The 2018 US-China Trade War and Trade Diversion: Evidence from Thai Customs Data*

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Abstract

The 2018 U.S.–China trade war marked a major shift in global trade patterns, yet its effects on third-country exporters remain incompletely understood. We examine Thailand's export responses to the trade war using transaction-level customs data from 2013 to 2023. Exploiting cross-product variations in the magnitude and timing of tariff changes across HS-6 products, we find that, in response to U.S. tariffs on Chinese products, Thailand experiences an increase in exports to the United States, consistent with trade diversion. The effects emerge with a delay and are large for capital goods within certain manufacturing sectors. Products that displace China in the U.S. market tend to be those with supply chain link to China. We also find significant evidence of both potential transshipment of Chinese goods to the United States and increased supply chain integration with China. In contrast, Chinese retaliatory tariffs show limited spillover effects, with some negative impact on Thai exports to China.

Keywords: Trade War, Trade Diversion, Tariffs, Supply Chains, Transshipment, Thailand, US, China

JEL Classifications: F13, F14

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1 Introduction

As the world's two largest economies imposed retaliatory tariffs on hundreds of billions of dollars in bilateral trade, the resulting escalation reshaped supply chains, altered market access, and created substantial uncertainty for exporters worldwide. Although much of the existing literature has focused on the direct effects of these tariffs on the United States and China,[1] relatively little is known about how third-party countries responded to these shocks. Understanding how firms in third-party countries adjusted to the reconfiguration of global trade flows is essential to assess the broader welfare consequences of trade wars and to inform policy responses in open economies facing similar disruptions.

This paper examines the case of Thailand, a trade-dependent emerging economy in Southeast Asia. Thailand offers a valuable lens on third-country effects because of its strong trade ties with both China and the U.S., diversified manufacturing base, and strategic location within ASEAN. Although Thailand was not a direct participant in the trade dispute, the conflict posed both risks and opportunities. On the one hand, Thai exporters could benefit from trade diversion if they could substitute for U.S. or Chinese suppliers in global markets. However, as a supplier of intermediate goods to both countries, Thailand was vulnerable to upstream supply chain disruptions. For instance, if Chinese firms lost access to U.S. markets, their demand for Thai inputs may have declined.

This paper investigates the extent to which Thai exporters benefited from trade diversion resulting from the U.S.–China trade war. Using transaction-level customs data from 2013 to 2023 and exploiting variations in the timing and magnitude of tariff changes at the HS 6-digit level, we estimate the impact of U.S. and Chinese tariffs on Thai exports across destination markets.

Applying a difference-in-differences framework, we find evidence consistent with trade diversion towards Thailand. Specifically, Thai exports to the U.S. increase in product categories more exposed to the U.S. tariffs on Chinese goods, implying that Thai exports substitute for Chinese goods in the U.S. market. The U.S. tariffs also lead to higher Thai exports to ASEAN countries, which potentially reflect greater regional value chain integration. Meanwhile, the China's retaliatory tariffs show limited spillover effects onto Thai exports, with some negative impact on exports to China. Exploring the timing of these effects, we show that Thai exports to the U.S. did not respond immediately to the U.S. tariffs. Instead, the positive effect only appears in the third and fourth years after the tariffs were introduced, consistent with a gradual restructuring of U.S. supply chains. This delayed response suggests that trade diversion gained momentum over time as U.S. importers searched for and established new sourcing relationships.

To better understand which products drive the aggregate and destination-specific export responses to U.S.–China tariff shocks, we examine heterogeneity in the trade-war impact across different product groups. Our results reveal that larger exports to the

[1] See, for example, Amiti et al. (2019) and Fajgelbaum et al. (2020).

U.S. in responses to the U.S. tariffs are mainly driven by capital goods in the machinery, electrical and transportation sectors, whereas increased exports to ASEAN are mainly raw material and intermediate inputs in the chemical, plastic and rubber sectors. The sectoral results for Chinese retaliation are more mixed. In addition, products that displace China in the U.S. market tend to be those with supply chain link to China, and to a lesser extent, those with comparative advantage in the U.S. market. Last, given rising Chinese imports that occur alongside Thai export expansion, we show based on the firm-level estimation the significant evidence of both the transshipment of Chinese goods to the U.S. and increased supply chain integration with China. Such evidence is found in a few manufacturing industries including the petrochemical, metal, electronic and automotive sectors.

This paper mainly contributes to the growing literature on third-country spillovers from trade policy shocks. Fajgelbaum et al. (2024) show that many bystander countries increased exports to the U.S. and to the rest of the world in response to the tariffs. Countries that operate along downward-sloping supplies whose exports substitute U.S. and China, e.g., Vietnam, Thailand, Korea and Mexico, are among the larger beneficiaries of the trade war. Similarly, Alfaro and Chor (2023) and Alfaro et al. (2025) point to a great reallocation of global supply chains, as U.S. sourcing has been reallocated away from China and toward other locations, notably Mexico and Vietnam. In addition, U.S. imports have become more upstream, which indicates some production reshoring. Meanwhile, Flaaen et al. (2020) show that antidumping duties imposed by the U.S. against South Korea and China, that occurred in a few years leading up to the trade war were accompanied by production relocation to other export platform countries.[2]

However, the trade war may not reduce U.S. dependence on supply chain links to China, since imports from China also improve for those countries with larger exports to the US (Alfaro and Chor, 2023; Goldberg and Reed, 2023; Freund et al., 2024; Alfaro et al., 2025; Gopinath et al., 2025). This potentially reflects transshipment or increased supply chain integration with China. Among papers that emphasize this issue, Iyoha et al. (2024) show evidence of trade rerouting in the context of Vietnam, driven by new establishments and Chinese-owned enterprises. Hayakawa (2024), meanwhile, identifies input-output linkages for the general and electric machinery industries and shows that, among Southeast Asian nations, Thailand increased imports of downstream products from China to produce the downstream. For Mexico, Utar et al. (2023) show that GVC participant firms, particularly foreign MNEs, increased exports to the U.S. as well as imports from China, while Wang and Hannan (2023) find a positive impact on input demand due to higher tariffs imposed on Chinese downstream industries. Our paper mainly contributes to this country-specific research by providing additional results in the context of Thailand to shed light on how the U.S.–China trade war has reshaped global

[2]Based on the empirical framework of Fajgelbaum et al. (2024), Khandelwal (2023) shows that India fails to reap any export opportunities from the trade war.

trade flows. In addition, based on assessments at the firm level, we attempt to identify both the role of transshipment of Chinese products and increased supply chain integration with China, as well as highlight specific sectors that are prone to these effects.

