}) + \alpha_{ij} + \alpha_{ig} + \alpha_{js}) \, \eta_{ijg}. \tag{9}$$

The exponential regression model includes exporter-by-importer (α_{ij}), exporter-by-product (α_{ig}), and importer-by-sector (α_{it}) fixed effects. Standard errors are clustered at the country-pair and tariff-line level. An insignificant coefficient of interest (λ) indicates that retaliatory tariff increases are not correlated with import demand and export supply shocks. The estimation results are summarized

in Table 7. For both panels, we find no evidence for significant coefficient estimates for λ in all regression specifications. Therefore, we can conclude that the elasticity estimates are not biased by the presence of pre-existing trends in the trade data.

We formally test for the presence of anticipatory and delayed trade effects of retaliatory tariff increases by allowing for lags and leads in the following regression specification:

$$\begin{aligned} y_{ijgt} = \exp\Bigg(& \alpha_{ij} + \alpha_{ig} + \alpha_{it} + \alpha_{jg} + \alpha_{jt} + \alpha_{gt} \\ & + \sum_{k=-12}^{12} \log(1+\tau_{ijgt}) \times \big(\beta_k R_i + \gamma_k R_j\big) \times \mathbf{1}\big\{K_t = k\big\} \times T_g \Bigg) \eta_{ijgt}. \end{aligned} \tag{10}$$

This regression model allows for up to twelve months of leads and lags before and after the announcement of retaliatory tariff increases. The model includes all fixed effects from the baseline specification. We cluster standard errors at the country-pair and tariff-line level. Figures 4 and 5 plot the cumulative coefficients for export quantities, values, and unit values. The results indicate no quantitively large anticipatory *trade destruction* effects for the quantity and value specifications. We find only limited evidence for lagged trade effects for all specifications. The cumulative coefficients have a similar magnitude as the reduced-form estimates obtained with Equation 8. Therefore, the results assure us that the elasticity estimates are not biased due to anticipatory and delayed effects.

5.5 Comparative Statistics Analysis

Table 8 presents the distributional trade effects of retaliatory tariffs against agricultural and food products. The table shows point estimates and percentage changes by retaliatory policy changes. Panel (A) shows the *trade destruction* and *trade deflection* effects and Panel (B) details the *trade diversion* and *trade depression* effects. The results indicate that U.S. agricultural and food trade faced a 55.1 percent decrease in trade with retaliatory countries. The decrease of export trade with retaliatory countries outweighs the gains from additional export trade with non-retaliatory countries by far. While the United States lost about USD 15.6 billion in trade with retaliatory countries, it only gained USD 1.2 billion in trade with non-retaliatory countries. The non-retaliatory countries were able to substantially expand their trade with retaliatory countries at the cost of the United States. They increased their exports by USD 13.5 billion (30.9 percent) after the announcement of retaliatory

tariff increases against agricultural and food products. These results imply that retaliatory countries substitute a large share of the losses that they faced in terms of trade with the United States by additional imports from non-retaliatory countries.

Table 9 summarizes product-level differences in the distributional trade effects of retaliatory tariff increases against agricultural and food products. The results indicate substantial evidence for *trade destruction* at the product level. Soybeans (USD -7.1 billion), pork products (USD -0.8 billion), and coarse grains (USD -0.6 billion) recorded substantial losses in trade volumes. These products saw only a limit degree of *trade deflection* to non-retaliatory countries. U.S. exports of these products increased by USD 113 million for soybeans, USD 93 million for pork products, and USD 2 million for coarse grains, respectively. The negligible adjustment of export volumes implies that U.S. exporters faced difficulties adapting their foreign supply chains to non-retaliatory countries. Therefore, a substantial share of excess supply is stored or sold in the domestic market. Retaliatory countries were not able to fully compensate for the losses in trade with the United States by additional imports from non-retaliatory countries. The results show that retaliatory countries increased their imports from non-retaliatory countries by USD 3.7 billion for soybeans, USD 1.5 billion for pork products, and USD 1.0 billion for corn. The degree of *trade diversion* is substantial and implies that foreign firms were able to benefit from retaliatory tariff increases by gaining a higher market share in retaliatory countries.

Figure 7 compares the country-level trade effects of retaliatory tariff increases for agricultural and food products. Panel (A) shows exports of the United States to non-retaliatory countries and panel (B) exports of non-retaliatory countries to retaliatory countries. The data indicate that the United States diverted its exports primarily to other developed countries such as Canada and the European Union. These countries are the primary destination for the replacement of agricultural and food products and accommodate the largest share of displaced soybean, pork, and coarse grain exports. We find that countries in South America were the primary beneficiary of the retaliatory tariff increases. These countries picked up a large share of the excess demand for soybeans and pork products. They also benefited strongly from the increasing demand for fresh produce. We find that Chinese importers also expanded their supply chains in Europe. Ukraine and Russia substantially increased their exports of corn and coarse grains to retaliatory countries. Moreover, Australia and the European Union

benefited from the retaliatory tariffs as they were able to increase their exports of meat products and grains. These results imply that the United States lost a significant stack in foreign markets and foreign competitors filled the void by substantially expanding their exports to these markets.

6 Conclusion

This paper investigates the effects of the 2018 trade war on agricultural and food trade. To assess the impact of retaliatory tariff increases on export trade of the United States and non-retaliatory countries, we exploit differences in export quantities, values, and unit values between targeted and non-targeted *varieties* over time. Our results indicate large and statistically highly significant trade effects for the United States and non-retaliatory countries. The identification is robust to pre-existing trends and anticipatory effects and reveals substantial heterogeneity between products and trading partners. We find that the United States lost more than USD 15.6 billion in trade with retaliatory countries. Soybeans, pork products, and coarse grains recorded the most substantial *trade destruction* effects. Additional exports to non-retaliatory countries only partially compensated for these losses. At the same time, non-retaliatory countries were able to expand their trade with retaliatory countries significantly. These countries gained more than USD 13.5 billion in additional trade with retaliatory countries. The *trade diversion* effects are dominated by increasing exports of soybeans and pork products. The primary beneficiaries of retaliatory tariff increases are countries from South America such as Argentina, Brazil, and Chile. Retaliatory countries also increased their imports from Eastern Europe and the European Union. These results indicate that the retaliatory tariff increases in 2018 had substantial redistribution effects for global agricultural and food trade.

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7 Tables and Figures

Table 1: Timeline of Retaliatory Tariffs against Agricultural and Food Trade of the United States

Retaliatory Country	Date Enacted	Products (# HS-8)	U.S. Import Trade		Other Import Trade		Tariffs	
			Value	Share	Value	Share	Before	After
China I	April 6	61	780	3.0	8,294	7.4	14.3	32.4
Mexico	June 5	15	2,528	12.8	435	1.5	15.4	34.2
Turkey	June 21	58	325	18.0	788	5.8	24.0	45.3
European Union	June 22	42	964	6.3	13,899	58.4	3.2	28.2
Canada	July 1	27	2,515	11.0	990	5.9	5.0	15.0
China II	July 2	307	19,748	76.8	50,627	45.4	10.5	35.5
China III	August 23	2	< 1	< 0.1	2	< 0.1	4.2	18.5
China IV	September 24	396	5,010	19.5	31,986	28.7	14.1	23.5
Total		908	31,868	37.1	107,021	14.1	8.3	28.6

Notes – This table summarizes the timeline of retaliatory tariffs against agricultural and food products of the United States. All trade flows are measured in millions of USD, and shares are defined as the value of import trade for affected products divided by the total import trade of agricultural and food products. The tariff changes are trade-value weighted *ad valorem* tariff changes for affected products.

Table 2: Trade Flows of Agricultural and Food Products Before and After the Imposition of Retaliatory Tariffs

	With Retaliatory Country		With Other Countries	
Retaliatory Country	Before	After	Before	After
Panel (A): Export Trade of the United States				
China I	855	574	16,433	16,030
Turkey	527	342	19,623	19,693
European Union	2,188	1,493	13,405	14,727
Mexico	2,374	2,025	11,497	11,792
Canada	3,729	3,861	4,280	4,666
China II	15,056	5,802	61,416	64,908
China III	< 1	< 1	757	923
China IV	4,122	3,171	37,261	37,082
Total	28,851	17,268	164,672	169,821
Panel (B): Export Trade of Non-Retaliatory Countries				
China I	4,964	5,257	54,844	49,866
Turkey	342	298	13,781	15,444
European Union	5,303	6,508	27,457	24,443
Mexico	524	614	39,640	40,047
Canada	1,315	1,408	29,343	33,280
China II	38,411	41,281	195,431	177,764
China III	< 1	< 1	1,398	1,642
China IV	13,985	12,908	213,009	195,212
Total	64,845	68,276	574,903	537,698

Notes – The table shows export trade flows to retaliatory and other countries before and after the imposition of retaliatory tariffs against agricultural and food products. We summarize trade flows twelve month before and after the tariff increases for the United States in Panel (A) and for other non-retaliatory countries in Panel (B). All trade values are expressed in millions of USD.

