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Kazunobu HAYAKAWA*

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Keywords: ASEAN, US-China trade war; Tariffs

JEL Classification: F15; F53

* Senior Research Fellow, Bangkok Research Center, IDE (kazunobu_hayakawa @jetro.go.jp)

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INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

The Trade Impact of U.S.-China Conflict in Southeast Asia

Kazunobu HAYAKAWA[§#]

Bangkok Research Center, Institute of Developing Economies, Thailand

***Abstract*:** This study empirically examines the effects of the U.S.-China tariff war on exports to the U.S. from Southeast Asian countries and these countries' imports from China. To do that, we estimate various equations for monthly trade during the period from January 2018 to December 2019. As a result, we found that some Southeast Asian countries increased their exports to the U.S. At the same time, some Southeast Asian countries also increased their imports from China. Most countries experienced either an increase in exports to the U.S. or an increase in imports from China, but not both. Exceptions include Cambodia and Vietnam, which had increases in both categories. In particular, we found some suggestive evidence that certain products made in China are re-exported to the U.S. through these countries to sidestep the tariffs imposed by the U.S. on China.

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1. Introduction

In the latter half of the 2010s, a trade war broke out between the U.S. and China. The U.S. initiated the trade war by implementing a four-phase increase in tariffs on imports from China.[1] The tariff increase in the U.S. was gradual and expanded to a larger number of products over time. In retaliation, China also imposed additional tariffs on an array of products imported from the U.S. The U.S. has restricted not only imports from, but also exports to, China. In August 2018, the U.S. strengthened export control from the perspective of national security and regulated exports of key technology and component to China. In retaliation, China introduced an export control law, as well as an anti-foreign sanctions-blocking law.[2] As of October 2022, this trade war shows no signs of ending.

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Author: Kazunobu Hayakawa; Address: JETRO Bangkok, 127 Gaysorn Tower, 29th Floor, Ratchadamri Road, Lumphini, Pathumwan, Bangkok 10330, Thailand; Tel: 66-2-253-6441; Fax: 66-2-254-1447; E-mail: kazunobu_hayakawa@ide-gsm.org.

[1] See Bown (2021) for details on the timing and scale of the products subject to the tariff changes in the U.S.-China trade war.

[2] These laws include the Unreliable Entity List, the Rules on Counteracting Unjustified Extraterritorial Application of Foreign Laws and Other Measures, and the Anti-Foreign Sanctions Law.

This paper empirically investigates how the tariff war has changed trade in the Association of Southeast Asian Nations (ASEAN). While the increase in U.S. tariffs on goods from China decreased China's exports to the U.S., we examine two other impacts in this study. First, we look at the impact of those U.S. tariffs on ASEAN countries' exports to the U.S. As a substitute for Chinese exports, exports from ASEAN countries to the U.S. market may increase, i.e., trade diversion. Second, we look at the impact on imports to ASEAN countries from China. Since firms in China cannot export their goods to the U.S. market without paying high tariffs, they may switch to exporting their goods to neighboring countries, i.e., trade deflection. We focus our attention on ASEAN because this region may receive large impacts from changes in China's economy due to its geographical proximity to China. Indeed, we later empirically demonstrate the greatest trade deflection of China's exports to ASEAN countries. To examine these impacts in the short run, we employ monthly trade data from January 2018 to December 2019, which is the period when the U.S. raised tariffs against goods from China.

Indeed, there is much anecdotal evidence for the impacts we are examining. Due to the decrease in China's exports to the U.S. market, various other players in ASEAN have begun to export to the U.S., including not only indigenous firms but also Chinese firms and multinational firms. Indeed, the presence of Chinese multinational enterprises in the ASEAN market has been rising dramatically. Figure 1 shows the trend of ASEAN's inward foreign direct investment (FDI) flow in the manufacturing industry.[3] In most study years, either Japan, Singapore, or the U.S. was the top investor in ASEAN. However, the flow from China has been growing. Especially in 2019 and 2020, the FDI flow from China is larger than those from Japan and Singapore, and China ranked as the second largest investor. Among multinational firms, on the other hand, a Japanese multinational electronics company, Ricoh Company, Ltd, moved the production base of multi-function printers for the U.S. market from China to Thailand.[4] Such relocations of production bases may increase ASEAN exports to the U.S. Also, we observed an increase in imports from China in ASEAN. For example, a Japanese automobile parts company in Vietnam claimed that the parts originally intended for export from China to the U.S. were instead distributed in the Vietnamese market.[5]

=== Figure 1 ===

In particular, our study sheds light on the net impact of the two impacts discussed

[3] These data are obtained from ASEANStats. Note that in this figure, FDI flow from China includes the flows from not only China but also Hong Kong.

[4] Several examples are available in an article by Nikkei Asia on July 18, 2019: https://asia.nikkei.com/Economy/Trade-war/China-scrambles-to-stem-manufacturing-exodus-as-50-companies-leave.

[5] https://www.jetro.go.jp/biz/areareports/special/2019/1201/841dfbc3ab6705b9.html

above on ASEAN countries, i.e., the impacts on exports to the U.S. and imports from China. For example, some ASEAN countries increased exports to the U.S., while some other ASEAN countries increased imports from China. In terms of the effects on trade accounts, countries with greater exports to the U.S. increased their trade surplus, while countries with greater imports from China increased their trade deficit. In some cases, ASEAN countries may have experienced both increases in exports to the U.S. and imports from China. Such simultaneous increases may be simply the combination of both trade diversion and trade deflection, or it may indicate that an ASEAN country is being used as a trans-shipment platform for Chinese exports to sidestep the tariffs imposed by the U.S. on China (Ha and Phuc, 2019).[6] The latter case may raise tensions between ASEAN and the U.S. In sum, the implications of our findings differ depending on the specific case.

Our study clearly belongs to the literature on the U.S.-China tariff war.[7] Many studies have examined the direct effects of tariffs on the U.S. economy (Amiti et al., 2019; Amiti et al., 2020; Fajgelbaum et al., 2020; Cavallo et al., 2021; Handley et al., 2020; Egger and Zhu, 2020; Blanchard et al., 2019) or the China's economy (Ma et al., 2021; Chor and Li, 2021; Cui and Li, 2021). Fewer studies have investigated the trade effects on third economies. For example, Cigna et al. (2022) report no significant changes in U.S. imports from third countries in the short term. Ma et al. (2021) demonstrate that the trade diversion effect in China's imports was observed only in those from Brazil and South Africa.[8] A more comprehensive analysis on trade diversion effects was undertaken by Fajgelbaum et al. (2020), which found that some countries gained from the trade war in terms of their total export increase, while others lost from it. To the best of our knowledge, no studies have investigated the deflection of China's *exports* to third countries in the context of the U.S.-China trade disputes. Therefore, no studies have compared exports to the U.S. and imports from China. However, as mentioned above, this analysis leads various implications.[9]

This study is also related to the literature on trade rerouting. For example, Rotunno et al. (2013) showed that U.S. quotas on Chinese apparel induced China to export to the U.S. through African countries. Liu and Shi (2019) found evidence of Chinese exporters' evasion

[6] Many pieces of anecdotal evidence on such trans-shipment are available. See, for example, https://www.reuters.com/article/us-usa-trade-china-vietnam-idUSKCN1TB0I3, https://www.woodworkingnetwork.com/cabinets/us-customs-border-protection-finds-us-cabinet-depot-evading-cabinet-duties, https://www.woodworkingnetwork.com/news/woodworking-industry-news/customs-finds-cabinet-importers-evaded-chinese-duties-transshipping, and https://www.forest-trends.org/blog/us-customs-and-border-protection-cbp-finds-chinese-timber-products-fraudulently-sold-in-us-as-made-in-vietnam-in-order-to-evade-tariffs/.

[7] See, for example, Fajgelbaum and Khandelwal (2022) for the review of this literature.