Last, this paper relates to the broader literature that studies the impact of 2018-19 US-China trade war on the U.S. and Chinese economies. Fajgelbaum et al. (2020), for example, document a significant decline in U.S. imports. Several studies report that U.S. importers, producers and consumers face a large passthrough of tariff rates onto product prices (Amiti et al., 2020; Cavallo et al., 2021; Fajgelbaum et al., 2020). Handley et al. (2020) further show that U.S. exports also decline because U.S. firms faced higher import costs, while Huang et al. (2023) observe the decline in firm value for the U.S. firms with large supply chain linkages with China. On the impact on Chinese exporters, Jiao et al. (2024) find that their exports to the EU moderately increased to compensate for the decline in U.S. sales, but exports to other markets are barely affected. Fajgelbaum and Khandelwal (2022) and Caliendo and Parro (2022) both offer a survey of research on the economic impacts of the trade war.

The rest of the paper proceeds as follows. Section 2 provides an overview of the 2018 U.S.–China trade war. Section 3 describes the data sources and the construction of the main variables. Section 4 presents estimation results, including average treatment effects and dynamic responses over time. Section 5 investigates heterogeneous effects across different product groups. Section 6 examines the possibility of transshipment of imports from China. Finally, Section 7 concludes.

2 Background: The 2018 U.S.–China Trade War

The U.S.–China trade war began in 2018 as a series of escalating tariff actions between the world's two largest economies. The first tariff increases began in February 2018, when the U.S. imposed safeguard tariffs on 8 billion dollar of solar panel and washing machine imports. This was followed by additional tariffs in March 2018 that targeted aluminum, iron and steel products, amounting around 48 billion dollar of imports. These tariffs targeted many countries, not only China. China and other trade partners, such as Canada, Mexico and the EU, imposed retaliatory tariffs in response.

Subsequent rounds of tariffs by the U.S. mainly targeted China. Citing unfair trade practices and intellectual property violations by China, under the Trade Act of 1974, Section 301 investigations, the U.S. imposed five rounds of tariff hikes. The first wave of tariffs was imposed in July 2018, targeting 34 billion dollar of Chinese imports at a 25-percent rate. In August 2018, another 16 billion dollar worth of commodities faced tariff rate increases of 25 percent. China responded immediately with retaliatory tariffs of an equivalent value on U.S. goods, primarily agricultural products. By September 2018, the U.S. imposed tariffs on an additional 200 billion dollar of Chinese goods at a 10-percent rate, and in response, China levied duties on 60 billion dollar of U.S. imports.

The trade war intensified in 2019, due to the U.S. announcement of 15-percent tariffs on additional 100 billion dollar worth of Chinese products, which broadens the coverage of products subjected to tariffs to nearly all sectors, including many consumer goods. In addition, the products targeted in the third-wave list also faced higher tariffs at 25 percent. By the end of 2019, over 360 billion dollar of Chinese exports to the U.S. and around 110 billion dollar of U.S. exports to China were subject to elevated tariff rates, which account for around two-thirds of total U.S. imports from China and over 50 percent of total China imports from the U.S., respectively. As shown in Bown (2021), during these periods, the weighted average tariff rates facing Chinese products exported to the U.S. and the U.S. products exported to China have been raised from 3.1 and 8.0 percent to around 20 percent, respectively.[3]

In January 2020, the two countries signed the "Phase One" agreement, which paused further escalation and led to modest reductions in tariff rates on some products. However, most tariffs remained in place. The onset of the COVID-19 pandemic in early 2020 diverted global attention and disrupted trade volumes, but the underlying tariff regime persisted. Despite changing administrations in the U.S., the core structure of the trade barriers remained largely unchanged until 2024, with limited liberalization.

Overall, the 2018–2020 period featured sustained trade policy uncertainty, prolonged tariff exposure, and significant reconfiguration of global supply chains. For third countries like Thailand, these developments created both risks and opportunities, as firms and consumers in the U.S., China, and elsewhere adjusted sourcing strategies in response to altered tariffs and increased geopolitical tensions.

3 Data

The empirical analysis in this paper mainly relies on comprehensive administrative data from Thailand's Customs Department, over the period 2013 to 2023. The dataset includes records of both Thai exports and imports at the transaction level. Each observation contains information on trade values, physical quantities, destination or origin country, and product classification based on the Harmonized System (HS) code at the 11-digit level. Given the raw data, we initially exclude gold exports and imports; exclude transactions with values less than 1,500 baht; keep only transactions with reporting units in kilograms

[3]The waves of U.S. and Chinese tariffs targeted different mixes of products. More than 80 percent of U.S. imports from China of intermediate inputs faced new tariffs of 25 percent. But, several consumer products, such as clothes, toys and sports equipment faced lower or no tariffs. In contrast, China's tariff retaliation disproportionately focused on agricultural and seafood products. China avoided imposing tariffs on key inputs such as semiconductors and semiconductor manufacturing equipments, as well as autos (Bown, 2021).

or pieces; and, focus only on trade with Thailand's major trading partners.[4] All trade values are recorded in both Thai baht and U.S. dollar; in this analysis, we use trade values in baht.

To harmonize the Thai customs data with international trade policy databases and ensure comparability across countries, we aggregate all trade flows to the HS-6 digit level, which represents the international standard for product-level analyses in trade policy research. We further collapse the data to the annual frequency to reduce volatility and zero trade flows, and further clean the data by focusing on products with existing transactions in every year prior to the trade war. We are, as a result, left with around 3,765 products at the HS-6 level.

We construct four mutually exclusive export categories based on export destinations: exports to the U.S., exports to China, exports to ASEAN and exports to the rest of the world (ROW). This categorization enables us to assess various channels of the trade-war impact on Thai exports, especially the trade diversion effects arising from changes in relative market access conditions.