Table 3: Product-Level Variation in Tariff Rate Changes

	United States		Non-Retaliatory Countries		Tariff Change	
Product Category	# Products	# Varieties	# Products	# Varieties	$\bar{\tau}_{ig}$	σ_{ig}
Panel (A): Agricultural-Related Products						
Biodiesel & Blends >B30	1	22	7	37	10.00	0.00
Distilled Spirits	10	687	153	467	40.00	0.00
Ethanol (non-bev.)	3	149	13	76	11.24	15.03
Fish Products	187	2,913	1,348	4,543	22.56	7.43
Forest Products	94	3,256	572	2,500	7.90	6.87
Panel (B): Bulk Products						
Coarse Grains (ex. corn)	4	61	18	88	24.20	5.09
Corn	2	171	15	68	25.00	0.00
Cotton	4	170	17	75	9.40	13.98
Oilseeds (ex. soybean)	7	148	45	228	6.12	5.26
Other Bulk Commodities	30	779	232	866	7.68	4.00
Pulses	21	653	82	412	22.38	7.84
Rice	6	320	64	268	25.00	0.00
Soybeans	1	65	9	36	25.00	0.00
Tobacco	14	183	36	170	25.00	0.00
Wheat	2	90	16	61	25.00	0.00
Panel (C): Consumer-Oriented Products						
Beef & Beef Products	17	876	89	430	3.55	8.74
Breakfast Cereals	4	259	28	210	22.94	6.10
Chocolate & Cocoa Products	11	643	98	507	9.77	1.42
Condiments & Sauces	6	603	53	338	9.86	0.89
Dairy Products	42	2,057	434	1,835	17.74	10.14
Dog & Cat Food	1	107	22	89	25.00	0.00
Eggs & Products	12	389	55	295	0.85	2.51
Fresh Fruit	31	921	226	1,192	23.67	5.71

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Table 3 – *Continued from Previous Page*

	United States		Non-Retaliatory Countries		Tariff Change	
Product Category	# Products	# Varieties	# Products	# Varieties	$\bar{\tau}_{ig}$	σ_{ig}
Fresh Vegetables	40	783	224	1,335	21.96	8.28
Fruit & Vegetable Juices	23	845	210	942	16.65	7.74
Meat Products NESOI	20	435	162	537	8.34	7.97
Non-Alcoholic Bev. (ex. juices)	17	999	233	909	9.53	2.17
Other Consumer Oriented	54	1,148	382	1,834	7.42	4.42
Pork & Pork Products	26	937	146	520	22.37	6.42
Poultry Meat & Prods. (ex. eggs)	18	770	190	673	22.03	6.09
Prepared Food	23	1,613	202	1,133	13.42	3.34
Processed Fruit	40	1,478	388	1,630	16.89	9.18
Processed Vegetables	61	2,034	416	2,037	16.89	7.33
Snack Foods NESOI	8	570	85	521	9.92	0.98
Tree Nuts	28	1,205	104	676	23.06	6.02
Wine & Beer	11	732	233	602	7.35	6.43
Panel (D): Intermediate Products						
Animal Fats	12	201	64	258	3.00	7.97
Distillers Grains	1	51	4	26	25.00	0.00
Feeds & Fodders NESOI	14	547	100	541	10.26	11.70
Hides & Skins	30	212	78	285	4.60	2.77
Live Animals	16	319	89	372	2.18	4.26
Other Intermediate Products	90	3,206	662	2,982	6.99	3.72
Planting Seeds	28	1,072	139	588	0.26	2.56
Soybean Meal	2	140	9	71	8.10	5.55
Soybean Oil	2	108	12	91	10.00	0.00
Sugar, Sweeteners, Bev. Bases	16	739	107	562	9.35	2.44
Vegetable Oils (ex. soybean)	39	1,560	356	1,577	6.26	4.73
Total	1,118	36,517	8,277	35,493	16.98	10.40

Notes – The table shows the mean and standard deviation of tariff increases across agricultural and food products classified according to the Global Agricultural Trade System (United States Deparment of Agriculture, 2020). Mean and standard deviation are calculated as the value-weighted tariff increases. The table also presents the number of products and traded varieties by agricultural and food product category for the United States and non-retaliatory countries.

Table 4: Trade Effects of Retaliatory Tariff Increases

	Dummy Specification			Tariff Specification		
	Quantity	Value	Unit Value	Quantity	Value	Unit Value
Panel (A): Export Trade of the United States						
Trade Destruction (β)	-0.062^{***}	-0.054^{***}	0.017	-0.472^{***}	-0.464^{***}	0.224^{**}
	(0.023)	(0.015)	(0.012)	(0.121)	(0.075)	(0.106)
Trade Deflection (γ)	0.003^{*}	0.005^{**}	-0.000	0.019^{*}	0.042^{*}	-0.006
	(0.002)	(0.003)	(0.001)	(0.011)	(0.022)	(0.006)
Observations	8,916,809	8,916,809	4,064,906	8,916,809	8,916,809	4,064,906
R-squared	0.961	0.955	0.963	0.961	0.955	0.963
Panel (B): Export Trade of Non-Retaliatory Countries						
Trade Diversion (β)	0.028	0.017^{**}	0.038^{**}	0.143^{*}	0.134^{**}	0.368^{***}
	(0.017)	(0.008)	(0.018)	(0.079)	(0.057)	(0.135)
Trade Depression (γ)	-0.001	0.001	-0.035	0.002	0.007	-0.100
	(0.007)	(0.004)	(0.023)	(0.045)	(0.025)	(0.094)
Observations	16,266,860	16,266,860	9,070,496	16,266,860	16,266,860	9,070,496
R-squared	0.991	0.987	0.975	0.991	0.987	0.975

Notes – The table presents the estimation results of *trade destruction* and *trade deflection* effects using export data for the United States and *trade diversion* and *trade depression* effects export data for other non-retaliatory countries. The estimates of trade effects for the dummy specification are reported in columns (3)-(5) and for the tariff specification in columns (6)-(8). Standard errors are clustered at the country-pair and tariff-line level (HS-8 or HS-10).

Table 5: Product-Category Differences in the Trade Effects of Retaliatory Tariff Increases

	Dummy Specification			Tariff Specification		
	Quantity	Value	Unit Value	Quantity	Value	Unit Value
Panel (A): Export Trade of the United States						
Trade Destruction						
Agricultural-Related Products	−0.476*	−0.038*	0.018	−1.874	−0.208	0.154
	(0.261)	(0.020)	(0.018)	(1.143)	(0.136)	(0.146)
Bulk Products	−0.402**	−0.272***	0.064	−1.832**	−1.221***	0.220
	(0.165)	(0.091)	(0.049)	(0.849)	(0.406)	(0.186)
Consumer-Oriented Products	0.012	0.048	0.081**	0.060	0.324	0.364**
	(0.033)	(0.048)	(0.034)	(0.231)	(0.297)	(0.161)
Intermediate Products	0.035	0.139***	0.002	0.573	0.518***	0.292
	(0.075)	(0.037)	(0.029)	(0.759)	(0.179)	(0.343)
Trade Deflection						
Agricultural-Related Products	0.008	0.007	−0.001	0.039	0.024	−0.010
	(0.009)	(0.006)	(0.001)	(0.044)	(0.022)	(0.009)
Bulk products	0.011	0.029	−0.002	0.052	0.133	−0.007
	(0.008)	(0.020)	(0.002)	(0.036)	(0.090)	(0.005)
Consumer-Oriented Products	−0.001	−0.004	−0.001	−0.004	−0.022	−0.006
	(0.003)	(0.005)	(0.002)	(0.016)	(0.028)	(0.008)
Intermediate Products	−0.000	−0.010	0.000	−0.004	−0.034	−0.003
	(0.001)	(0.009)	(0.001)	(0.005)	(0.029)	(0.008)
Observations	8,916,809	8,916,809	4,064,906	8,916,809	8,916,809	4,064,906
R-squared	0.961	0.955	0.963	0.961	0.955	0.963
Panel (B): Export Trade of Non-Retaliatory Countries						
Trade Diversion						
Agricultural-Related Products	−0.044	0.069	0.076	0.030	0.552**	0.395
	(0.082)	(0.050)	(0.059)	(0.535)	(0.270)	(0.303)
Bulk Products	0.035	0.033**	−0.087	0.156	0.149**	−1.145

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	Dummy Specification			Tariff Specification		
	Quantity	Value	Unit Value	Quantity	Value	Unit Value
	(0.027)	(0.014)	(0.090)	(0.120)	(0.064)	(0.829)
Consumer-Oriented Products	−0.004	−0.002	0.069***	−0.000	0.058	0.451***
	(0.031)	(0.017)	(0.027)	(0.148)	(0.085)	(0.164)
Intermediate Products	0.007	−0.053	−0.049	0.121	−0.557	−0.465
	(0.036)	(0.034)	(0.033)	(0.357)	(0.366)	(0.393)
Trade Depression						
Agricultural-Related Products	−0.017	0.007	−0.006	0.032	0.080	−0.010
	(0.023)	(0.010)	(0.010)	(0.148)	(0.061)	(0.041)
Bulk Products	0.019	0.011	0.010	0.058	−0.001	0.027
	(0.016)	(0.022)	(0.018)	(0.063)	(0.142)	(0.076)
Consumer-Oriented Products	−0.002	−0.004	−0.058	−0.011	−0.030	−0.181
	(0.009)	(0.006)	(0.041)	(0.056)	(0.036)	(0.179)
Intermediate Products	0.014	0.023	−0.051	0.103	0.208	−0.686
	(0.045)	(0.019)	(0.031)	(0.267)	(0.217)	(0.435)
Observations	16,266,860	16,266,860	9,070,496	16,266,860	16,266,860	9,070,496
R-squared	0.991	0.987	0.975	0.991	0.987	0.975

Notes – The table reports the trade effects of retaliatory tariff increases according to the product classification. The same fixed effects as for the baseline specification are included. Two-way standard errors are clustered at the country-pair and tariff-line level (HS-8 or HS-10).