[8] Choi and Nguyen (2021) examined exports from Vietnam to the U.S. and found that they increased.

[9] Yang and Hayakawa (2022) also examined Taiwan's exports to the U.S. and imports from China. However, their study shed light on the input-output linkage in Taiwan, i.e., its imports of inputs from China and exports of outputs to the U.S. On the other hand, our paper examines the exports and imports of the same product.

of U.S. anti-dumping duties through trade rerouting, especially via countries that are geographically closer to China or have a relatively large ethnic Chinese population. Similarly, Li and Lin (2022) showed that Chinese exporters evaded U.S. technical barriers to trade through U.S. free trade agreement partner countries, especially those that are near China or have similar institutions as China, better political relations with China, a larger Chinese population, or linguistic commonality with China. On the other hand, we examine China's trade rerouting in a different context, namely the U.S.-China tariff war.

There are some other differences between our study and previous studies in the trade-rerouting literature. First, we focus on ASEAN, which is likely to receive large impacts due to its geographical proximity to China, as shown in the studies discussed above. Second, we do not restrict our analysis only to trade rerouting because the anecdotal evidence above suggests the existence of not only trade rerouting but also U.S. trade diversion and China's trade deflection. Indeed, if Chinese or multinational firms relocating from China produce their products in an ASEAN country and export them to the U.S., we will observe a significant increase in exports to the U.S. but not in imports from China. Similarly, if inputs imported from China are further processed in ASEAN and then are exported to the U.S., we may not observe increases in both exports to the U.S. and imports from China within the same product category. Third, to compare between these exports and imports in each ASEAN country, we conduct mainly country-by-country analyses rather than pooling trade values for all ASEAN countries.

Our findings can be summarized as follows. When examining the average effects of U.S. tariffs against China among all ASEAN countries, we do not see robust effects on exports to the U.S. or imports from China. On the other hand, country-by-country analyses reveal that some ASEAN countries increased their exports to the U.S. for certain products facing higher U.S. tariffs against China, resulting in an increase in their trade surplus. Some countries also increased their imports from China and thus incurred an increase in their trade deficit. Most ASEAN countries experienced an increase in either their exports to the U.S. or their imports from China, but not both. Exceptions to this include Cambodia and Vietnam, which had increases in both categories. In these two countries, import prices from China also rose significantly though we do not see any changes in export prices to the U.S. In addition, although they share national borders with China, exports from China by land transport did not change significantly. Lastly, we found some suggestive evidence that products made in China are re-exported to the U.S. through some countries, including Cambodia and Vietnam, to sidestep the tariffs imposed by the U.S. on China.

The rest of this study is organized as follows. The next section provides an overview of the ASEAN economy. After explaining our empirical framework in Section 3, Section 4 reports our estimation results. Section 5 concludes this study.

2. A Brief Overview of ASEAN

This section presents various statistics on ASEAN to understand its potential to induce changes in exports to the U.S. and imports from China. We use statistics from 2017, which is just before the tariff war. One of the most basic statistics is gross domestic product (GDP), which is shown in the GDP column in Table 1. For reference, we also report GDP in India, Japan, and South Korea. The data are obtained from the World Development Indicators published by the World Bank. Larger GDP may indicate larger supply and demand within that country, which may increase exports to the U.S. and imports from China, respectively. Among ASEAN countries, Indonesia has the largest GDP, followed by Thailand. Malaysia, the Philippines, Singapore, and Vietnam are middle-sized countries. In particular, the recent GDP growth in Vietnam is noteworthy. On the other hand, Brunei, Cambodia, Laos, and Myanmar are small economically in terms of overall GDP, but per capita GDP is very high in Brunei.

=== Table 1 ===

Next, we examine how similar the export structures are in ASEAN countries and China. To this end, we compute the export similarity index (*ESI*) proposed in Finger and Kreinin (1979), which is given by

$$ESI_i \equiv \sum_p \min\left(\frac{Export_{i,US,p}}{\sum_p Export_{i,US,p}}, \quad \frac{Export_{CN,US,p}}{\sum_p Export_{CN,US,p}}\right). \tag{1}$$

$Export_{i,US,p}$ refers to exports of product p from country i to the U.S. Similarly, $Export_{CN,US,p}$ is exports from China. This index reflects a unit interval, with a higher value indicating greater similarity in export bundle to the U.S. between the relevant country and China. We compute this index for ASEAN countries, as well as for some other Asian countries for reference, by using the data on U.S. imports in 2017, which are obtained from the Global Trade Atlas (IHS Markit). Product is aggregated at the four-digit, six-digit, eight-digit, or ten-digit Harmonized System (HS) code level.

The results are shown in the Export Similarity Index column in Table 1. The order of the index looks similar across HS code groupings. In particular, Vietnam has the highest similarity values in most product categories. Thailand and Malaysia also show relatively high values. These countries may be more likely to increase their exports to the U.S. since fewer production adjustments are needed in order to substitute for Chinese exports. Also, this similarity in outputs may also result in similar input demand. Therefore, more inputs produced in China may go to these countries. In sum, in terms of production structure, the increases in exports to the U.S. and imports from China may be likely to occur in these countries.

Next, we investigate the feasibility of trade rerouting via ASEAN. It may be more possible to bypass trade barriers through ASEAN countries with a similar political stance as China. To assess similarity of political stances, we use the similarity index of voting alignment in the United Nations General Assembly (UNGA), the data of which are obtained from Bailey et al. (2017).[10] This index indicates the similarity of state preferences inferred from voting behavior in the UNGA. For example, there is ample evidence that G7 governments place some weight on the outcome of General Assembly votes (e.g., Dreher and Sturm, 2012). The Vote Similarity column in Table 2 indicates the similarity indices with China and the U.S. The index for China does not differ greatly across ASEAN countries but is relatively high in Cambodia, Laos, and Vietnam. These countries also have a relatively low similarity index for the U.S.

=== Table 2 ===

Trade rerouting for bypassing trade barriers may also be possible through ASEAN countries with lower quality of institutions or governance. To measure institutional quality, we examine four indices that are drawn from the Worldwide Governance Indicators published by the World Bank, including control of corruption (e.g., the extent that public authorities can limit corruption), government effectiveness (e.g., the quality of public services), regulatory quality (e.g., the ability of the government to formulate and implement sound policies and regulations), and rule of law (e.g., the quality of contract enforcement, property rights, the police, and the courts). These indices range from −2.5 to 2.5, with higher values indicating better quality. The indices are shown in Governance column in Table 2. Overall, Brunei, Malaysia, and Singapore have relatively high values, while relatively low values are found in Cambodia, Laos, Myanmar, and Vietnam. The latter countries may be more likely to become trans-shipment platforms for Chinese exports.

3. Empirical Framework

This section explains our empirical framework for investigating the trade effects of U.S. tariffs on goods from China. Focusing on the period from January 2018 to December 2019, we examine monthly trade and tariffs. First, as found in the previous studies, the tariff hike in the U.S. against goods from China contributed to decreases in China's exports to the U.S. Such a decrease may induce other countries to increase export to the U.S. in place of China. To examine this hypothesis for exports from ASEAN countries to the U.S., we regress the following equation.

[10] https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/LEJUQZ

$$Export_{cpt} = \exp\{\alpha \times \ln(1 + Tariff_{pt}) + \delta_{cp} + \delta_{ct}\} \times \epsilon_{cpt} \quad (2)$$

The dependent variable ($Export_{cpt}$) is the exports of product p from ASEAN country c to the U.S. at time t. Product p is defined at the six-digit HS code classification level, while time t is defined at a monthly basis.