Based on Thai exports in 2022 and 2023, Table A.1 in the Appendix shows some facts regarding the sectoral distribution of Thai exports in overall and to three major export destinations, i.e., the U.S., China and ASEAN. Over 40 percent of Thai exports belong to 'machinery' and 'electrical equipment' sectors, where the U.S. and ASEAN are their major export destinations. In particular, they account for around 60 percent of total Thai exports in the U.S. market. Thailand also exports a great deal of 'agricultural' and 'plastics & rubbers' products, mainly to China. Additionally, a large share of goods from the 'transportation' sector, including autos and auto parts, are exported to neighboring countries in ASEAN, as confirmed by Table A.2.

Figure A.1 in the Appendix shows trend of Thai exports over time. Exports to all three major export destinations exhibit growth during the sample periods. This comes despite the trade war in 2018-19 and the occurrence of COVID-19 pandemic, the latter causing a temporary drop in trade with ASEAN and China. Exports to the U.S., however, show a strong expansion, suggestive of trade diversion, resulting in an increase in the share of U.S. exports from around 10 percent to almost 20 percent of total Thai exports. On the flipped side of the coin, imports from China materially rise, especially after 2021. This may indicate the flooding of Chinese products into the Thai economy or the potential transshipment of Chinese goods to the U.S.. We will examine this issue in Section 6.

To measure exposure of Thai exports to trade war shocks, we merge the Thai customs data with the dataset provided by Fajgelbaum et al. (2024), which systematically records

[4] 51 countries in total including Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Cambodia, Canada, Chile, China, Colombia, Czech Republic, Denmark, Ecuador, Finland, France, Germany, Hong Kong, Hungary, India, Indonesia, Israel, Italy, Japan, Korea, Kuwait, Lao PDR, Malaysia, Mexico, Myanmar, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Qatar, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Turkey, UAE, United Kingdom, United States, Vietnam.

the universe of retaliatory tariff actions taken by the U.S. and China between 2018 and 2019, including applied ad valorem rates at the HS-10 level. For each of the HS-6 products, we compute two measures of trade-war exposure: one for U.S. tariffs on Chinese imports ($\Delta\tau_i^{US\to CN}$) and the other for China tariffs on U.S. imports ($\Delta\tau_i^{CN\to US}$). They are computed as weighted-average changes in the HS-10 digit tariff rates at the end of 2019 relative to the pre-war period:

$$\Delta\tau_i^{US\to CN} = \sum_{j\in i} w_{j,1317}^{US\leftarrow CN} \Delta\tau_j^{US\to CN}, \tag{1}$$

$$\Delta\tau_i^{CN\to US} = \sum_{j\in i} w_{j,1317}^{CN\leftarrow US} \Delta\tau_j^{CN\to US}, \tag{2}$$

where $w_{j,1317}^{US\leftarrow CN}$ is the share of U.S. imports of Chinese HS-10 products j within the corresponding HS-6 product category i during 2013-2017, and $w_{j,1317}^{CN\leftarrow US}$ denotes the share of China's imports of U.S. HS-10 products during the same period. We obtain these weights from Fajgelbaum et al. (2024) and Bown (2021), respectively. These two measures of trade war exposure capture tariff shocks that may create reallocation opportunities for Thai exporters. As a robustness check, we also compute the unweighted version of HS-6 tariff rate changes, i.e. based on simple averaging.

Figure 1 shows, for each sector, the variations in the weighted-average U.S. tariffs imposed on China, and weighted-average China tariffs imposed on the U.S. at the HS-6 level. Panel (a) suggests that the majority of Chinese HS-6 products face tariff exposure of 25 percent due to the U.S. tariffs, which is also the maximum tariff increases in almost every sector. The relatively lower tariff adjustments can be observed in the 'agricultural' sector, with the median tariff increase of around 15 percent. Despite the observations above, there remain significant variations of tariff increases within each sector and for the entire economy, that can help with the identification of the trade-war impact of interest. In Panel (b), given the smaller coverage of China tariffs on U.S. products, the median tariff increases are lower than those imposed by the U.S. in all sectors. The lowest is in the 'transportation' sector, as China decided to suspend retaliation tariffs on imports of U.S. autos and parts at the beginning of 2019. This rather limited coverage of products facing tariff hikes creates significant variations in tariff exposures within and across industries.

Aside from the datasets above, we also use tariff and trade data from the WITS and UN Comtrade database to compute the tariff rates imposed by the destination country on each of Thailand's HS-6 products, which will be used as a controlled variable in the regression. They are mainly based on Most-Favored-Nation (MFN) tariff rates. The only exception is U.S. tariffs on Thai products, some of which faced increased tariffs during early 2018. Hence, we obtain the data on U.S. tariffs directly from Fajgelbaum et al. (2024).

4 Export Responses to the U.S.–China Trade War

This section describes the empirical framework used to estimate the impact of the U.S.–China trade war on Thailand's export performance. The identification strategy leverages two key sources of variation: (i) differences in product-level exposure to tariff increases resulting from the bilateral escalation of trade tensions between the U.S. and China as evident in Figure 1, and (ii) the staggered timing of tariff implementation across multiple rounds between 2018 and 2019. These variations allow us to compare changes in Thai exports across products with differing degrees of exposure to the trade war after the imposition of tariffs.

Importantly, Thai exports were not subject to any major, exclusive changes in tariff treatment by either the U.S. or China during the trade war period. This institutional feature enables us to isolate the indirect, general-equilibrium effects of the trade war—such as trade diversion and demand reallocation—from direct effects driven by changes in Thailand's market access.

4.1 Baseline Specification

Our baseline panel specification is estimated at the HS-6 product-by-year level, separately for each export destination d. We estimate the following regression:

$$EX_{it}^{d} = \beta_1^d \left(\text{Post}_{it} \times \Delta\tau_i^{US\to CN}\right) + \beta_2^d \left(\text{Post}_{it} \times \Delta\tau_i^{CN\to US}\right) + \boldsymbol{\beta^d} \cdot \mathbf{X}_{it}^{d} + \epsilon_{it}^{d}, \qquad (3)$$

where EX_{it}^{d} denotes the logarithm of export value to destination d for HS-6 product i at time t. To deal with potential zero trade values, we follow the literature by applying the inverse of the hyperbolic sine transformation (i.e., $ln[x + (x^2 + 1)^{0.5}]$). The variable Post_{it} is a binary indicator that equals one for periods the product i faces tariff increases due to the trade war, and zero otherwise. As shown earlier, the variables $\Delta\tau_i^{US\to CN}$ and $\Delta\tau_i^{CN\to US}$ represent for each product i the increase in tariffs imposed by the U.S. on imports from China and by China on imports from the U.S., respectively.