Table 6: Economic Development and Trade Effects of Retaliatory Tariff Increases

	Dummy Specification			Tariff Specification		
	Quantity	Value	Unit Value	Quantity	Value	Unit Value
Panel (A): Export Trade of the United States						
Trade Destruction						
Non-OECD	−0.100**	−0.049***	0.024**	−0.613**	−0.440***	0.302***
	(0.047)	(0.019)	(0.011)	(0.247)	(0.131)	(0.112)
OECD	0.055	−0.012	−0.051	0.238	−0.073	−0.412*
	(0.060)	(0.040)	(0.034)	(0.307)	(0.244)	(0.241)
Trade Deflection						
Non-OECD	0.018***	0.006	−0.006	0.106**	0.031	−0.017
	(0.006)	(0.010)	(0.006)	(0.050)	(0.056)	(0.047)
OECD	−0.021***	−0.001	0.011	−0.127**	0.017	0.023
	(0.008)	(0.014)	(0.009)	(0.061)	(0.067)	(0.097)
Observations	8,916,809	8,916,809	4,064,906	8,916,809	8,916,809	4,064,906
R-squared	0.961	0.955	0.963	0.961	0.955	0.963
Panel (B): Export Trade of Non-Retaliatory Countries						
Trade Diversion						
Non-OECD	0.028*	0.012	0.038**	0.141*	0.113**	0.371***
	(0.016)	(0.008)	(0.018)	(0.075)	(0.050)	(0.137)
OECD	−0.001	0.039	−0.021	0.081	0.217	−0.565
	(0.032)	(0.046)	(0.070)	(0.211)	(0.273)	(0.465)
Trade Depression						
Non-OECD	0.003	0.004	−0.035	0.010	0.022	−0.096
	(0.015)	(0.006)	(0.024)	(0.092)	(0.042)	(0.092)
OECD	−0.007	−0.008	0.009	−0.014	−0.035	−0.352
	(0.016)	(0.008)	(0.049)	(0.094)	(0.050)	(0.433)
Observations	16,266,860	16,266,860	9,070,496	16,266,860	16,266,860	9,070,496
R-squared	0.991	0.987	0.975	0.991	0.987	0.975

Notes – The table reports the trade effects of retaliatory tariff increases according to the economic development stage of trading partners. The same fixed effects as for the baseline specification are included. Two-way standard errors are clustered at the country-pair and tariff-line level (HS-8 or HS-10).

Table 7: Pre-Existing Trend Tests

	Value	Quantity	Unit Value
Panel (A): Export Trade of the United States			
λ	0.093	0.263	0.067
	(0.085)	(0.292)	(0.106)
Observations	401,256	401,256	395,541
Pseudo R-squared	0.925	0.936	0.951
Panel (B): Export Trade of Non-Retaliatory Countries			
λ	−0.049	0.079	−0.005
	(0.037)	(0.059)	(0.013)
Observations	873,836	873,836	860,028
Pseudo R-squared	0.948	0.971	0.954

Notes – This table summarizes the estimates of the pre-existing trend test for retaliatory tariff increases on agricultural and food products. We regress the 2018 retaliatory tariff increases on the 2017 value, quantity, and unit value of U.S. exports in Panel (A) and non-retaliatory countries exports in Panel (B). The regressions include exporter-by-importer, exporter-by-product and importer-by-sector fixed effects. Two-way standard errors clustered at the country-pair and tariff-line (HS-8 or HS-10) level.

Table 8: Comparative Statistics Effects

Panel (A): Export Trade of the United States				
	Trade Destruction		Trade Deflection	
Retaliatory Country	Absolute	Percentage	Absolute	Percentage
China I	−604	−59.28	107	0.66
Turkey	−8	−2.24	107	0.55
European Union	−329	−17.00	136	0.94
Mexico	−172	−8.00	82	0.70
Canada	−1,658	−30.58	19	0.40
China II	−9,381	−61.60	608	0.95
China III	< 1	−59.78	9	0.95
China IV	−3,407	−54.53	159	0.43
Total	−15,558	−55.09	1,227	0.79
Panel (B): Export Trade of Non-Retaliatory Countries				
	Trade Diversion		Trade Depression	
Retaliatory Country	Absolute	Percentage	Absolute	Percentage
China I	1,977	59.82	10	0.02
Turkey	16	5.43	3	0.02
European Union	186	14.59	5	0.01
Mexico	140	32.30	9	0.02
Canada	2,172	52.32	2	0.01
China II	6,345	18.44	37	0.02
China III	1	53.43	< 1	0.01
China IV	2,637	22.79	26	0.01
Total	13,474	30.91	92	0.02

Notes – This table presents the comparative statistics effects of retaliatory tariff increases for agricultural and food products. The comparative statistics estimates are based on the baseline model specification. All effect estimates are expressed in Millions of USD.

Table 9: Product-Level Differences in Comparative Statistics Effects

	Trade Destruction		Trade Deflection		Trade Diversion		Trade Depression	
Product	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage
Panel (A): Agricultural-Related Products								
Biodiesel & Blends >B30	< -1	−42.97	2	0.57	1	6.88	< 1	0.02
Distilled Spirits	−355	−24.45	66	1.07	124	19.20	7	0.03
Ethanol (non-bev.)	−100	−65.34	18	0.76	29	58.77	< 1	0.02
Fish Products	−262	−48.08	19	0.95	687	29.77	11	0.04
Forest Products	−1,414	−53.61	28	0.57	537	29.65	4	0.02
Panel (B): Bulk Products								
Coarse Grains (ex. corn)	−616	−75.05	2	0.95	63	29.64	< 1	0.00
Corn	−73	−24.28	188	0.95	971	30.39	< 1	0.00
Cotton	−7	−15.59	3	0.95	127	34.01	< 1	0.00
Oilseeds (ex. soybean)	−1	−33.70	2	0.43	31	93.58	< 1	0.00
Other Bulk Commodities	−36	−55.55	3	0.46	27	20.18	2	0.02
Pulses	−24	−20.95	5	0.95	< 1	0.16	< 1	0.01
Rice	−2	−4.63	31	0.87	1	0.28	1	0.00
Soybeans	−7,074	−64.21	113	0.95	3,685	19.42	< 1	0.00
Tobacco	−71	−60.28	13	0.95	66	19.84	1	0.02
Wheat	−111	−59.24	57	0.95	62	84.82	< 1	0.00

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Table 9 – *Continued from Previous Page*

Product	Trade Destruction		Trade Deflection		Trade Diversion		Trade Depression	
	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage
Panel (C): Consumer-Oriented Products								
Beef & Beef Products	−68	−34.95	10	0.88	661	20.49	2	0.01
Breakfast Cereals	−19	−44.47	8	0.72	5	11.36	< 1	0.01
Chocolate & Cocoa Products	−97	−42.51	10	0.47	92	25.51	1	0.01
Condiments & Sauces	−310	−33.78	12	0.43	54	11.88	1	0.01
Dairy Products	−367	−40.43	43	0.81	1,380	33.50	2	0.01
Dog & Cat Food	−7	−60.45	15	0.95	5	32.90	< 1	0.01
Eggs & Products	−2	−46.30	< 1	0.34	< 1	34.97	< 1	0.00
Fresh Fruit	51	15.14	47	0.77	1,234	48.37	16	0.03
Fresh Vegetables	0	−57.58	23	0.95	1	29.10	6	0.07
Fruit & Vegetable Juices	−74	−27.05	8	0.72	7	0.60	2	0.03
Meat Products NESOI	< − 1	−50.08	< 1	0.63	15	11.52	< 1	0.00
Non-Alcoholic Bev. (ex. juices)	−271	−31.38	7	0.47	80	16.84	3	0.01
Other Consumer Oriented	−1	−57.25	2	0.47	16	24.79	1	0.02
Pork & Pork Products	−828	−39.43	93	0.88	1,456	29.65	2	0.01
Poultry Meat & Prods. (ex. eggs)	−52	−20.50	32	0.79	183	19.89	< 1	0.00
Prepared Food	−327	−18.23	60	0.48	163	12.05	11	0.02
Processed Fruit	−158	−38.59	17	0.71	78	17.83	1	0.02
Processed Vegetables	−119	−31.77	22	0.56	79	16.47	4	0.02