The main independent variable is $Tariff_{pt}$, which is applied tariffs in the U.S. against product p from China at time t. We expect the coefficient for this tariff variable (α) to be positively estimated. Namely, ASEAN countries are expected to increase exports to the U.S. for products where the U.S. tariffs on China rose. In the later analyses, we also introduce the one-month and two-month lagged tariffs to capture the delayed effects. We also introduce country-product fixed effects (δ_{cp}) and country-time fixed effects (δ_{ct}). The country-product fixed effects will control for U.S. tariffs on goods from ASEAN countries because those tariffs differ by product but do not change much over time. Also, this type of fixed effect may control for the potential size of product-level demand in the U.S. and the productivity/international competitiveness of ASEAN countries. The country-time fixed effects control for ASEAN countries' export trend in the pre-war period. They will also control for the over-time change of factor prices (e.g., land prices or wages) in ASEAN countries. ϵ_{cpt} is a disturbance term. We estimate this equation by the Poisson Pseudo Maximum Likelihood (PPML) method.

Second, due to the tariff hike in the U.S. against goods from China, exporters in China may sell their products to neighboring countries rather than to the U.S. To examine this hypothesis for imports to ASEAN countries from China, we regress the following equation for each country.

$$Import_{cpt} = \exp\{\beta \times \ln(1 + Tariff_{pt}) + \theta_{cp} + \theta_{ct}\} \times \varepsilon_{cpt} \quad (3)$$

The specification is the same as equation (2), except for the dependent variable ($Import_{cpt}$), which is the imports of product p from China in ASEAN country c at time t. Product p is defined at a six-digit level of HS classification. If the hypothesis above is true, the coefficient for U.S. tariffs (β) will be positively estimated. Namely, ASEAN countries are expected to increase imports from China of the products where the U.S. tariffs on China rose.

In this model, country-product fixed effects (θ_{cp}) and country-time fixed effects (θ_{ct}) control for the following elements. As in equation (2), the country-product fixed effects will control for the potential size of product-level demand in ASEAN countries and the productivity/international competitiveness in China, as well as China's export trend in the pre-war period. ASEAN countries' tariffs against goods from China are also controlled by this type of fixed effect because these tariffs do not change for almost all products during our study period.[11] The country-time fixed effects will control for the over-time change of

[11] The tariff reduction based on the ASEAN-China free trade agreement was completed in 2018.

factor prices (e.g., land prices or wages) in China. ε_{pt} is a disturbance term. We estimate this equation by the PPML method.

There are three empirical issues. First, we treat U.S. tariffs for goods from China as exogenous to our study countries' exports to the U.S. and imports from China. Since U.S. trade sanction clearly targets China, this assumption appears to be reasonable. Furthermore, as explained above, we introduce product fixed effects and time fixed effects to reduce the risk of omitted variable bias. Second, in order to obtain the implications of the net effect, we use the same set of observations in estimating equations (2) and (3).[12] Then, we interpret the difference in the estimates between exports and imports as the net effect. As discussed above, this sample selection will not cause endogeneity bias. Third, Chinese exporters who do not experience a tariff hike in the U.S. market may also change their behavior in preparation for future tariff hikes (e.g., decreasing their exports to the U.S.). In this case, our estimates will likely be underestimated, rather than overestimated.

Our data sources are as follows. The data on trade values (i.e., $Export_{cpt}$ and $Import_{cpt}$) are obtained from the Global Trade Atlas (IHS Markit). We obtain the figures for exports from the import data for the U.S., while those for imports are drawn from the export data for China. The data on U.S. tariffs are drawn from the World Integrated Trade Solution, the replication files of Fajgelbaum et al. (2020), and the Notices of Modification by the Office of the United States Trade Representative. Figure 2 depicts the changes in ASEAN exports to the U.S. and ASEAN imports from China, in addition to U.S. tariffs against goods from China. ASEAN exports and imports are normalized so that those in January 2018 become a value of one. Overall, except for ASEAN imports from China in February 2019 (the lunar new year season in China), both the exports and imports increased gradually. From January 2018 to December 2019, those values increased by 20-40%. Furthermore, we can see similar changes between exports to the U.S. and imports from China in some months.

=== Figure 2 ===

4. Empirical Results

This section reports our estimation results. In all estimations, the standard errors are clustered by products. We first demonstrate the significant effect of the tariff war on ASEAN's imports from China, compared with other regions' imports. Then, focusing on ASEAN's trade, we estimate our models specified in the previous section. Last, to see more closely what was going on in ASEAN, we conduct some further analyses.

[12] The estimation results for all observations are available in the Appendix.

4.1. Basic Analyses

Before estimating equations (2) and (3) for ASEAN countries, we show the significance of ASEAN's imports from China. Specifically, we estimate the following equations for all countries in the world.

$$\ln Import_{cpt} = \beta \times \ln\left(1 + Tariff_{pt}\right) + \ln\left(1 + Tariff_{pt}\right)\mathbf{R}'\boldsymbol{\gamma} + \theta_{cp} + \theta_{ct} + \varepsilon_{cpt} \qquad (4)$$

Variable descriptions are same as those in equation (2). Namely, the dependent variable is a log of imports of product p from China in country c at time t. The main explanatory variable is a log of (one-plus) U.S. tariffs of product p imported from China at time t. In this equation, this tariff variable is interacted with a vector of region dummy variables, **R**. Specifically, the world is divided into seven regions, including ASEAN, Africa, America, East Asia (Japan, South Korea, and Taiwan), Other Asia, Europe, and Oceania. Due to the large number of study countries in this equation, we use the ordinary least square (OLS) method, i.e., drop observations with zero-valued imports.

The OLS estimation result of equation (4) is shown in column (I) in Table 3. We set ASEAN as a base region. The coefficient for (non-interacted) tariffs is significantly positive. Except for the case of "Other Asia," all regions have negative coefficients, some of which are significant. In column (II), we use one-month lagged tariffs and found that all regions including "Other Asia" have negative coefficients. Qualitatively similar results are found in column (III), which uses two-month lagged tariffs. These results are unchanged even if we control for product-time fixed effects, as shown in columns (IV)-(VI). In short, ASEAN increased the imports of sanctioned products from China most greatly in the world. To see more closely what was going on in ASEAN, we focus on ASEAN trade in the analyses below.

=== Table 3 ===

The left-upper panel in Table 4 shows the results of estimating equation (2) for ASEAN countries by the PPML method. Column (I) shows that the coefficient for concurrent tariffs is not statistically significant. In column (II), we add one-month and two-month lagged tariffs. Row "Sum" indicates the sum of the coefficients for tariffs, for which the chi-squared test is conducted. In column (II), two-month lagged tariffs have a significantly positive coefficient, but the sum of the coefficients is insignificant. Thus, on average, ASEAN countries do not significantly increase their exports of sanctioned products to the U.S. The right-upper panel shows the results of estimating equation (3). Again, in column (IV), we add lagged tariff variables. All coefficients and their sum are insignificantly estimated, indicating the insignificant changes in ASEAN's imports from China.

=== Table 4 ===

Next, we estimate logged versions of equations (2) and (3) by the OLS method. The key difference with the PPML method is that we do not include zero-valued observations in the OLS method. In other words, we restrict our study observations only to country-product pairs where trade linkages already exist. Since the existence of such U.S. or Chinese trade linkage with ASEAN is not associated with U.S. tariffs against China, this restriction will not yield sample selection bias.

The estimation results are reported in lower part of Table 4. For exports to the U.S., the concurrent tariffs have a significantly positive coefficient in column (I). In column (II), the coefficient for the three-month lagged tariffs and the sum of the three coefficients are significantly positive. Thus, on average, ASEAN countries significantly increase their exports to the U.S. of products for which U.S. tariffs against China increased when we focus on the country-product pairs where trade linkages already existed. For imports from China, on the other hand, the concurrent tariffs have an insignificant coefficient in column (III). In column (IV), the coefficient for the three-month lagged tariffs and the sum of the three coefficients are significantly positive. Therefore, in this restricted sample, ASEAN countries significantly increased their imports from China of products for which U.S. tariffs against China increased. Comparing the sum of the coefficients between exports and imports, we can see that exports to the U.S. increased more greatly than imports from China in terms of elasticities.