The vector $\mathbf{X}_{it}^{d}$ includes time-varying controls for the applied tariff rates imposed by the destination country on Thai exports. The specification also incorporates time fixed effects to capture common macroeconomic shocks and product fixed effects to control for time-invariant factors that influence product-level trade flows. The variable ϵ_{it}^{d} is the error term. We estimate the model for total exports as well as separately for four export destinations: the U.S., China, ASEAN, and the rest of the world.

The coefficients of interest, β_1^d and β_2^d, identify the differential change in Thai exports of products more exposed to the bilateral US–China tariff shocks relative to less exposed products. In the regression for total exports, these coefficients summarize the net effect of bilateral tariff shocks on Thailand's overall export performance, aggregating substitution as well as other spillover channels across all destinations. A positive coefficient suggests

that Thai exports expanded in response to rising geopolitical tensions, either by capturing displaced demand or by benefiting from global reallocation.

In the equation for exports to the U.S., β_1^d reflects the extent to which Thai goods substitute for Chinese products in the U.S. market. A positive estimate indicates that Thai exporters gained market share as U.S. tariffs displaced Chinese competitors—consistent with substitution effects highlighted by Fajgelbaum et al. (2024) and Khandelwal (2023). The same logic applies for β_2^d in the equation for exports to China. However, both coefficients may also be negative if Thai exports are complements to U.S. or Chinese goods. In this case, reduced bilateral trade between the U.S. and China may weaken Thai exports through joint demand or supply chain linkages.

In regressions for other destinations—ASEAN, and the rest of the world—β_1^d and β_2^d may capture different trade channels, such as spillover effects associated with export supply curve. These channels include economies of scale, whereby expanded production for U.S. or Chinese markets lowers firm marginal costs and facilitates exports elsewhere. Alternatively, foreign buyers may respond to the trade war by diversifying their sourcing portfolios. Supply chain effects are also plausible: if declining exports from China or the U.S. reduce global demand for Thai intermediate goods, the coefficients may be negative. Under the same logic, β_1^d in the regression for exports to China may capture reduced demand for inputs previously re-exported to the U.S., while β_2^d in the regression for exports to the U.S. may reflect disruptions in Thai-sourced components embedded in U.S. goods to be sold in China.

Table 1 presents the baseline estimates of the impact of the U.S.–China trade war on Thailand's exports, where Columns (1) through (5) report results for total exports, the United States, China, ASEAN, and the rest of the world, respectively. We report the results based on weighted tariffs in the top panel and unweighted tariffs in the bottom panel. Standard errors are clustered at the HS-6 product level.

Column (1) presents the results for Thailand's total exports. Only the tariff interaction terms for the U.S. tariff actions are positive and statistically significant at the 90-percent level. The coefficient on U.S. tariffs on Chinese goods is 0.4 for both weighted and unweighted tariff measures. To get a sense of magnitude, for products that the U.S. imposes a 25-percent tariff rate on Chinese products, total Thai exports expanded by around 10.5 percentage points greater than growth of non-tariffed products. This finding suggests that Thailand increased exports in product categories where Chinese firms faced heightened trade barriers. One plausible explanation is that U.S. importers sought to diversify their sourcing in response to tariff-induced uncertainty, reallocating demand toward alternative suppliers such as Thailand. The coefficient on Chinese retaliation, however, is statistically insignificant.

Thai exports to the US potentially explain increased exports to the world in response to U.S. tariffs on Chinese goods. In Column (2), the coefficient of weighted U.S. tariffs on Chinese goods is large and statistically significant at 0.63, despite being weakly significant.

Table 1: The Effect of U.S.–China Trade War on Thai Exports by Destination.

Dep. Var.: Log Thai Export Value	Total	USA	China	ASEAN	ROW
	(1)	(2)	(3)	(4)	(5)
A. Weighted tariff rates					
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$	0.400*	0.628*	0.629	0.387*	0.544*
	(0.207)	(0.354)	(0.457)	(0.224)	(0.278)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$	-0.119	-0.467	-1.115**	-0.049	0.077
	(0.227)	(0.377)	(0.434)	(0.262)	(0.311)
Observations	33,990	15,235	13,299	29,601	22,770
Adjusted R^2	0.854	0.795	0.772	0.804	0.806
HS6 FEs	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes
Dep. Var.: Log Thai Export Value	Total	USA	China	ASEAN	ROW
	(1)	(2)	(3)	(4)	(5)
B. Unweighted tariff rates					
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$	0.396*	0.744*	0.454	0.367	0.515*
	(0.220)	(0.386)	(0.462)	(0.238)	(0.303)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$	0.284	0.043	-0.564	0.231	0.125
	(0.258)	(0.402)	(0.526)	(0.302)	(0.351)
Observations	33,990	15,235	13,299	29,601	22,770
Adjusted R^2	0.854	0.795	0.772	0.804	0.806
HS6 FEs	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for tariffs the destination country imposes on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

This result is consistent with the interpretation that Thai firms expanded market share in the U.S. in product lines where Chinese suppliers faced tariff-induced disadvantages, and therefore points to strong evidence of trade diversion. The finding is in line with Fajgelbaum et al. (2024), who earlier show that Thailand is among the countries that reaped export opportunities amid the trade war. Whereas their paper considers merely the contemporaneous impact, our results are based on the post-event periods of five years, suggestive of longer-term implications that the trade war may have on global trade patterns. Nevertheless, we still do not find any significant impact from Chinese retaliation on Thai exports to the U.S., in line with the finding with respect to total exports.

Despite significant positive responses of Thai exports to the U.S., Column (3) suggests that exports to China react negatively to U.S.-China tariff actions. In particular, the coefficient on weighted China tariffs is negative and significant. This suggests that Thailand did not experience measurable trade diversion into the Chinese market. However, the negative response may reflect the complementarity between Thai and U.S. products for those U.S. goods that become exposed to China tariffs. Alternatively, it may indicate that Chinese producers may be able to expand production of the affected goods and become less reliant on imports. Nevertheless, this result is not robust, as the coefficient turns

insignificant in the case of unweighted tariff rates.