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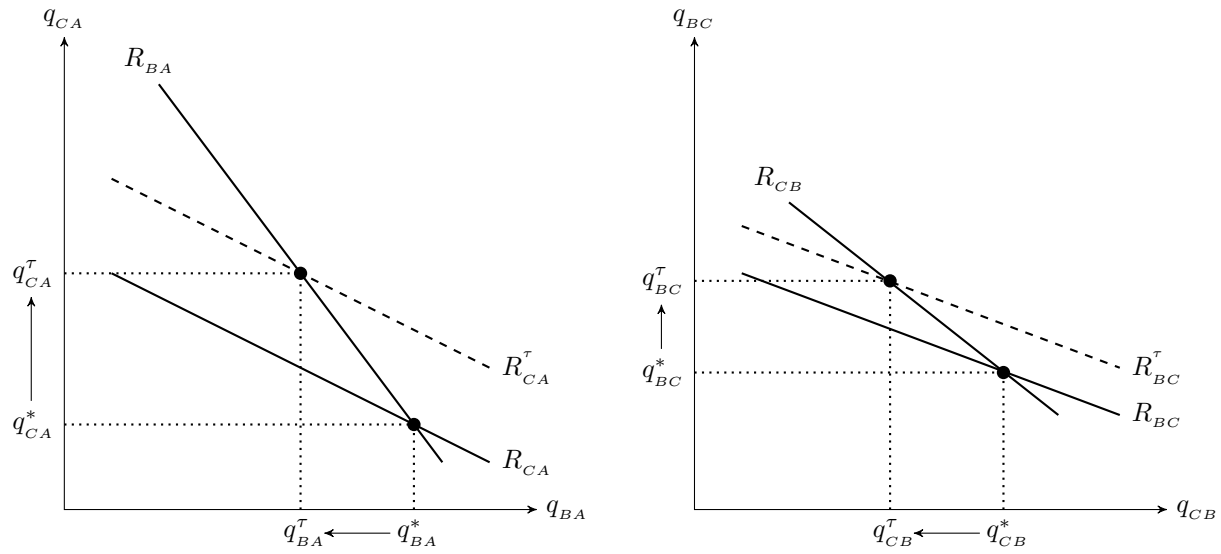
Table 9 – *Continued from Previous Page*

	Trade Destruction		Trade Deflection		Trade Diversion		Trade Depression	
Product	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage
Snack Foods NESOI	−145	−33.66	4	0.47	33	19.32	1	0.01
Tree Nuts	−473	−46.51	136	0.58	223	31.42	3	0.01
Wine & Beer	−39	−62.99	7	0.54	258	37.00	4	0.03
Panel (D): Intermediate Products								
Animal Fats	−1	−54.67	< 1	0.79	1	34.01	< 1	0.01
Distillers Grains	−33	−58.03	22	0.95	11	31.51	< 1	0.00
Feeds & Fodders NESOI	−383	−54.03	13	0.70	103	31.20	< 1	0.00
Hides & Skins	−531	−61.77	1	0.26	61	27.08	< 1	0.00
Live Animals	< − 1	−67.37	1	0.45	3	36.48	< 1	0.04
Other Intermediate Products	−331	−46.52	21	0.36	315	18.01	3	0.01
Planting Seeds	< − 1	−40.43	< 1	0.95	< 1	16.98	< 1	0.08
Soybean Meal	−1	−60.08	17	0.49	5	21.01	< 1	0.00
Soybean Oil	−2	−71.68	3	0.49	19	18.39	< 1	0.00
Sugar, Sweeteners, Bev. Bases	−16	−52.68	5	0.49	50	26.39	< 1	0.01
Vegetable Oils (ex. soybean)	−38	−56.62	6	0.46	470	26.91	1	0.02

Notes – The table shows the product-level estimates of trade effects caused by retaliatory tariffs imposed against agricultural and food products. The comparative statistics estimates are based on the baseline tariff specification. All effect estimates are expressed in Millions of USD.

7.1 Figures

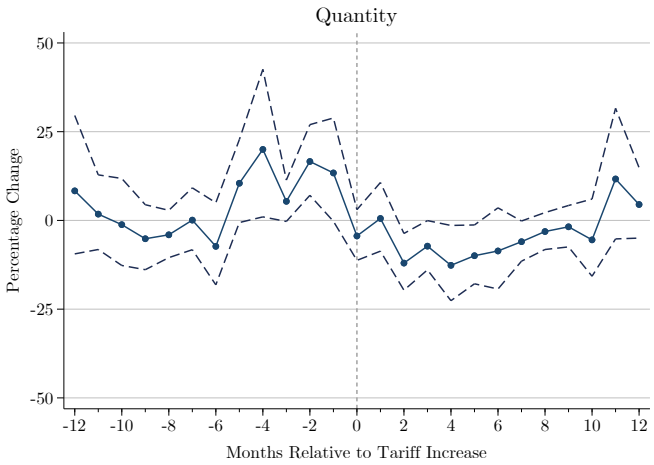


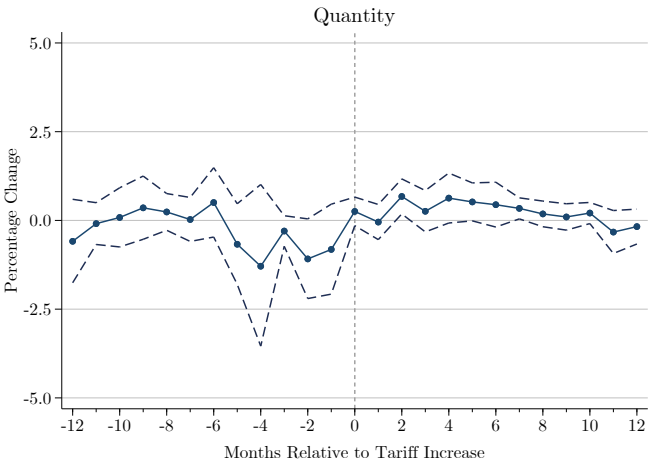
Panel (A): Trade Destruction and Diversion

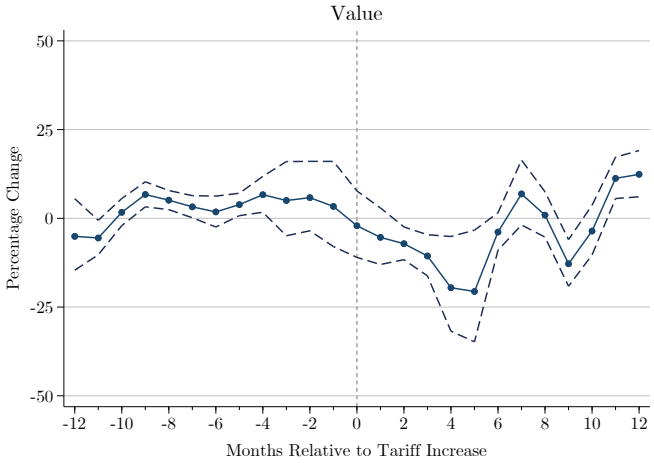
Panel (B): Trade Deflection and Depression

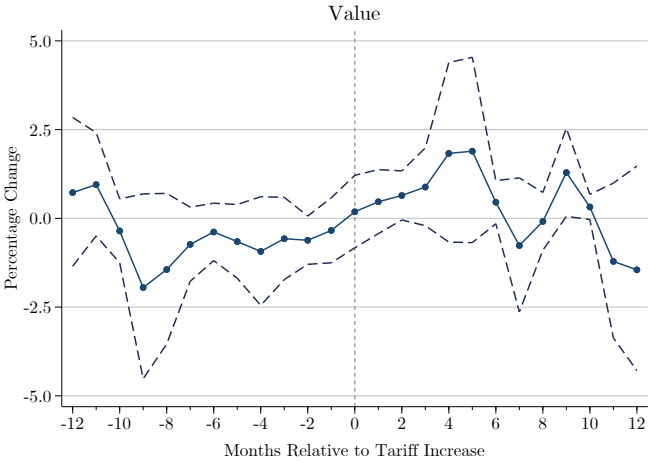
Figure 1: Trade Effects of Retaliatory Tariff Increases

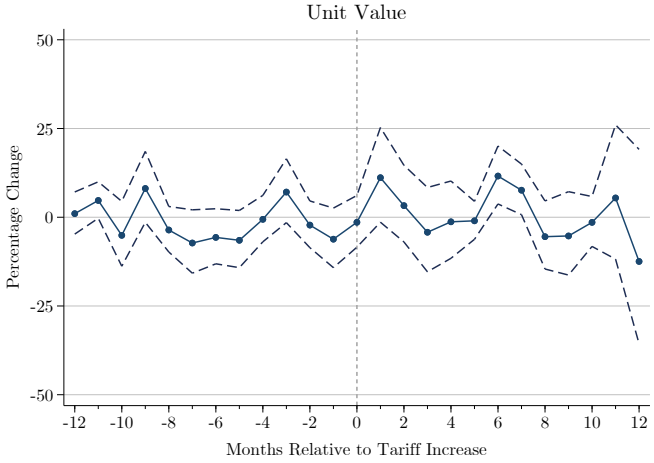
Notes – The figure plots the trade effects of retaliatory tariff increases. The left panel shows the effects of retaliatory tariffs on trade with country A and the right panel the effects on trade between country B and C.