So far, we have investigated the average effects among ASEAN countries. Next, we estimate our model by ASEAN countries individually since only some specific countries may receive the trade effects of U.S. tariff changes. Table 5 shows the results of estimating equations (2) and (3) by ASEAN country using the PPML method. We estimate the model with lagged tariffs. As in the previous estimation, we use the same set of products in estimating equations (2) and (3) to see the net effect. Some countries show significant results in the sum of coefficients. The significant increase for exports to the U.S. can be found for Brunei, Indonesia, Cambodia, and Myanmar, while Laos and Vietnam experience a significant increase for imports from China. These results indicate that countries with an increase in exports to the U.S. are different from those with an increase in imports from China.

=== Table 5 ===

We also estimate these models using the OLS method, i.e., focusing on the country-product pairs with existing trade linkages. The results are shown in Table 6 and are slightly different from those when using PPML, though the number of observations is too small in the cases of Brunei and Laos. A significant increase in exports to the U.S. can be found in Indonesia, Cambodia, Myanmar, Thailand, and Vietnam, while Brunei, Cambodia, Laos, and Vietnam experienced a significant increase in imports from China. In particular,

Cambodia and Vietnam experienced significant increases in both exports to the U.S. and imports from China. Furthermore, the net effect in these two countries is negative. Namely, for products for which U.S. tariffs against China increased, the two countries increased imports from China more greatly than exports to the U.S. in terms of elasticities.

=== Table 6 ===

3.2. Further Analyses

Why do Cambodia and Vietnam increase both exports to the U.S. and imports from China? To investigate this question, we first examine export prices to the U.S. and import prices from China by estimating the following equations for each country c by the OLS method.

$$\ln Export\ price_{cpt} = \alpha_0 \times \ln\left(1 + Tariff_{pt}\right) + \alpha_1 \times \ln\left(1 + Tariff_{pt-1}\right) + \alpha_2 \times \ln\left(1 + Tariff_{pt-2}\right) + \delta_{cp} + \delta_{ct} + \epsilon_{cpt} \quad (5)$$

$$\ln Import\ price_{cpt} = \beta_0 \times \ln\left(1 + Tariff_{pt}\right) + \beta_1 \times \ln\left(1 + Tariff_{pt-1}\right) + \beta_2 \times \ln\left(1 + Tariff_{pt-2}\right) + \theta_{cp} + \theta_{ct} + \epsilon_{cpt} \quad (6)$$

The results are shown in Table 7. In Cambodia and Vietnam, we can see a significant increase in import prices from China, while the effect on the export prices to the U.S. is insignificant. Thus, products imported from China may have changed qualitatively after the U.S.-China trade war. In particular, even if Chinese exporters switched sales destinations from the U.S. to these countries because of rising tariffs in the U.S. market, they did not necessarily sell their products at a greatly reduced price.

=== Table 7 ===

Next, we examine ASEAN imports from China by transport mode. We have found significant results in Cambodia, Laos, Myanmar, and Vietnam. One clear common characteristic among these four countries is that they share national borders with China. Therefore, on-land transport shipments may play a crucial role in those results. Specifically, we estimate equation (3) by transport mode. We classify it into three modes, including (i) air or sea (Air/Sea), (ii) automobile or railway (Auto/Rail), and (iii) other modes such as mail (Others). The data are obtained from the Global Trade Atlas but are available only in 2018. The results by the PPML and OLS methods are shown in Table 8. The results, which are inconsistent with our expectation above, show that the sum of coefficients is significantly negative for automobile or railway transport, while it is significantly positive for air or sea transport. Thus, an increase in imports from China was not observed for over-land transport

shipments.[13]

=== Table 8 ===

Last, we examine the linkage between exports and imports. One natural question regarding the increase for certain countries in both exports to the U.S. and imports from China is that products imported from China are re-exported to the U.S. without substantial changes. To investigate this possibility, we estimate the model used in the trade-rerouting literature, which is introduced in Section 1. Specifically, we estimate the following equations for each country c.

$$\ln Export_{cpt} = \alpha_0 \times \ln Import_{cpt-1} + \alpha_1 \times \ln\left(1 + Tariff_{pt-1}\right) + \alpha_2 \times \ln Import_{cpt-1} \times \ln\left(1 + Tariff_{pt-1}\right) + \delta_{cp} + \delta_{ct} + \epsilon_{cpt} \quad (7)$$

$$Export_{cpt} = \exp\{\beta_0 \times \ln Import_{cpt-1} + \beta_1 \times \ln\left(1 + Tariff_{pt-1}\right) + \beta_2 \times \ln Import_{cpt-1} \times \ln\left(1 + Tariff_{pt-1}\right) + \theta_{cp} + \theta_{ct}\} \times \epsilon_{cpt} \quad (8)$$

$$\operatorname{arcsinh}\left(Export_{cpt}\right) = \gamma_0 \times \operatorname{arcsinh}\left(Import_{cpt-1}\right) + \gamma_1 \times \operatorname{arcsinh}\left(1 + Tariff_{pt-1}\right) + \gamma_2 \times \operatorname{arcsinh}\left(Import_{cpt-1}\right) \times \operatorname{arcsinh}\left(1 + Tariff_{pt-1}\right) + \vartheta_{cp} + \vartheta_{ct} + \epsilon_{cpt} \quad (9)$$

In equation (9), we take the inverse hyperbolic sine (or arcsinh) transformation[14] for all variables. Because $\operatorname{arcsinh}(0) = 0$, zero-valued variables can be included in our analysis.[15] We estimate equations (11) and (9) by the OLS method and equation (8) by the PPML method. Observations with zero-valued exports are included in equations (8) and (9) but not in equation (11). Similarly, observations with zero valued-imports are included in equation (9) but not in equations (7) and (8).

In these models, the coefficient for tariffs captures the effect of trade diversion, i.e., increases in U.S. imports from third countries, while the coefficient for imports from China indicates the extent of trade rerouting. To strengthen the empirical identification of trade rerouting, the model further introduces the interaction term between these two variables, of which the coefficient indicates how much such rerouting is stronger for the products with higher U.S. tariffs against goods from China. Nevertheless, the positive coefficient for this interaction term is just suggestive evidence of trade rerouting. Indeed, it could be driven by

[13] We also estimate this model by countries. For example, we do not find a significantly positive sum of coefficients for Vietnam.

[14] In general, $\operatorname{arcsinh}(x) = \ln\left(x + \sqrt{x^2 + 1}\right)$.

[15] One limitation is that, as demonstrated in Bellemare and Wichman (2020), this arcsinh–arcsinh specification allows us to interpret coefficients as elasticities if the variables take large values (e.g., >10). Since tariffs do not meet this requirement, we refrain from quantitatively interpreting the results of tariffs.

other channels and may indicate only the combination of trade diversion and trade deflection. Namely, our analysis here is not a direct examination of re-exporting. To take the possible time lag in this rerouting into account, we use one-month lagged imports and thus one-month lagged tariffs.

The estimation results are reported in Table 9. We only show coefficients for the interaction term. Although all three estimations do not necessarily show significant results, significantly positive coefficients can be found in many countries, including Indonesia, Cambodia, Laos, Myanmar, Malaysia, Thailand, and Vietnam. In particular, as is consistent with the previous results, Cambodia and Vietnam have significant results. The results here *suggest* the potential re-exporting of products made in China to the U.S. through these countries. According to our observations in Section 2, Cambodia, Laos, and Vietnam have a similar political stance to China and lower institutional quality. Also, Malaysia, Thailand, and Vietnam have similar export structures as China. In terms of meeting all three characteristics here, Vietnam might be the best trans-shipment platform for Chinese exports.