Meanwhile, Thai exports to ASEAN and the rest of the world appear to respond positively to U.S. tariffs on Chinese goods. For example, as shown in Column (4), the coefficient of weighted U.S. tariffs on Thai exports to ASEAN is at 0.39, while that for exports to the rest of the world is even larger at 0.54 (Column (5)). Both are weakly significant. As emphasized in Fajgelbaum et al. (2024), Thai exports may benefit from downward supply curve, as firms expand export opportunities not only in the U.S., but also the ASEAN markets given geographical proximity. In addition, these results are also in line with greater regional value chain integration that could facilitate substitutions of Chinese products in the U.S. market. However, all coefficients for Chinese tariffs on U.S. goods are found to be insignificant, pointing to the rather limited impact from Chinese retaliation in overall.

4.2 Dynamic Effects

Next, we examine how the impact of the U.S.-China trade war on Thai exports evolved over time. To do so, we extend the baseline specification by replacing the post-treatment indicator with a set of year-specific indicators. This event-study approach allows us to trace the dynamic adjustments of Thai exports relative to a pre-treatment baseline.

The extended regression is as follows:

$$\begin{aligned} EX_{it}^{d} = &\sum_{k=-3}^{4} \beta_{1,k}^{d} \left(\text{Dur}_{it}^{US \to CN,k} \times \Delta\tau_{i}^{US \to CN} \right) \\ &+ \sum_{k=-3}^{4} \beta_{2,k}^{d} \left(\text{Dur}_{it}^{CN \to US,k} \times \Delta\tau_{i}^{CN \to US} \right) + \boldsymbol{\beta^{d}} \cdot \mathbf{X}_{it}^{d} + \varepsilon_{it}^{d}, \end{aligned} \tag{4}$$

where $\text{Dur}_{it}^{US \to CN,k}$ and $\text{Dur}_{it}^{CN \to US,k}$ is a set of dummy variables indicating the number of years k relative to the U.S. and China tariff announcement for product i, respectively, with binning at the end-points. To be precise, for products that the U.S. began imposing tariffs in 2018, $\text{Dur}_{it}^{US \to CN,0} = 1$ if year t is 2018, $\text{Dur}_{it}^{US \to CN,1} = 1$ if year t is 2019, and $\text{Dur}_{it}^{US \to CN,2} = 1$ if year t is 2020, and so on. The coefficients $\beta_{1,k}^{d}$ and $\beta_{2,k}^{d}$ measure the differential impact of U.S. and Chinese tariff changes on Thai exports in duration k, relative to the pre-treatment baseline. Moreover, this event-study specification also allows for the pre-trend test.

This specification allows us to assess both the timing and persistence of trade diversion effects. A gradual rise in the coefficients after the trade war would suggest adjustment frictions or delayed reallocation of trade flows. In contrast, an immediate and sustained increase would be consistent with rapid substitution away from U.S. and Chinese suppliers. The absence of significant pre-trends would support the identifying assumption that, conditional on controls, Thai exports would have evolved similarly across products with

different levels of tariff exposure in the absence of the trade war.

Figure 2 sheds light on the dynamic export response by destination. In the case of total exports, the adjustment is delayed. In Panel (a), a positive effect in response to the U.S. tariffs imposed on Chinese products emerges in the third year after the introduction of U.S. tariffs on China. The estimated impact four years after tariff shocks is weakly significant, but remains large. The results, thus, imply rather delayed impact of the trade war. In contrast, no discernible pattern is observed in response to Chinese retaliatory tariffs (Panel (b)).

Thai exports to the U.S. also exhibit a delayed but pronounced response to U.S. tariffs on China (Panel (c)). A positive effect arises from the second year, suggesting that trade diversion gained momentum as U.S. importers restructured their supply chains. However, the effect only turns significant four years after the tariff shock. Once again, we do not observe any significant impact from China tariffs to the U.S., as shown in Panel (d).

For exports to China, a different pattern emerges. While Table 1 reports a significant average effect from Chinese retaliatory tariffs, we do not observe any significant impact in the dynamic specification (Panel (f)). Meanwhile, similarly to the responses of Thai exports to the U.S., exports to ASEAN respond with some delay to the U.S. tariffs on Chinese products (Panel (g)). All in all, the results point to delayed responses of Thai exports to tariff shocks, but the significant effect can be observed for only the U.S. tariffs, not the Chinese retaliation.

5 Product-Level Heterogeneity

In this section, we examine heterogeneity in the product-level responses to US-China tariff adjustments to gain added insights into which products drive the aggregate and destination-level trade responses to tariff shocks. As before, we focus on three export destinations, including the U.S., China and ASEAN, and consider heterogeneous responses along two dimensions.

First, export responses may differ between manufacturing and agricultural sectors. For manufacturing products, we further classify them into three broad categories: (1) chemicals, plastics and rubbers (2) machinery, electrical and transportation (3) other. Second, in an era of global value chains, we differentiate products into 'raw material and intermediate inputs', 'consumer goods' and 'capital goods'. We explore these two dimensions by interacting tariff exposure with a dummy variable indicating whether a product falls within certain categories.

Figure 3 shows heterogeneous export responses to the weighted U.S. tariffs on Chinese products.[5] Focusing first on Thai exports to U.S. (panel (b)), whose response in aggregate is weakly significant, we find the responses are heterogeneous across products and are significant only for products within the machinery, electrical and transportation sectors,

[5]Full regression estimates can be found in Tables A.3 in the Appendix

with the coefficient estimate close to 2.0. Since most products within these sectors are classified by the U.S. government as high-technology products that the U.S. aims to reduce its exports and imports with China, the result implies that trade diversion effects take place and so the U.S. still imports these products from elsewhere. The estimated impact for the chemical, plastic and rubber products is also large but only weakly significant. However, we barely find any impact of U.S. tariffs on agricultural products. Classifying products according to their production stages, we find the effect to be largest for capital goods despite being weakly significant. In panel (c), the U.S. tariffs also have a significant impact on exports of capital goods to China.