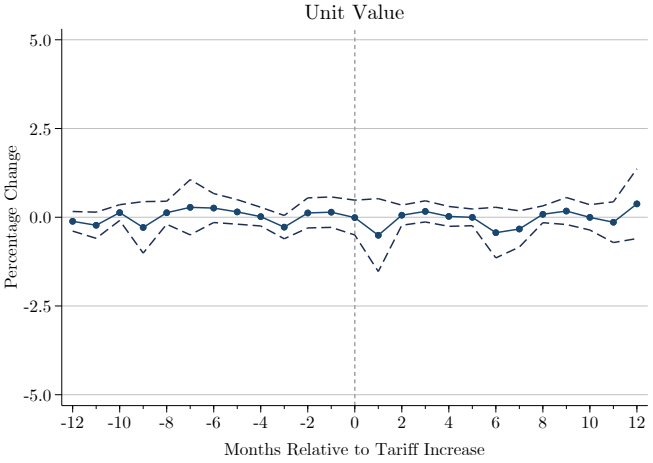










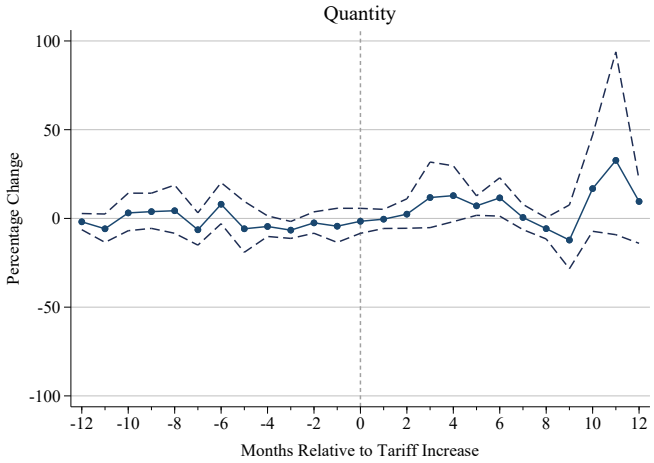


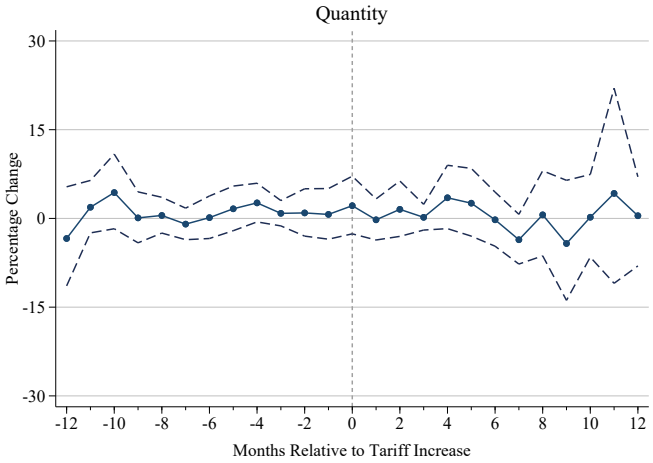
Panel (A): Trade Destruction

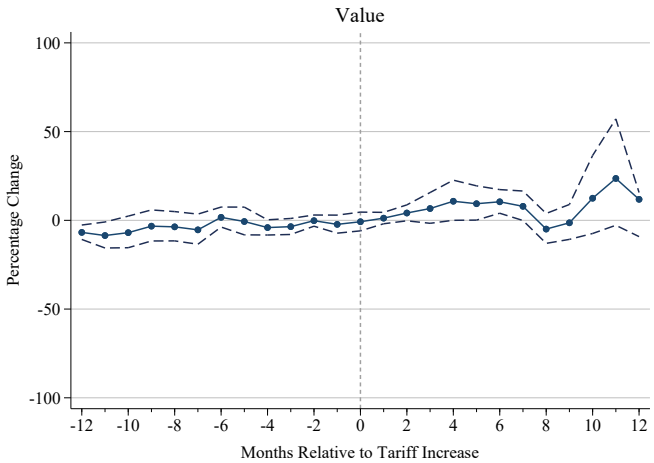
Panel (B): Trade Deflection

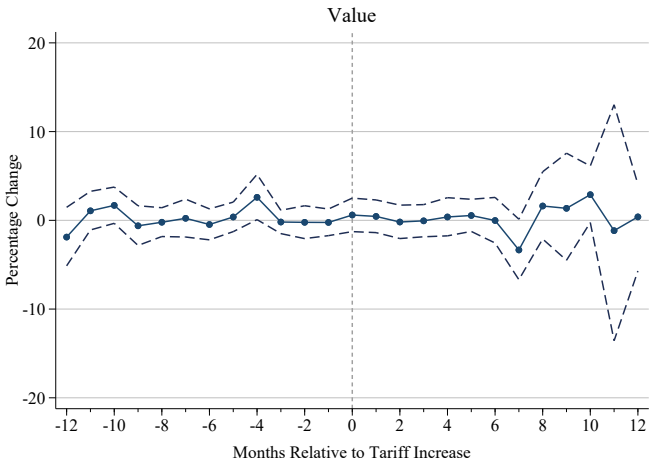
Figure 2: Trade Destruction and Deflection Effects of Retaliatory Tariff Increases

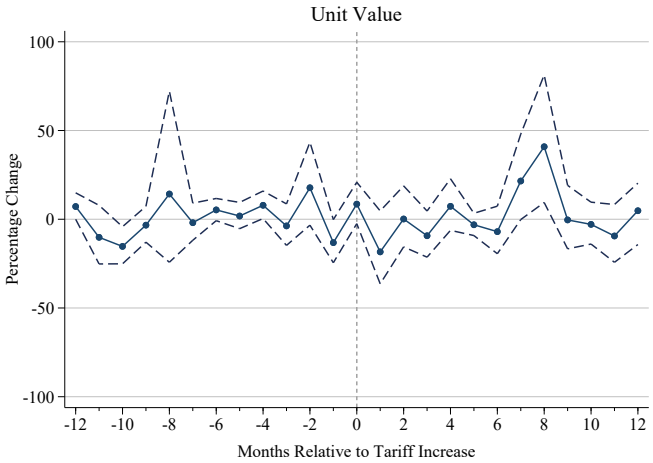
Notes – The figure plots the event study estimates for the *trade destruction* and *trade diversion* effects of retaliatory tariff increases against agricultural and food exports of the United States. All regressions include fixed effects, as specified in the baseline model. The standard errors are clustered at the country-pair and tariff-line level. Error bands indicate 95 percent confidence intervals.