=== Table 9 ===

5. Concluding Remarks

This study examined the effects of the U.S.-China tariff war on ASEAN exports to the U.S. and ASEAN imports from China. For this analysis, we estimated various equations for trade during the period of January 2018 to December 2019. As a result, we found that some countries increased their exports to the U.S. and had an increase in their trade surplus, while some other countries increased their imports from China and thus their trade deficit. Most countries experienced either an increase in exports to the U.S. or imports from China, but not both, with the exception of only Cambodia and Vietnam, which had an increase in both categories. Notably, we found some suggestive evidence that certain products made in China are re-exported to the U.S. through these countries to sidestep the tariffs imposed by the U.S. on China.

The re-exports of Chinese products to the U.S. via ASEAN may lead to the spread of the trade war to ASEAN. Indeed, the U.S. government has investigated ASEAN countries in many cases for anti-dumping and countervailing measures, including solar panels in Cambodia, Malaysia, Thailand, and Vietnam and automotive tires in Thailand and Vietnam. In order to avoid creating "a chilling effect" against "normal exporters" in ASEAN, it is crucially important for ASEAN to prevent this kind of re-exporting by tightening the rules on certificates of origin. Indeed, the Thai government has tightened factory inspections for this purpose. Also, the Vietnamese government has changed the criteria of "made-in-Vietnam" and now requires manufacturers to add processing values of more than 30% of product prices. Such an effort or policy change should be implemented throughout the

whole ASEAN.

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Table 1. GDP (in Billions of USD) and Export Similarity Indices with China's Exports to the U.S for ASEAN and Selected Countries

	GDP	Export similarity index			
		4-digit	6-digit	8-digit	10-digit
BN	12	0.087	0.061	0.058	0.046
ID	1,016	0.302	0.230	0.204	0.188
KH	22	0.156	0.123	0.113	0.104
LA	17	0.207	0.100	0.089	0.076
MM	61	0.148	0.110	0.091	0.078
MY	319	0.384	0.244	0.232	0.216
PH	328	0.414	0.256	0.228	0.193
SG	343	0.183	0.153	0.137	0.129
TH	456	0.530	0.304	0.281	0.256
VN	281	0.444	0.386	0.368	0.348
IN	2,651	0.294	0.239	0.219	0.198
JP	4,931	0.282	0.233	0.216	0.201
KR	1,624	0.389	0.332	0.308	0.285

Source: Author's compilation.

Notes: This table reports GDP in 2017 and the export similarity index proposed in Finger and Kreinin (1979). We compute this index for ASEAN countries, as well as some other Asian countries for reference, by using data on U.S. imports in 2017. The index is computed by using the data aggregated at the 4-digit, 6-digit, 8-digit, and 10-digit HS code levels.

Table 2. Vote Similarity and Governance Indicators in 2017

	Vote similarity		Governance			
	China	USA	Corruption	Effectiveness	Regulation	Law
BN	0.79	0.31	0.708	1.140	0.714	0.642
ID	0.78	0.31	-0.281	0.014	0.042	-0.332
KH	0.83	0.28	-1.298	-0.655	-0.503	-1.059
LA	0.82	0.26	-0.938	-0.374	-0.733	-0.890
MM	0.76	0.31	-0.572	-1.066	-0.835	-0.946
MY	0.77	0.30	0.021	0.824	0.682	0.410
PH	0.78	0.33	-0.484	-0.001	0.141	-0.483
SG	0.79	0.32	2.129	2.214	2.113	1.816
TH	0.78	0.33	-0.423	0.304	0.021	0.034
VN	0.81	0.30	-0.599	0.008	-0.416	0.063
CN			-0.266	0.439	-0.164	-0.238
IN	0.78	0.34	-0.267	0.069	-0.241	-0.010
JP	0.68	0.53	1.518	1.612	1.372	1.560
KR	0.68	0.63	0.476	1.069	1.103	1.158

Sources: Bailey et al. (2017) and the Worldwide Governance Indicators (World Bank).

Table 3. OLS Results for Imports from China

	(I)	(II)	(III)	(IV)	(V)	(VI)
Tariff	0.122**	0.114**	0.146***			
	[0.057]	[0.057]	[0.056]			
Tariff * Africa	-0.042	-0.055	-0.109	-0.051	-0.062	-0.115*
	[0.073]	[0.071]	[0.071]	[0.070]	[0.068]	[0.068]
Tariff * America	-0.099	-0.096	-0.146**	-0.087	-0.096	-0.153**
	[0.066]	[0.065]	[0.064]	[0.065]	[0.064]	[0.063]
Tariff * East Asia	-0.168**	-0.166**	-0.236***	-0.140*	-0.151*	-0.225***
	[0.082]	[0.082]	[0.081]	[0.082]	[0.082]	[0.080]
Tariff * Other Asia	0.041	-0.021	-0.042	0.040	-0.029	-0.057
	[0.063]	[0.063]	[0.062]	[0.062]	[0.062]	[0.061]
Tariff * Europe	-0.114	-0.074	-0.018	-0.109	-0.089	-0.059
	[0.071]	[0.070]	[0.067]	[0.071]	[0.069]	[0.067]
Tariff * Pacific	-0.254***	-0.203**	-0.137	-0.251***	-0.213**	-0.157*
	[0.089]	[0.089]	[0.087]	[0.089]	[0.089]	[0.087]
Lag	0	1	2	0	1	2
Fixed effects	*cp, ct*	*cp, ct*	*cp, ct*	*cp, cp, ct*	*cp, cp, ct*	*cp, cp, ct*
Number of obs.	5,494,050	5,493,955	5,493,874	5,488,727	5,488,635	5,488,558
Adjusted R-squared	0.756	0.756	0.756	0.761	0.761	0.761

Source: Author's estimation.

Notes: This table reports the estimation results using the OLS method. The dependent variable is imports from China and is defined at a country-product-year level. The base region is ASEAN. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Lag" indicates the lag of tariff variables in terms of month.

Table 4. Estimation Results for Trade by ASEAN Countries

		Exports to the U.S.		Imports from China	
		(I)	(II)	(IV)	(V)
PPML					
	Tariff (*t*)	0.022	-0.237	0.076	-0.076
		[0.198]	[0.182]	[0.159]	[0.103]
	Tariff (*t*-1)		-0.159		0.077
			[0.119]		[0.125]
	Tariff (*t*-2)		0.540**		0.121
			[0.242]		[0.147]
	Sum		0.144		0.122
	Number of obs.	329,625	329,607	329,625	329,607
	Pseudo R-squared	0.951	0.951	0.961	0.961
OLS					
	Tariff (*t*)	0.232**	0.16	0.11	0.028
		[0.107]	[0.120]	[0.081]	[0.103]
	Tariff (*t*-1)		-0.094		-0.06
			[0.123]		[0.119]
	Tariff (*t*-2)		0.217*		0.189*
			[0.117]		[0.112]
	Sum		0.283**		0.157*
	Number of obs.	155,262	155,258	155,262	155,258
	Adjusted R-squared	0.797	0.797	0.869	0.869

Source: Author's estimation.

Notes: This table reports the estimation results using the PPML/OLS methods. In columns under "Exports to the U.S.," the dependent variable is exports from ASEAN countries to the U.S.; in the columns under "Imports from China," the dependent variable is their imports from China. The dependent variables are defined at an ASEAN country-product-year level. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for country-product fixed effects and country-time fixed effects.