On the impact of exports to ASEAN, although we similarly find relocation towards manufacturing products, they are mainly raw material and intermediate inputs within the chemical, plastic and rubber sectors (panel (d)). This finding is not consistent with the conjecture put forth by Fajgelbaum et al. (2024) that firms may benefit from economies of scale as they expand their production and exports to the U.S., allowing them to extend their exports to other destinations as well. Instead, it may reflect strengthened regional supply chain integration, as Thai firms export more of inputs to ASEAN nations, whose firms may use these inputs for producing goods destined for the U.S. More research is, however, needed to verify this hypothesis. In panel (a), sectoral results for overall export responses are mostly in line with those found for exports to major destinations. However, a puzzle also emerges as the responses of consumer goods and agricultural products appear to be the large and significant.

The results for Chinese retaliation are more mixed across sectors, as shown in Figure 4. While most estimates appear to be insignificant, the responses of exports to China tend to be negative for capital goods within other manufacturing sectors (panel (c)). On the other hand, in panel (d), we find positive responses of exports to ASEAN but only for the chemical, plastic and rubber products.

These results highlight meaningful sectoral heterogeneity in Thailand's export responses to the U.S.–China trade war. Thai manufacturing firms appear to have gained from the imposition of U.S. tariffs on Chinese goods. In contrast, trade realignments triggered by Chinese retaliation have a rather limited as well as mixed impact on manufacturing sectors.

For our next exercise, we shed light on underlying factors or mechanisms that may help explain the positive responses of Thai exports to the U.S. due to the U.S. tariffs imposed on Chinese products. We examine three potential factors. The first one relates to the comparative advantage of Thai products, as the most competitive alternative suppliers may be able to gain the U.S. market share. Therefore, for each HS-6 product, we calculate two indices of revealed comparative advantage: one for the U.S. market (RCA_i^{US}) and the

other for the global market (RCA_i^{Global}):

$$RCA_i^{US} = \frac{EX_{TH,i}^{US} / \sum_i EX_{TH,i}^{US}}{\sum_{j \neq TH} EX_{j,i}^{US} / \sum_{j \neq TH} \sum_i EX_{j,i}^{US}},$$

$$RCA_i^{Global} = \frac{EX_{TH,i} / \sum_i EX_{TH,i}}{\sum_{j \neq TH} EX_{j,i} / \sum_{j \neq TH} \sum_i EX_{j,i}},$$

where $EX_{j,i}^{US}$ denotes exports of product i from country j to the U.S., while $EX_{j,i}$ is product i-exports from country j to all countries. We compute these two indices using trade data from the UN Comtrade database during the period 2013–2017. We then convert the index into the dummy variable that equals to one if the RCA index exceeds one, and zero otherwise.

Second, Thai exporters may take advantage of products that Chinese firms lost their U.S. market share the most. We therefore introduce the dummy variable for each HS-6 product indicating whether China's lost market share in the U.S. between 2017 and 2023 exceeds the average U.S. market share loss. Third, we hypothesize that products that gain from the trade war may be those with supply chain linkages with China or regional countries. These linkages can help facilitate production relocation toward Thailand. Following Freund et al. (2024), we use the intra-industry trade index as a proxy for supply chain integration (Grubel and Lloyd, 1975):

$$GLI_j^k = 1 - \frac{|EX_{TH,j}^k - IM_{TH,j}^k|}{EX_{TH,j}^k + IM_{TH,j}^k},$$

where $EX_{TH,j}^k$ and $IM_{TH,j}^k$ represent Thai exports and imports of product j from country k, respectively. $GLI_j^k \in [0,1]$ reflects trade back and forth between Thailand and country k within industry j. We compute the index at the HS 4-digit level, which allows the index to capture vertical or supply chain integration between two countries. For example, firms in Thailand may import inputs (e.g., HS854190: parts of diodes) from China to produce output (e.g., HS854140: LED), part of which is exported back to China. However, we acknowledge the imperfect nature of GLI index, as it may also reflect horizontal integration, i.e. trade in different varieties.

Table 2 reports results from including the interaction terms between each of the above characteristics and tariff exposure into the baseline specification with Thai exports to the U.S. as the dependent variable. First, we find revealed comparative advantage of the Thai products in the U.S. market to be important, though its estimate shown in Column (1) is weakly significant. Second, Thai products that show positive export responses are not necessarily those that China lost its market share the most. This aligns with the findings in Freund et al. (2024) that Thailand is not among the top countries that gained the most market share in the U.S., which for example include Vietnam, Mexico and Taiwan. In addition, the production relocation that took place after the trade war is consistent with

Table 2: The Effect of U.S. Tariffs on Thai Exports to the U.S. by Product Characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN}$	0.362	0.631	0.500	0.243	0.064	-0.108	-0.171
	(0.388)	(0.401)	(0.544)	(0.409)	(0.467)	(0.449)	(0.496)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{RCA}_i^{US}$	0.618*					0.792**	0.658*
	(0.325)					(0.398)	(0.387)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{RCA}_i^{Global}$		-0.005					
		(0.323)					
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{CN Loss}_i$			0.297			-0.110	-0.092
			(0.339)			(0.406)	(0.404)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{GLI}_i^{China}$				1.371**		1.571**	
				(0.629)		(0.643)	
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{GLI}_i^{ASEAN}$					1.144*		1.127*
					(0.607)		(0.605)
$\text{Post}_{it} \times \Delta\tau_i^{CN\to US}$	-0.507	-0.467	-0.489	-0.483	-0.457	-0.528	-0.493
	(0.376)	(0.377)	(0.377)	(0.378)	(0.376)	(0.376)	(0.374)
Observations	15,235	15,235	15,235	15,224	15,235	15,224	15,235
Adjusted R^2	0.795	0.795	0.795	0.795	0.795	0.796	0.795
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for U.S. tariffs on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

the China +1 strategy, since only one alternative supplier picked up the lion's share of exports in most products. Third, we find the supply chain linkages with China to be a significant factor (Column (4)). That is, the products with large supply chain integration with China enjoy higher growth of exports to the U.S.. When all of these factors are simultaneously included in the specification, the product's comparative advantage in the U.S. and depth in supply chain link with China remain a significant driver (Column (6)). We explore the latter factor further over the next section.