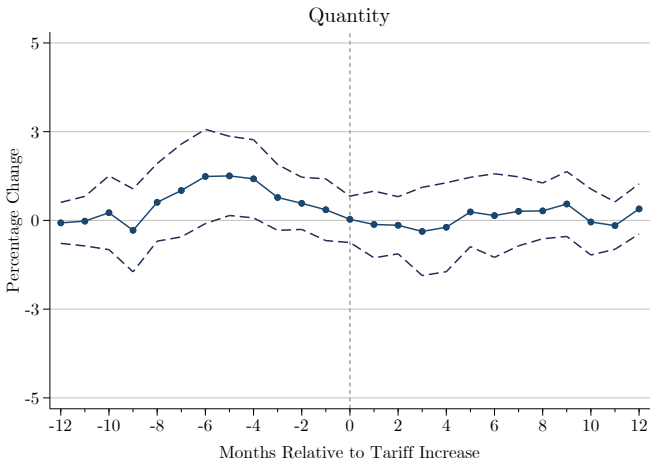


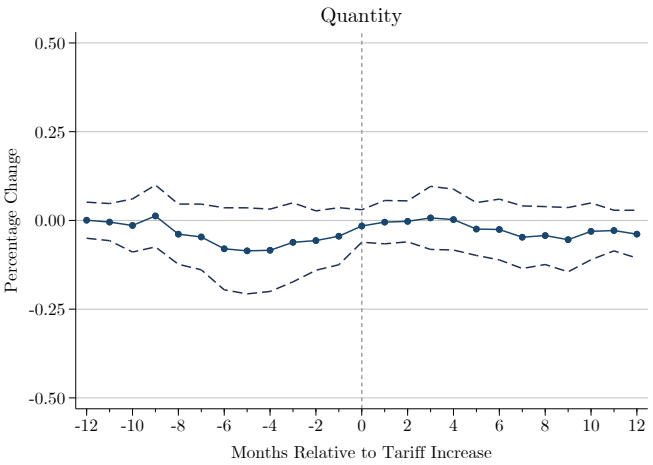
Panel (A): Trade Diversion

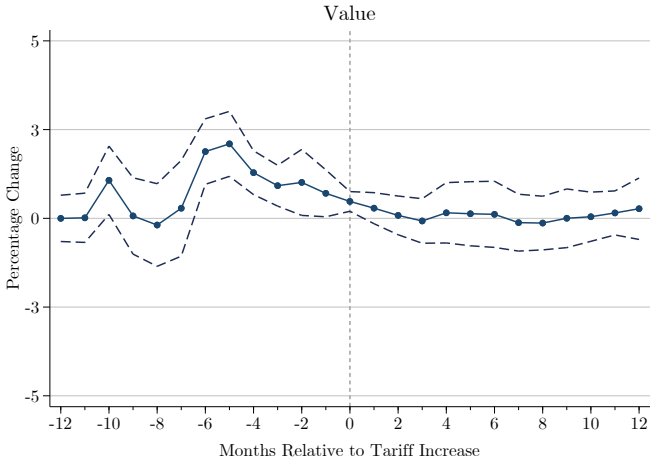
Panel (B): Trade Depression

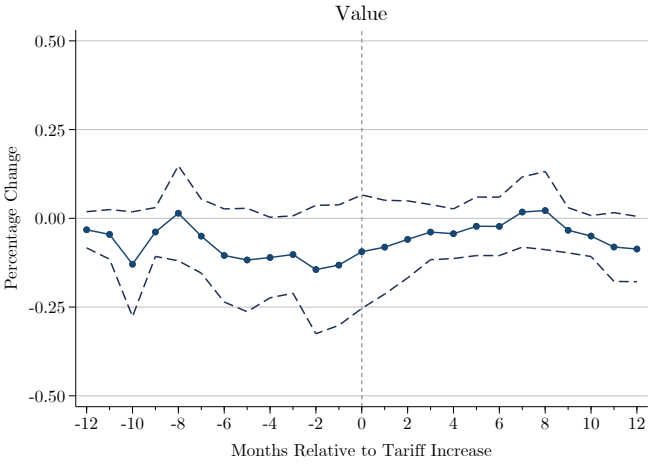
Figure 3: Trade Diversion and Depression Effects of Retaliatory Tariff Increases

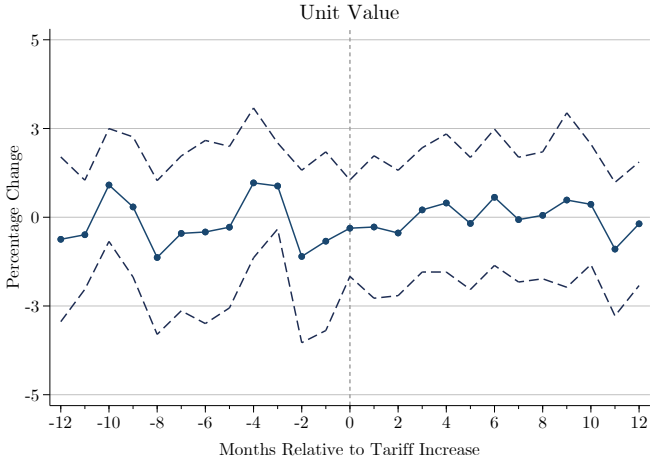
Notes – The figure plots the event study estimates for the *trade diversion* and *trade depression* effects of retaliatory tariff increases against agricultural and food exports of the United States. All regressions include fixed effects, as specified in the baseline model. The standard errors are clustered at the country-pair and tariff-line level. Error bands indicate 95 percent confidence intervals. Data sources are described in the text.

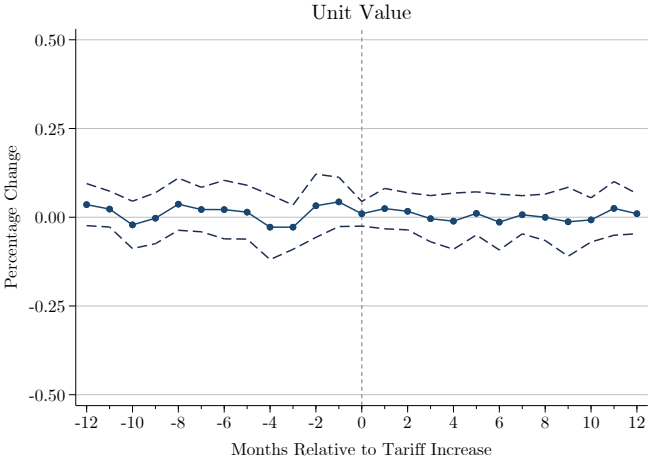










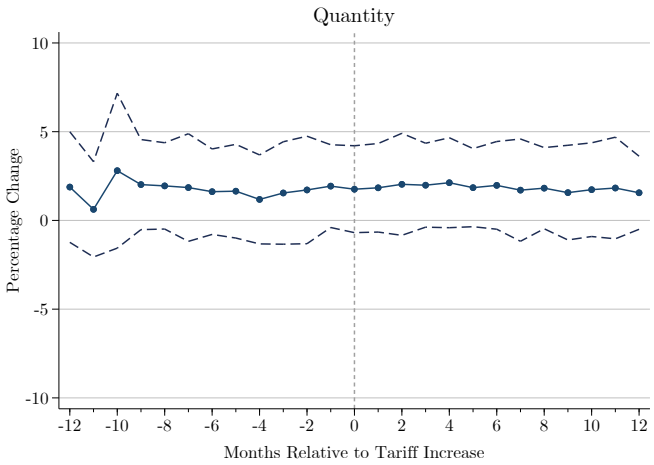


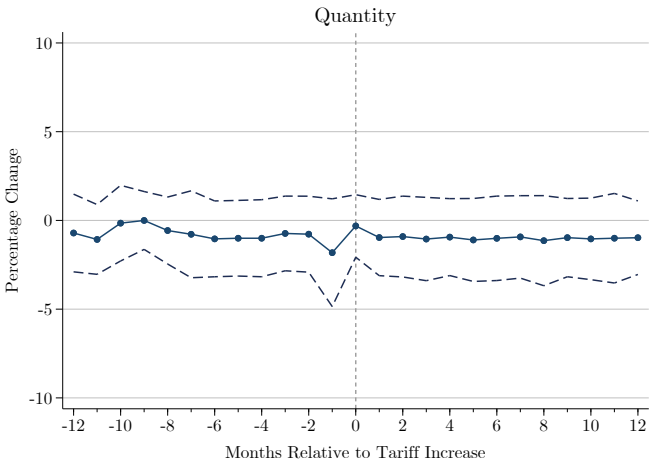
Panel (A): Trade Destruction

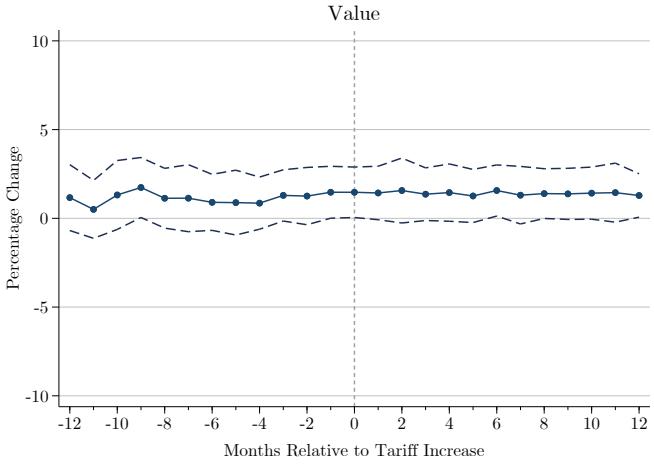
Panel (B): Trade Deflection

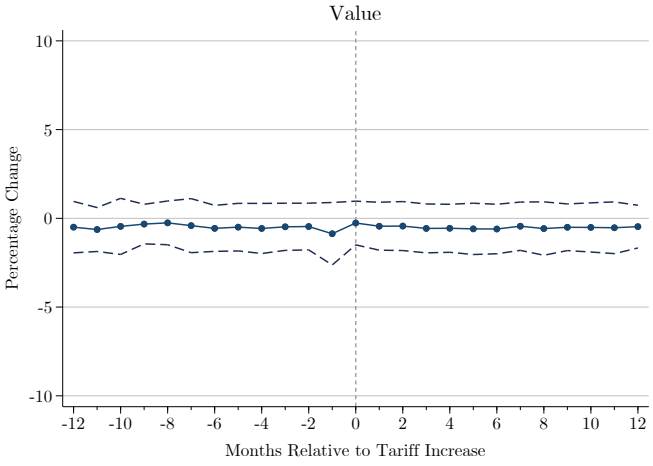
Figure 4: Dynamic Estimation of Trade Destruction and Trade Deflection Effects

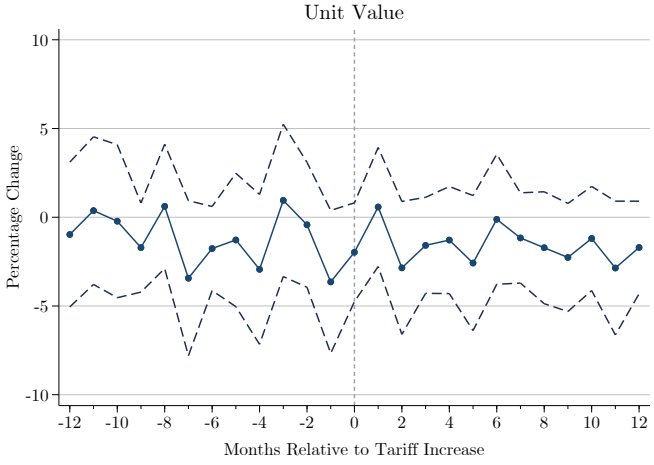
Notes – The figure plots the dynamic estimates for the *trade destruction* and *trade deflection* effects of retaliatory tariff increases against agricultural and food exports of the United States.The figures plot the cumulative sum of coefficient estimates for dynamic model specification. All regressions include fixed effects, as specified in the baseline model. The standard errors are clustered at the country-pair and tariff-line level. Error bands indicate 95 percent confidence intervals.