Table 5. PPML Results for Exports to the U.S. and Imports from China by ASEAN Country

		Tariff (*t*)	*Tariff* (*t*-1)	*Tariff* (*t*-2)	Sum	N	PR-sq
BN	Exports	1.07	4.813*	6.618*	12.501**	2,136	0.859
	Imports	4.344**	1.756	-2.17	3.930	2,136	0.777
ID	Exports	0.311	-0.326	0.853***	0.838**	48,330	0.93
	Imports	-0.272	0.28	-0.083	-0.075	48,330	0.95
KH	Exports	0.413	-0.528	4.182***	4.067***	13,193	0.928
	Imports	-0.955	-0.299	1.881***	0.627	13,193	0.927
LA	Exports	-1.533	-1.693	3.958	0.732	3,164	0.912
	Imports	-5.767*	11.717*	1.956	7.906***	3,164	0.792
MM	Exports	-0.166	0.269	1.921**	2.024**	9,890	0.867
	Imports	-1.029*	0.204	0.416	-0.409	9,890	0.883
MY	Exports	-0.263	-0.411***	0.467*	-0.207	50,612	0.968
	Imports	0.005	0.516**	-0.217	0.304	50,612	0.954
PH	Exports	0.479	-0.544*	-0.623	-0.688	38,650	0.924
	Imports	-0.085	0.306	-0.005	0.216	38,650	0.958
SG	Exports	-1.060**	-0.103	0.586	-0.577	44,708	0.928
	Imports	-0.460*	-0.538	-0.032	-1.030**	44,708	0.969
TH	Exports	0.054	-0.055	0.275	0.274	62,641	0.944
	Imports	0.073	-0.008	-0.073	-0.008	62,641	0.96
VN	Exports	-0.414	0.165	0.692	0.443	56,283	0.955
	Imports	0.172	0.057	0.602*	0.831***	56,283	0.962

Source: Author's estimation.

Notes: This table reports the estimation results by ASEAN country using the PPML method. The dependent variables for the two estimations are each ASEAN country's exports to the U.S. (top row labeled "Exports") and that country's imports from China (bottom row labeled "Imports"), respectively. The dependent variables are defined at the product-year level. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for six-digit HS code fixed effects and time fixed effects. "N" refers to the number of observations. "PR-sq" indicates pseudo R-squared.

Table 6. OLS Results for Exports to the U.S. and Imports from China by ASEAN Country

		Tariff (*t*)	*Tariff* (*t*-1)	*Tariff* (*t*-2)	Sum	N	AR-sq
BN	Exports	-36.116***	54.010***	-16.817**	1.077	209	0.523
	Imports	13.509	15.648	-17.453*	11.704*	209	0.431
ID	Exports	0.634**	-0.627*	0.501*	0.508**	23,841	0.8
	Imports	-0.043	0.177	-0.032	0.102	23,841	0.86
KH	Exports	-0.85	0.994	1.158	1.302*	4,484	0.801
	Imports	1.262	-1.354	2.505**	2.413***	4,484	0.742
LA	Exports	0.732	2.288	-8.150***	-5.130***	505	0.669
	Imports	-2.439	6.624	4.776	8.961***	505	0.733
MM	Exports	1.083	0.086	1.013	2.182*	2,586	0.703
	Imports	1.76	-1.811	0.871	0.820	2,586	0.734
MY	Exports	0.02	-0.17	0.264	0.114	24,582	0.795
	Imports	0.285	0.052	-0.316	0.021	24,582	0.876
PH	Exports	-0.123	-0.128	-0.239	-0.490*	18,028	0.802
	Imports	-0.304	-0.443	0.179	-0.568**	18,028	0.865
SG	Exports	0.136	-0.543	0.525*	0.118	16,959	0.772
	Imports	-0.135	0.172	0.004	0.041	16,959	0.889
TH	Exports	0.229	0.294	-0.186	0.337*	34,304	0.789
	Imports	0.073	-0.051	-0.11	-0.088	34,304	0.875
VN	Exports	0.083	0.085	0.454*	0.622**	29,760	0.809
	Imports	-0.128	-0.13	0.998***	0.740***	29,760	0.863

Source: Author's estimation.

Notes: This table reports the estimation results by ASEAN countries using the OLS method. The dependent variables for the two estimations are each ASEAN country's exports to the U.S. (top row labeled "Exports") and that country's imports from China (bottom row labeled "Imports"), respectively. It is defined at the product-year level. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for HS six-digit fixed effects and time fixed effects. "N" refers to the number of observations. "AR-sq" indicates adjusted R-squared.

Table 7. OLS Results for Trade Prices in ASEAN Countries

		Tariff (*t*)	*Tariff* (*t*-1)	*Tariff* (*t*-2)	Sum	N	AR-sq
BN	Export	1.386	13.984	-15.318	0.052	199	0.872
	Import	-13.325	38.715	-19.84	5.550***	199	0.733
ID	Export	0.162	-0.222	-0.207	-0.267	14,280	0.902
	Import	-0.252	0.870***	-0.36	0.258	14,280	0.887
KH	Export	0.669	-0.094	-0.588	-0.013	2,526	0.894
	Import	1.873*	0.527	-0.146	2.254***	2,526	0.66
LA	Export	1.798	-1.861	0.163	0.100	259	0.929
	Import	0.929	5.822	-1.382	5.369	259	0.746
MM	Export	-0.305	0.218	-0.438	-0.525	1,684	0.84
	Import	0.035	0.081	-0.499	-0.383	1,684	0.73
MY	Export	0.254	0.17	-0.632	-0.208	15,160	0.857
	Import	0.284	-0.252	0.151	0.183	15,160	0.935
PH	Export	-0.078	-0.697	0.113	-0.662**	10,462	0.873
	Import	-0.336	-0.176	0.738**	0.226	10,462	0.901
SG	Export	0.434	-0.338	-0.299	-0.203	9,737	0.829
	Import	0.109	-0.175	0.015	-0.051	9,737	0.919
TH	Export	-0.341	-0.129	0.187	-0.283	21,137	0.902
	Import	-0.057	-0.01	0.123	0.056	21,137	0.947
VN	Export	0.654**	-0.567*	0.07	0.157	17,854	0.898
	Import	0.192	-0.34	0.566***	0.418***	17,854	0.917

Source: Author's estimation.

Notes: This table reports the estimation results by ASEAN countries using the OLS method. The dependent variables for the two estimations are the log of export prices to the U.S. for ASEAN countries (top row labeled "Exports") and the log of import prices from China for ASEAN countries (top row labeled "Imports"), respectively. The dependent variables are defined at the product-year level. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for product fixed effects and time fixed effects. "N" refers to the number of observations. "AR-sq" indicates adjusted R-squared.

Table 8. Estimation Results for Imports from China by Transport Mode

Method	PPML			OLS		
Transport mode	Air/Sea	Auto/Rail	Others	Air/Sea	Auto/Rail	Others
Tariff (*t*)	0.437***	-0.491	2.698	0.147	0.013	0.409
	[0.152]	[0.303]	[2.236]	[0.094]	[0.187]	[0.704]
Tariff (*t*-1)	0.121	-0.750***	-4.564**	0.076	-0.955***	0.478
	[0.169]	[0.212]	[2.054]	[0.101]	[0.197]	[0.978]
Tariff (*t*-2)	-0.172	-0.091	2.220***	-0.061	0.483***	-0.257
	[0.155]	[0.222]	[0.696]	[0.087]	[0.175]	[1.059]
Sum	0.386*	-1.332***	0.354	0.162*	-0.459***	0.63
N	378,156	224,868	33,168	267,281	108,762	10,776
Pseudo/adjusted R-sq.	0.947	0.962	0.96	0.8	0.75	0.769

Source: Author's estimation.

Notes: This table reports the estimation results using the PPML and OLS methods. The dependent variable is imports from China to ASEAN countries, defined at an ASEAN country-product-year level. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for country-product fixed effects and country-time fixed effects.