6 Evidence of Transshipment

While the previous section shows higher exports to the U.S. among tariffed products, this may reflect potential transshipment of imports from China or increased supply chain integration with China (Alfaro and Chor, 2023; Freund et al., 2024). Both can serve as means to circumvent tariffs or other trade restrictions, with the former contributing to fewer or no value-added towards the Thai economy. For the latter, multinational companies may for example relocate their production from China to Thailand and continue to use Chinese inputs in their production for the purpose of exporting to the U.S.. Figure A.2 plots the shares of Thai exports to the U.S. and Thai imports from China, both of which exhibit a rising trend after the 2018 trade war. In particular, imports from China as a share of Thailand's total imports rose form just under 20 percent during the pre-war periods

to around 25 percent in the recent periods. One potential explanation is the flooding of Chinese goods into Thailand and other countries, as they become less competitive in the U.S. market. However, in the context of other emerging economies, earlier research has documented both the potential role for transshipment of Chinese goods (Iyoha et al., 2024) as well as changes in the sourcing patterns toward Chinese inputs (Utar et al., 2023).

To better identify the evidence of transshipment and increased supply chain integration with China, we switch from product-level to firm-level analyses. We, first, construct each firm's exposure to the trade war, in particular the U.S. tariffs on Chinese products:

$$\Delta\tau_f^{US\to CN} = \frac{\sum_i EX_{i,1317}^f \Delta\tau_i^{US\to CN}}{\sum_i EX_{i,1317}^f}, \tag{5}$$

which is computed as weighted-average changes in product-level tariff rates using a firm's share of exports of product i to its total exports during the pre-war period as weights. Since we are interested in firms that export to the U.S. market, we compute as a controlled variable each firm's exposure to U.S. tariffs that are directly imposed on Thai products:

$$\tau_{f,t}^{US\to TH} = \frac{\sum_i EX_{i,1317}^{f\to US} \tau_{it}^{US\to TH}}{\sum_i EX_{i,1317}^{f\to US}}, \tag{6}$$

where $EX_{i,1317}^{f\to US}$ denotes firm f's exports of product i to the U.S. from 2013–2017.

We estimate the following regression specification,

$$y_{ft} = \beta_1 Post_{ft}\Delta\tau_f^{US\to CN} + \boldsymbol{\beta}\cdot\mathbf{X}_{ft} + \gamma_f + \delta_{jt} + \epsilon_{ft}, \tag{7}$$

where $Post_{ft}$ is a binary indicator that equals one for periods firm f is exposed to U.S. tariff hike, and zero otherwise. We explore three sets of dependent variables. The first one is the logarithm of a firm's exports to the U.S., $EX_{f,t}^{US}$. Second, we examine whether a firm's transshipment of Chinese products to the U.S. exists. To measure each firm's transshipment of a particular product i from China, we follow Iyoha et al. (2024) by taking the minimum value of imports of such good from China ($IM_{i,t}^{f\leftarrow CN}$) and exports that are destined for the U.S. in the same year ($EX_{i,t}^{f\to US}$). One caveat of the firm-level measure is that it may underestimate the actual amount of transshipment, since the latter may take place through different firms in Thailand. That is, one firm is responsible for importing products from China and then pass them onto the other firm, who will then export those products to the U.S. Iyoha et al. (2024) additionally compute this rerouting measure at the provincial level, which should provide a more accurate estimate if the two firms reside within the same province. However, our firm-level measure should give a conservative estimate of transshipment. Third, we investigate the impact of the trade war on a firm's imports of Chinese inputs, $\sum_k IM_{k,t}^{f\leftarrow CN}$. Product k must be raw material, intermediate input or capital good and is not the same product that firm f exports to the US.

Table 3: Evidence of Transshipment and Supply Chain Effects

	(1) EX^{US}	(2)	(3) Transshipment	(4)	(5)	(6) Import of Chinese Inputs
	Value	Value	Ratio to EX^{US}	Value	Ratio to EX^{Total}	Ratio to Revenue
$\text{Post}_{f,t} \times \Delta\tau_f^{US \to CN}$	6.836***	1.993***	0.045**	4.046***	0.081***	0.023***
	(0.957)	(0.442)	(0.018)	(0.711)	(0.027)	(0.009)
Observations	78,672	76,616	76,616	76,616	76,616	62,808
Adjusted R^2	0.505	0.636	0.423	0.641	0.373	0.627
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for a firm's exposure to U.S. tariffs on Thai exports. Industry × Time FEs are specified separately for non-manufacturing and manufacturing industries. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Results, as reported in Table 3, show that firms that are highly exposed to the U.S. tariffs on Chinese goods tend to export more to the U.S. market when compared against those that are less exposed. This finding confirms our baseline result based on the product-level estimation. However, we find strong evidence that increased exports to the U.S. are in part associated with both the transshipment of products from China and the increased supply chain integration with China. Regarding the potential role of transshipment shown in Columns (2) and (3), we find that the U.S. tariffs on Chinese goods raise the amount of transshipped products from China. As we expressed firm transshipment value as a ratio to its total exports to the U.S., the effects of U.S. tariffs remain statistically significant. This significant evidence of transshipment or re-routing means that the Thai export sector may not reap gains from trade diversion as much, despite the significant expansion of exports to the U.S.. Additionally, from Columns (4) to (6), firm imports of Chinese inputs increase among those firms exposed to the U.S. tariffs. Since imports of Chinese inputs may be used not only for producing output sold in the U.S., we express them as a ratio to a firm's total exports or total revenue. We find a significant impact on these ratios, implying that the Chinese content of firm products increases in response to the trade war. This result is aligned with Hayakawa (2024), who documents greater demand for upstream products from China, in the context of machinery industries.

Classifying firms into sectors, we find that the rise in transshipment of Chinese products is driven by several sectors (Column (1) of Table 4). However, when considering the ratio of transshipment to firm exports to the U.S., the effect is significant only in two sectors, the petrochemical and metal sectors. Meanwhile, the larger number of sectors sees increased imports of Chinese products in terms of both value and a ratio to total exports or revenue. These include the petrochemical, metal, electronic and automotive sectors, many of which has high participation in the global value chains. These results, therefore, highlight specific sectors that experience with transshipment and increased integration with Chinese supply chains, and potentially drive the positive responses of Thai exports

to the U.S.. From Table A.6 in the Appendix, we further show that in response to the U.S. tariff action, firms also increase imports of inputs from other regions, including the U.S., ASEAN and East Asia. However, only imports from ASEAN remain significant when they are expressed as a ratio to a firm's total exports.