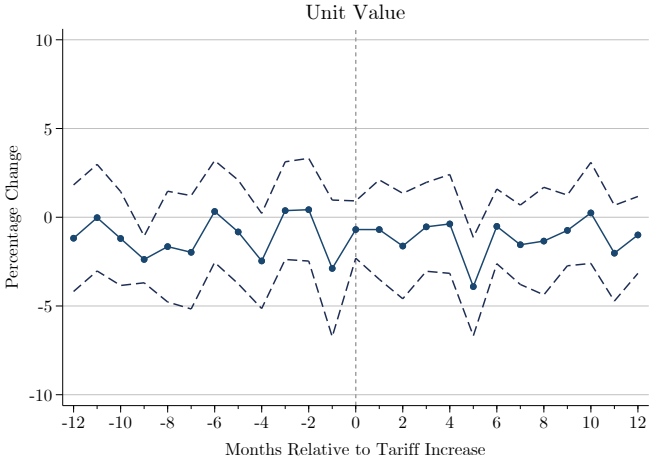










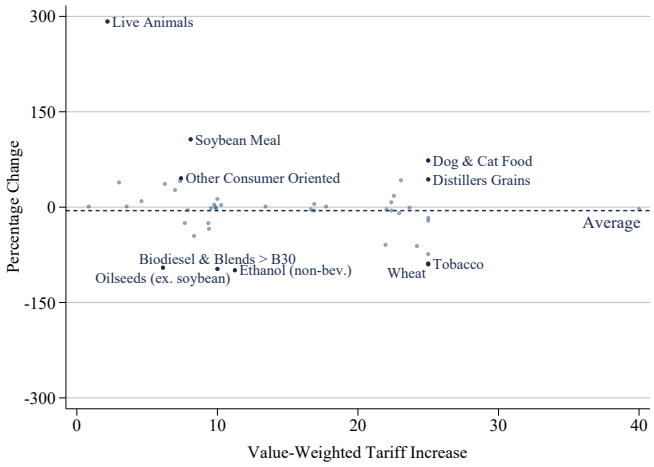


Panel (A): Trade Diversion

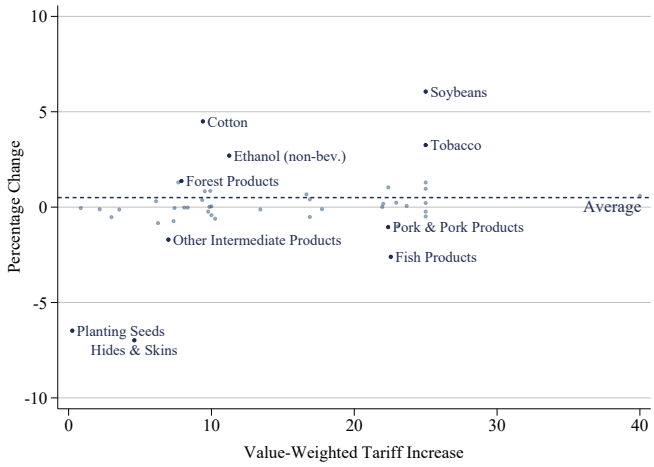
Panel (B): Trade Depression

Figure 5: Dynamic Estimation of Trade Diversion and Trade Depression Effects

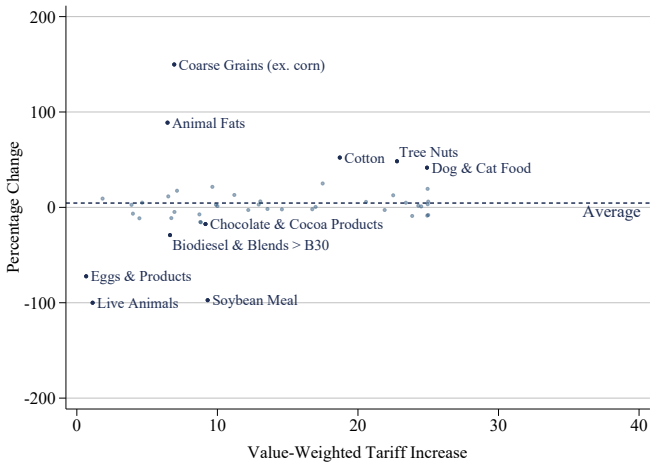
Notes – The figure plots the dynamic estimates for the *trade diversion* and *trade depression* effects of retaliatory tariff increases against agricultural and food exports of the United States.The figures plot the cumulative sum of coefficient estimates for dynamic model specification. All regressions include fixed effects, as specified in the baseline model. The standard errors are clustered at the country-pair and tariff-line level. Error bands indicate 95 percent confidence intervals.



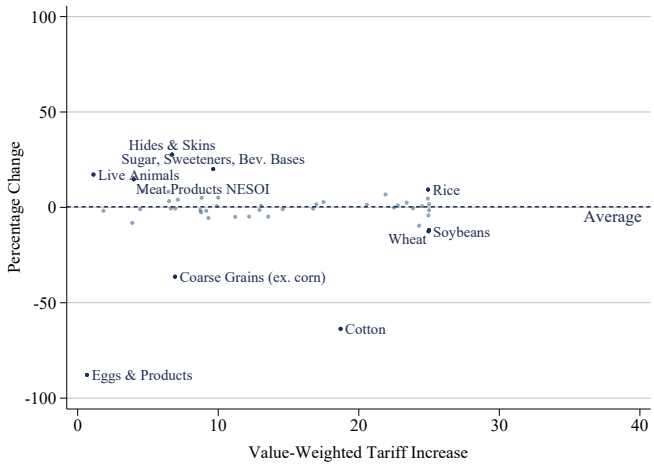
Panel (A): Trade Destruction



Panel (B): Trade Deflection



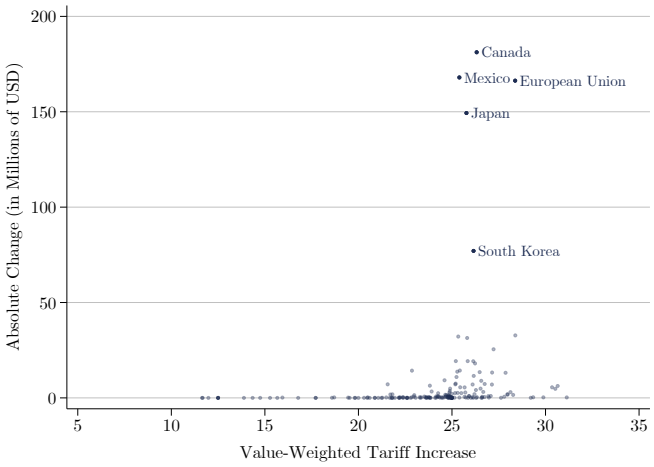
Panel (C): Trade Diversion



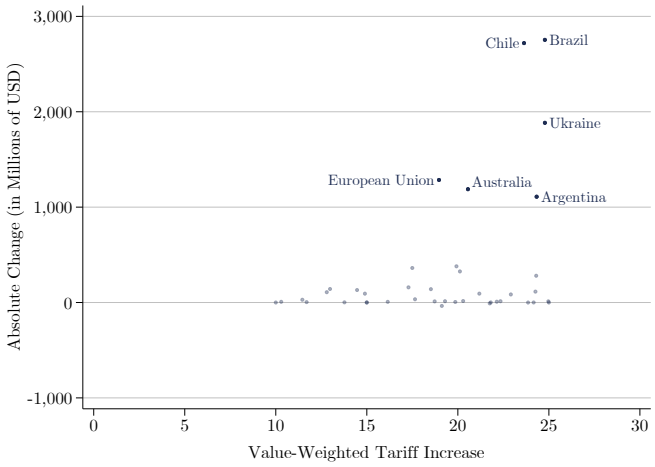
Panel (D): Trade Depression

Figure 6: Product-Level Differences in the Trade Effects of Retaliatory Tariff Increases

Notes – The figures plot the trade effects of retaliatory tariffs increases at the product level. We include fixed effects according to the baseline specification. Standard errors are clustered at the country-pair and tariff-line level. The horizontal dashed line in each figure denotes the overall average impact.



Panel (A): Trade Deflection



Panel (B): Trade Diversion

Figure 7: Country-Level Differences in the Distributional Trade Effects of Retaliatory Tariff Increases

Notes – The figures plot the simulated trade gains due to retaliatory tariffs imposed against agricultural and food exports of the United States. Panel (A) shows the change in export trade of the United States with non-retaliatory countries and panel (B) the change in export trade of non-retaliatory countries with retaliatory countries. The comparative statistics analysis is based on the baseline regression specification.

The Impact of Retaliatory Tariffs on Agricultural and Food Trade

Supplementary Materials

Colin A. Carter and Sandro Steinbach

Appendix (A) – Data

We collect data on eight waves of retaliatory tariff increases imposed against agricultural and food exports of the United States and match this policy data to monthly import and export trade data and tariff data for the United States and 101 non-retaliatory countries.