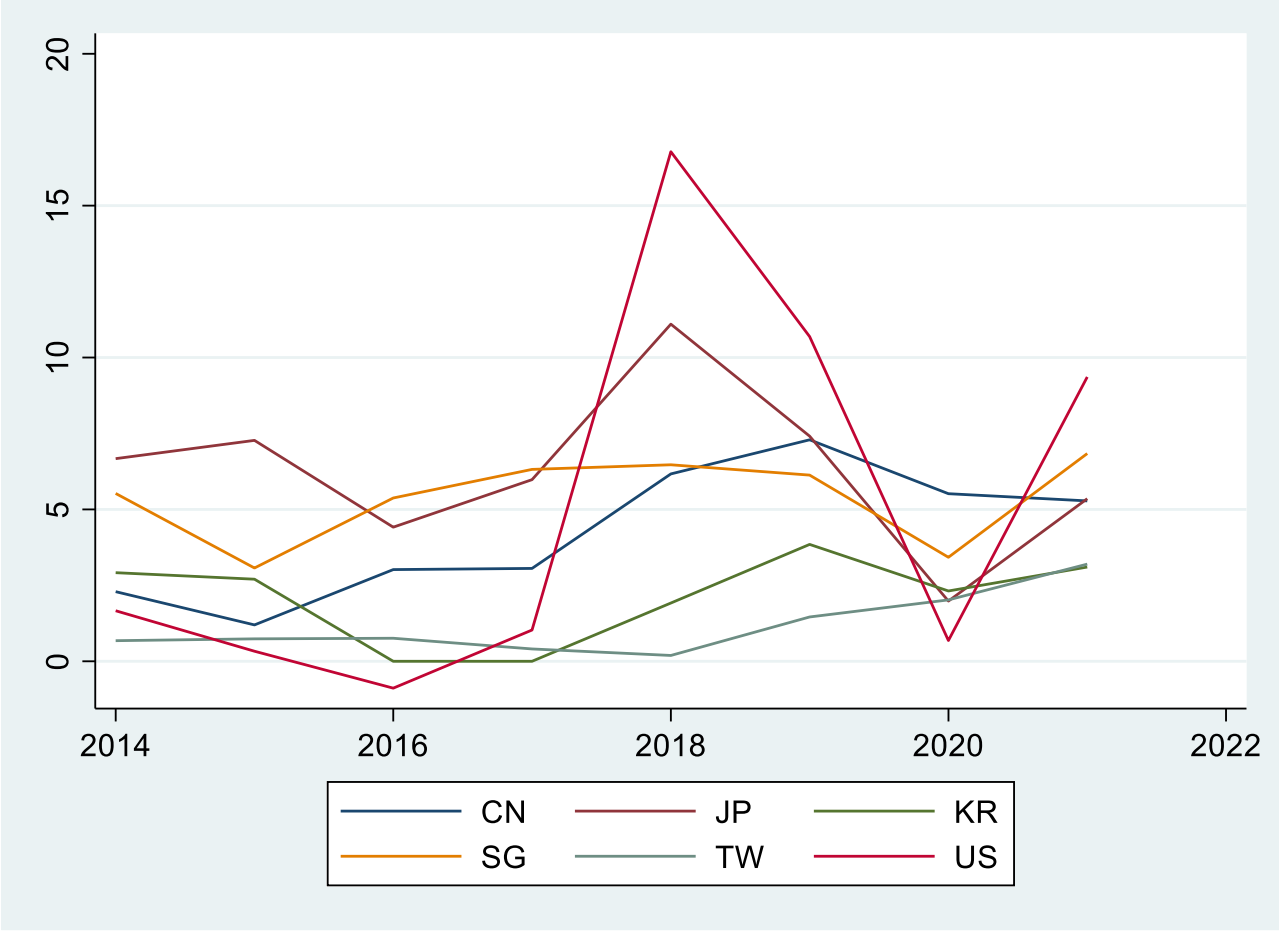
Table 9. Results for Trade Rerouting by ASEAN Countries

Equation	(11)	(12)	(13)
Transform	log	log	asinh
Method	OLS	PPML	OLS
BN	0.509	0.650	-0.007
ID	0.121*	0.220**	0.062***
KH	0.356**	0.632***	0.124***
LA	0.599**	0.599**	0.017
MM	-0.077	0.191	0.067***
MY	0.237***	-0.023	0.139***
PH	-0.005	0.128	0.001
SG	0.008	0.160	0.003
TH	0.110**	-0.078	0.088***
VN	0.185***	0.374**	0.149***

Source: Author's estimation.

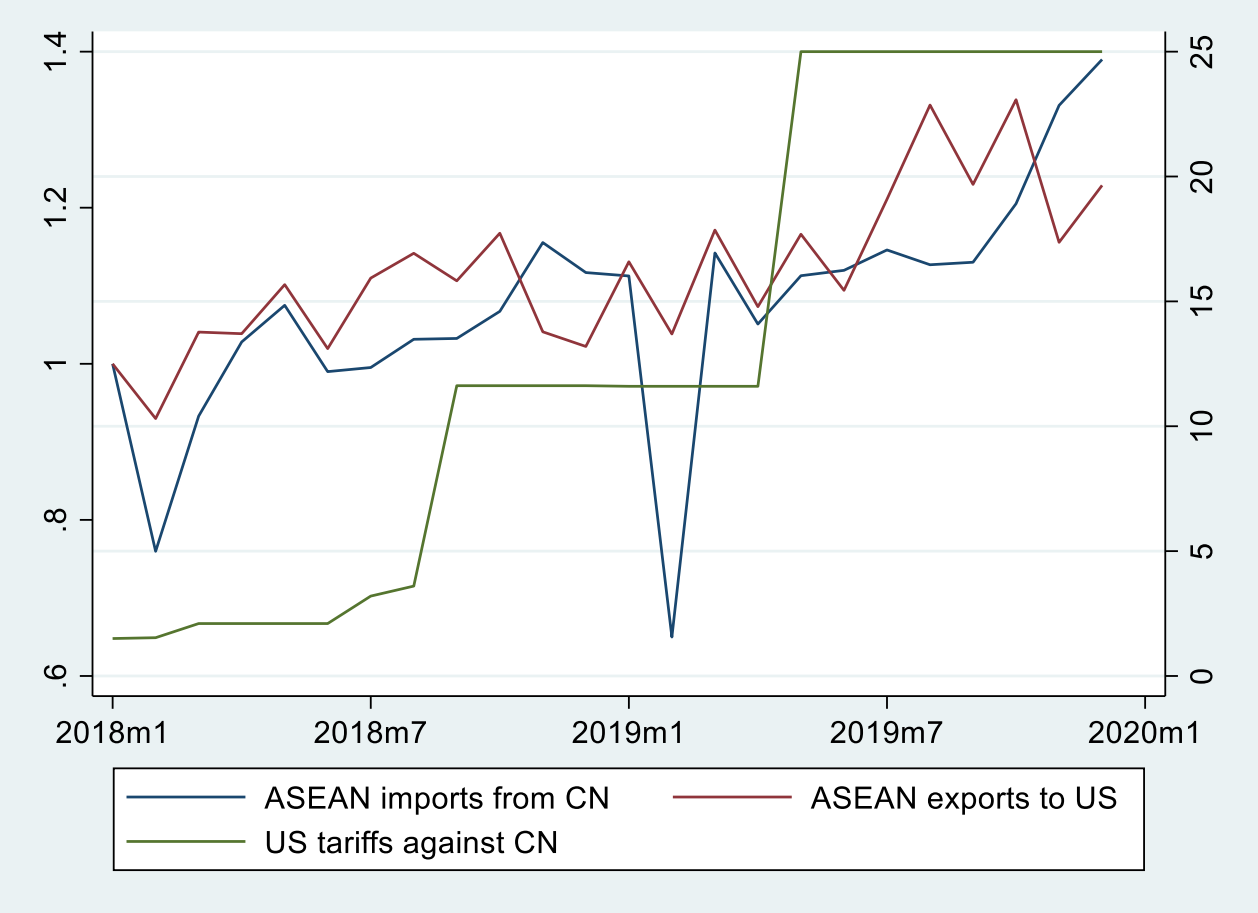
Notes: This table reports the estimation results of the interaction term in equations (11) through (13). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. In all specifications, we control for six-digit HS code fixed effects and time fixed effects.

Figure 1. ASEAN's Inward FDI Flow in Manufacturing (in Billions of USD)



Source: ASEANStats.

Figure 2. ASEAN Exports to the U.S. (Left Axis), ASEAN Imports from China (Left Axis), and US Tariffs against China (%, Right Axis)



Source: ASEAN exports and imports are normalized so that January 2018 levels take a value of one.

Note: Global Trade Atlas.

Appendix. Other Tables

Table A1. Estimation Results: No Restrictive Observations

	PPML		OLS	
	Exports	Imports	Exports	Imports
	(I)	(II)	(III)	(IV)
Tariff (*t*)	-0.23	0.217*	0.135	0.084
	[0.178]	[0.132]	[0.113]	[0.074]
Tariff (*t*-1)	-0.116	-0.012	-0.093	-0.105
	[0.121]	[0.115]	[0.117]	[0.083]
Tariff (*t*-2)	0.500**	-0.042	0.215*	0.144**
	[0.238]	[0.132]	[0.112]	[0.073]
Sum	0.154	0.163	0.257**	0.123*
Number of obs.	352,006	865,633	177,585	601,688
R-squared	0.951	0.952	0.8	0.799

Source: Author's estimation.

Notes: This table reports the estimation results using the PPML or OLS methods. We estimate equations (1) and (2) without restricting observations to the common set between exports and imports. The dependent variables are exports to the U.S. of ASEAN countries (in the "Exports" columns) and theirs imports from China (in the "Imports" columns). In the case of OLS, the dependent variables are taken as logs. "R-squared" indicates pseudo R-squared in the PPML and adjusted R-squared in the OLS. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. All specifications control for country-six-digit HS code fixed effects and country-time fixed effects.

Table A2. PPML Results on All ASEAN Trade by Product Types

	Intermediate		Capital		Consumption	
	Exports	Imports	Exports	Imports	Exports	Imports
Tariff (*t*)	-0.276	0.047	-0.007	0.141	0.2	-0.191
	[0.338]	[0.126]	[0.288]	[0.157]	[0.264]	[0.306]
Tariff (*t*-1)	-0.126	0.231*	-0.268	-0.154	-0.662***	0.028
	[0.156]	[0.134]	[0.219]	[0.263]	[0.169]	[0.187]
Tariff (*t*-2)	0.144	0.038	0.843**	-0.039	1.225***	0.222
	[0.243]	[0.178]	[0.350]	[0.238]	[0.377]	[0.303]
Sum	-0.258	0.316	0.568	-0.052	0.763**	0.059
Number of obs.	170,825	170,825	52,228	52,228	103,730	103,730
Pseudo R-squared	0.954	0.966	0.944	0.961	0.962	0.939

Source: Author's estimation.

Notes: This table reports the estimation results using the PPML method. Specifically, we estimate equations (1) and (2) for product types grouped by end-use purposes. Based on the classification by Broad Economic Categories, we group study products into "intermediate goods," "capital goods," and "consumption goods." The dependent variables are all ASEAN exports to the U.S. (in the "Exports" columns) and all ASEAN imports from China (in the "Imports" columns). The dependent variables are defined at the product-year level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for six-digit HS code fixed effects and time fixed effects.

Table A3. PPML Results by ASEAN Countries: No Restrictive Observations

		Tariff (*t*)	*Tariff* (*t*-1)	*Tariff* (*t*-2)	Sum	N	PR-sq
BN	Exports	-13.239	-0.26	19.962	6.463**	282	0.572
	Imports	11.624	-6.552	-13.187***	-8.115**	250	0.926
ID	Exports	0.239	0.045	0.347	0.631*	27,177	0.938
	Imports	-0.307	0.362	-0.281	-0.226	25,683	0.96
KH	Exports	0.922	-0.357	3.952***	4.517***	5,708	0.904
	Imports	-0.205	0.746	1.415	1.956**	5,317	0.878
LA	Exports	-2.702**	1.273	1.885	0.456	955	0.909
	Imports	9.486***	-9.318	0.665	0.833	711	0.882
MM	Exports	-0.198	0.28	1.194	1.276	3,597	0.829
	Imports	-1.657	0.129	1.121	-0.407	3,094	0.869
MY	Exports	-0.217	-0.413***	0.478*	-0.152	25,235	0.966
	Imports	0.068	0.456**	-0.372	0.152	24,575	0.964
PH	Exports	0.525	-0.501*	-0.28	-0.256	20,011	0.91
	Imports	0.236	0.244	-0.108	0.372	19,054	0.958
SG	Exports	-1.116**	0.107	0.593	-0.416	17,622	0.917
	Imports	-0.401	-0.641	-0.112	-1.154**	17,207	0.97
TH	Exports	-0.006	-0.042	0.271	0.223	36,890	0.938
	Imports	0.197	0.029	-0.308	-0.082	35,845	0.966
VN	Exports	-0.394	0.166	0.586	0.358	32,623	0.95
	Imports	-0.028	-0.079	0.965***	0.858***	31,211	0.969

Source: Author's estimation.

Notes: This table reports the estimation results by ASEAN countries using the PPML method. The dependent variables for the two estimations are each ASEAN country's exports to the U.S. (top row labeled "Exports") and that country's imports from China (bottom row labeled "Imports"), respectively. The dependent variables are defined at the product-year level. We do not restrict observations to the common set between exports and imports. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for HS six-digit fixed effects and time fixed effects. "N" refers to the number of observations. "PR-sq" indicates pseudo R-squared.

Table A4. OLS Results by ASEAN Countries: No Restrictive Observations

		Tariff (*t*)	*Tariff* (*t*-1)	*Tariff* (*t*-2)	Sum	N	AR-sq
BN	Exports	-0.488	1.683	-0.873	0.322	388	0.645
	Imports	0.773	-1.919***	-0.012	-1.158***	21,922	0.529
ID	Exports	0.623**	-0.598**	0.369	0.394*	28,150	0.807
	Imports	-0.184	0.229	-0.066	-0.021	75,415	0.801
KH	Exports	-0.809	1.000	1.550*	1.741**	6,257	0.781
	Imports	0.513*	-0.4	0.753**	0.866***	48,050	0.693
LA	Exports	-1.797	4.101**	-4.494**	-2.190	1,080	0.727
	Imports	0.047	-0.033	1.101***	1.115***	26,941	0.644
MM	Exports	-0.86	0.405	1.415	0.960	4,123	0.69
	Imports	0.539**	-0.282	-0.003	0.254	50,921	0.708
MY	Exports	0.105	-0.264	0.274	0.115	26,407	0.798
	Imports	0.25	0.08	-0.187	0.143	77,238	0.802
PH	Exports	-0.001	-0.142	-0.272	-0.415*	20,732	0.806
	Imports	-0.288	-0.037	-0.053	-0.378***	68,932	0.792
SG	Exports	0.178	-0.48	0.525*	0.223	18,411	0.776
	Imports	-0.221	-0.084	0.159	-0.146	70,706	0.788
TH	Exports	0.142	0.255	-0.094	0.303	37,835	0.799
	Imports	0.169	-0.176	0.062	0.055	79,583	0.82
VN	Exports	0.028	0.115	0.332	0.475**	34,202	0.81
	Imports	-0.015	0.151	0.391**	0.527***	81,980	0.823

Source: Author's estimation.

Notes: This table reports the estimation results by ASEAN countries using the OLS method. The dependent variable is a log of exports of ASEAN countries to the U.S. in row "Exports" and a log of their imports from China in row "Imports." It is defined at the product-year level. We do not restrict observations to the common set between exports and imports. Tariffs are log-transformed after adding a value of one. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors are clustered by products. "Sum" indicates the sum of tariff coefficients, which is tested by the chi-squared test. In all specifications, we control for six-digit HS code fixed effects and time fixed effects. "N" refers to the number of observations. "AR-sq" indicates adjusted R-squared.