Trade Data

Monthly import and export data come from the U.S. Census Bureau and the Global Trade Atlas (IHS Markit, 2020). The trade data used to investigate *trade destruction* and *trade deflection* effects are from monthly administrative data published by the U.S. Census Bureau, which provides values and quantities of trade flows at the HS-10 codes and across countries from April 1990 to October 2019. Trade data used to investigate the *trade diversion* and *trade depression* effects come from the Global Trade Atlas, which includes monthly import and export data of 101 countries at the tariff-line level. The trade data in the Global Trade Atlas covers about 95 percent of all global trade and is available until July 2019. Our sample period covers 12 months before and up to 12 months after retaliatory tariff increases.

Because U.S. Schedule B numbers change over time, we develop a method to concord U.S. schedule B numbers over time and create time-consistent U.S. export flow data. We collect the obsolete-to-new codes from the U.S. Census Bureau and follow the approach of Pierce and Schott (2012) to obtain consistent trade flows of Schedule B codes over time.

Retaliatory Tariffs

The retaliatory tariff database is a monthly panel dataset of retaliatory tariff increases against U.S. exports during 2018. The database constructed by collecting data from foreign finance ministries describing retaliatory tariff actions due to the trade war. There are eight waves of retaliatory tariff increases: China announced four waves of retaliatory tariff increases in April, July, August, and September 2018; Mexico, Turkey, and European Union announced retaliatory tariff increases in June

2018; Canada announced retaliatory tariff increases in July 2018. For the retaliatory tariff increases announced by China in September, China reinstated the MFN tariff rate on US autos and auto parts as a result of negotiations in January 2019. Mexico and Canada removed their retaliatory tariffs in May 2019.

Import Tariffs

To assess the magnitude of the retaliatory tariffs, we also collect baseline tariff rates of all countries using *ad valorem* equivalent MFN rates from the most recent data in the Consolidated Tariff Schedules (CTS) database (World Trade Organization, 2020).

Appendix (B) – HS Code Matching between Countries

Trade partners of the United States impose retaliatory tariffs using their version of the HS code system. To measure the *trade destruction* and *trade deflection* effects of retaliatory tariff increases, we need to identify the corresponding U.S. Schedule B numbers. Because HS codes are harmonized across countries up to the 6-digit HS code level, we develop a method to determine the U.S. schedule B codes that are affected by retaliatory tariff increases. Depending on the number of digits of targeted products, the approach used to identify the corresponding U.S. products is as follows:

Step 1

For products at the 4- or 6-digit level, we assign all HS-10 schedule B numbers that belong to the same 4 or 6-digit HS codes in non-retaliatory countries as affected products.

Step 2

For products with more than 6-digit HS numbers, we develop a token-based matching method to identify the corresponding U.S. Schedule B numbers. Specifically, we first match the product codes in a retaliatory country to all potential HS codes with the same six-digit number in non-retaliatory countries. If there is only one 10-digit U.S. HS code that can be matched, then the corresponding 10-digit HS code is the code under investigation.

Step 3

For codes with multiple potentially matched 10-digit HS codes, depending on the descriptions of the products, we obtain a similarity score for each potential pair of product codes using a token based matching approach. We then choose the pair with the highest matching score as the matched product codes.

Step 4

Considering that some countries, China, for instance, impose tariffs on the US at the 8-digit level, we also assign schedule B numbers that share the same 8-digit numbers as the selected schedule B numbers as affected products.

Matching Results

There is a total number of 6,950 products in the trade policy dataset in 2018. The matching process generates a total number of 7,521 Schedule B numbers that are affected. This set forms the basis of targeted products in our analysis. However, 324 policy codes cannot be matched with U.S. Schedule B numbers because the first six digits of the policy codes cannot be matched with any of the first six-digit of U.S. Schedule B numbers.

Caveats

The matching has several caveats. First, the token-based approach can generate mismatched pairs, and, for some products, matching based on description might not be appropriate. Future research can combine other methods, like data-driven approaches that rely on the similarity of trade flows of products, to match HS codes across countries. Second, 324 policy codes cannot be matched with any U.S. schedule B numbers. Future research efforts should be directed to investigate whether these policies are wrongly specified.

The method outlined above develops a concordance between U.S. schedule B numbers and HS codes of retaliatory countries to investigate the *trade destruction* and *trade deflection* effects. We use the same approach to develop a concordance between other non-retaliatory and retaliatory countries to investigate the *trade diversion* and *trade depression* effects.

Appendix (C) – Tables and Figures

Table A.1: Timeline of Retaliatory Tariffs against Manufacturing Trade of the United States

Retaliatory Country	Date Enacted	Products (# HS-8)	U.S. Import Trade		Other Import Trade		Tariffs	
			Value	Share	Value	Share	Before	After
China I	April 6	28	120	0.1	2,801	0.2	7.7	22.7
Mexico	June 5	54	1,021	0.6	1,956	0.9	9.6	30.8
Turkey	June 21	85	651	6.6	14,193	7.6	1.5	17.3
European Union	June 22	263	5,012	1.8	264,229	5.6	3.2	26.5
Canada	July 1	198	9,727	5.0	6,653	3.5	2.0	18.6
China II	July 2	90	13,308	10.7	30,113	2.0	23.9	48.9
China III	August 23	236	14,108	11.4	154,531	10.2	4.5	29.5
China IV	September 24	4,735	48,263	38.9	703,660	46.4	5.0	11.8
Russia	August 6	66	358	4.2	3,381	1.9	4.3	34.4
Total		5,755	92,559	11.9	1,181,515	16.8	7.3	21.7

Notes – This table summarizes the timeline of retaliatory tariffs against manufacturing products of the United States. All trade flows are measured in millions of USD, and shares are defined as the value of import trade for affected products divided by the total import trade of manufacturing products. The tariff changes are trade-value weighted *ad valorem* tariff changes for affected products.

Table A.2: Global Trade Flows of Manufacturing Products Before and After the Imposition of Retaliatory Tariffs

Panel (A): Export Trade of the United States

	With Retaliatory Country		With Other Countries	
Retaliatory Country	Before	After	Before	After
China I	1,348	610	2,262	2,676
Turkey	1,150	837	97,689	95,901
European Union	6,975	6,029	38,186	36,225
Mexico	1,687	1,686	4,524	3,956
Canada	13,784	12,334	17,130	18,497
China II	9,006	5,696	33,875	38,413
China III	18,107	9,198	169,890	176,539
Russia	214	100	15,943	15,881
China IV	43,536	38,281	648,531	644,894
Total	95,808	74,772	1,028,030	1,032,981

Panel (B): Export Trade of Non-Retaliatory Countries

	With Retaliatory Country		With Other Countries	
Retaliatory Country	Before	After	Before	After
China I	1867	1200	8861	9648
Turkey	2250	1787	64,534	66,452
European Union	64,915	62,903	214,350	216,864
Mexico	1,604	1,797	77,276	79,794
Canada	7,684	8,145	192,069	213,044
China II	36,467	30,500	220,973	195,882
China III	75,999	66,673	808,043	740,000
Russia	4,171	3,858	94,584	92,338
China IV	275,452	252,645	2,493,281	2,260,097
Total	470,409	429,507	4,173,970	3,874,118

Notes – The table shows export trade flows to retaliatory and other countries before and after the imposition of retaliatory tariffs against manufacturing products. We summarize trade flows twelve month before and after the tariff increases for the United States in Panel (A) and for other non-retaliatory countries in Panel (B). All trade values are expressed in millions of USD.

Table A.3: Trade Effects of Retaliatory Tariff Increases for Manufacturing Products

	Dummy Specification			Tariff Specification		
	Quantity	Value	Unit Value	Quantity	Value	Unit Value
Panel (A): Export Trade of the United States						
Trade Destruction (β)	−0.065**	−0.044**	0.016	−0.758**	−0.519***	0.108
	(0.025)	(0.022)	(0.016)	(0.321)	(0.091)	(0.129)
Trade Deflection (γ)	0.004	0.003	−0.000	0.042	0.036	−0.001
	(0.003)	(0.002)	(0.001)	(0.035)	(0.023)	(0.003)
Observations	59,904,640	59,904,640	21,371,833	59,904,640	59,904,640	21,371,833
R-squared	0.984	0.964	0.957	0.984	0.964	0.957
Panel (B): Export Trade of Non-Retaliatory Countries						
Trade Diversion (β)	0.032	0.017	0.004	0.156*	0.233**	0.005
	(0.023)	(0.016)	(0.017)	(0.082)	(0.105)	(0.210)
Trade Depression (γ)	−0.003	−0.004	0.006	0.068	0.019	−0.108
	(0.008)	(0.006)	(0.012)	(0.076)	(0.032)	(0.170)
Observations	96,659,118	96,659,118	54,233,887	96,659,118	96,659,118	54,233,887
R-squared	0.995	0.988	0.981	0.995	0.988	0.981

Notes – The table presents the estimation results of *trade destruction* and *trade deflection* effects using export data for the United States and *trade diversion* and *trade depression* effects export data for other non-retaliatory countries. The estimates of trade effects for the dummy specification are reported in columns (3)-(5) and for the tariff specification in columns (6)-(8). Standard errors are clustered at the country-pair and tariff-line level (HS-8 or HS-10).