Table 4: Evidence of Transshipment and Supply Chain Effects across Sectors

	(1)	(2)	(3)	(4)	(5)
	Transshipment		Import of Chinese Inputs		
	Value	Ratio to EX^{US}	Value	Ratio to EX^{Total}	Ratio to Revenue
$\text{Post}_{ft} \times \Delta\tau_f^{US \to CN} \times Sector_j$					
Manufacturing:					
Food	0.042	0.036*	3.786***	0.037	0.001
	(0.866)	(0.020)	(1.408)	(0.039)	(0.011)
Apparel	0.606	0.008	-4.125**	-0.014	0.027
	(1.037)	(0.034)	(2.076)	(0.077)	(0.018)
Rubber&Wood	2.554**	0.032	2.753	-0.015	0.002
	(1.044)	(0.024)	(1.786)	(0.059)	(0.015)
Petrochemical	3.039***	0.094***	6.625***	0.113**	0.022*
	(1.006)	(0.034)	(1.622)	(0.053)	(0.013)
Metal	5.535***	0.108***	9.538***	0.272***	0.080***
	(1.193)	(0.040)	(1.860)	(0.079)	(0.021)
Electronic	4.139***	0.044	8.470***	0.286***	0.101***
	(1.036)	(0.037)	(1.597)	(0.064)	(0.020)
Automotive	2.754**	0.102*	5.835***	0.154**	0.028**
	(1.312)	(0.055)	(1.740)	(0.070)	(0.014)
Other Manufacturing	1.453	0.008	1.395	0.029	0.014
	(0.969)	(0.028)	(1.661)	(0.051)	(0.013)
Non-manufacturing:					
Agri&Food&Mining	0.523	0.018	2.030**	-0.040	-0.007
	(0.552)	(0.022)	(0.914)	(0.029)	(0.011)
Automotive Trade	4.789**	0.118	5.452**	0.091	0.026
	(1.882)	(0.088)	(2.457)	(0.075)	(0.021)
Wholesale Trade	0.459	0.011	2.227**	0.028	-0.003
	(0.673)	(0.029)	(1.006)	(0.049)	(0.013)
Retail Trade	2.345**	0.036	2.777**	-0.026	-0.028
	(1.109)	(0.044)	(1.399)	(0.072)	(0.032)
Other Trade	0.428	0.005	-0.256	0.015	0.003
	(0.655)	(0.024)	(1.044)	(0.047)	(0.017)
Observations	76,616	76,616	76,616	76,616	62,808
Adjusted R^2	0.637	0.423	0.642	0.374	0.628
Firm FEs	Yes	Yes	Yes	Yes	Yes
Industry x Time FEs	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for a firm's exposure to U.S. tariffs on Thai exports. Firms are classified into 13 sectors based on the International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4 at 2 or 3 digits as shown in parentheses. Manufacturing sectors consist of 8 industries: food (10-12), apparel (13-15), rubber&wood (16-17, 221), petrochemical (19-21, 222), metal (24-25), electronic (26-28), automotive (29-30), and other. For non-manufacturing sectors, they are 5 industries: agri&food&mining (01-03, 05-09, 462-463, 473-472), automotive trade (45), wholesale trade (46), retail trade (47), and other. Industry × Time FEs are specified separately for non-manufacturing and manufacturing industries. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

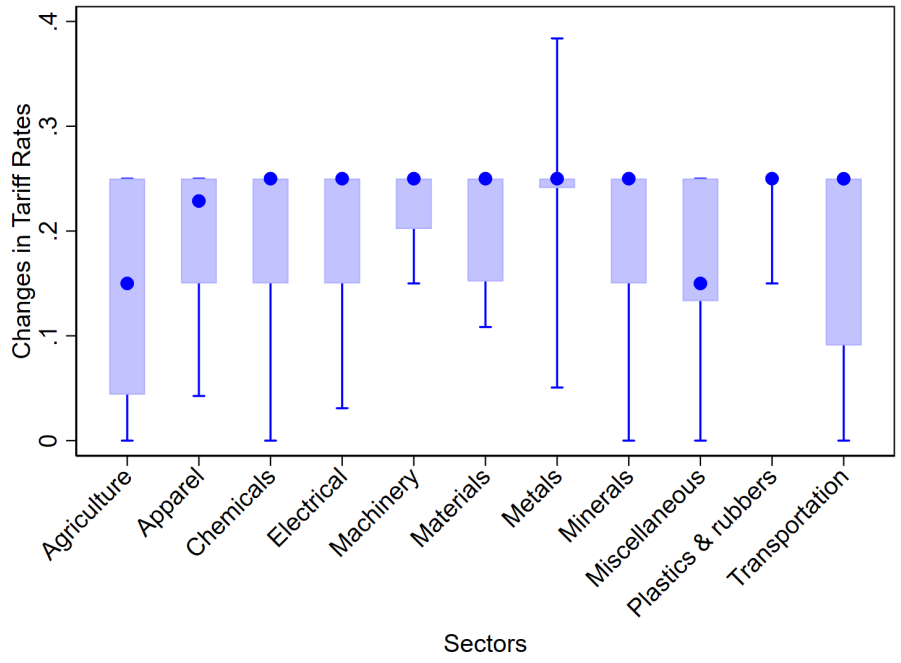
7 Conclusion

The 2018 US-China trade war significantly reshaped global trade patterns, and this paper provides evidence on how third-party exporting countries, specifically Thailand, responded to these tensions. Leveraging detailed Thai customs data from 2013 to 2023 and employing a difference-in-differences framework, our study estimates the impact of U.S. and Chinese tariff increases on Thai exports at the HS-6 level. We find robust evidence of trade diversion: Thailand experienced a substantial increase in exports to the U.S., as well as to ASEAN. The positive effect on Thai exports emerged with a delay, appearing in the third and fourth years after the tariffs were introduced, consistent with a gradual restructuring of US supply chains as importers sought alternative sourcing relationships. In contrast, we observe some negative responses of exports to China to the Chinese retaliatory actions. In addition, we highlight that greater exports to U.S. may reflect transshipment of Chinese products and increased supply chain integration with China.

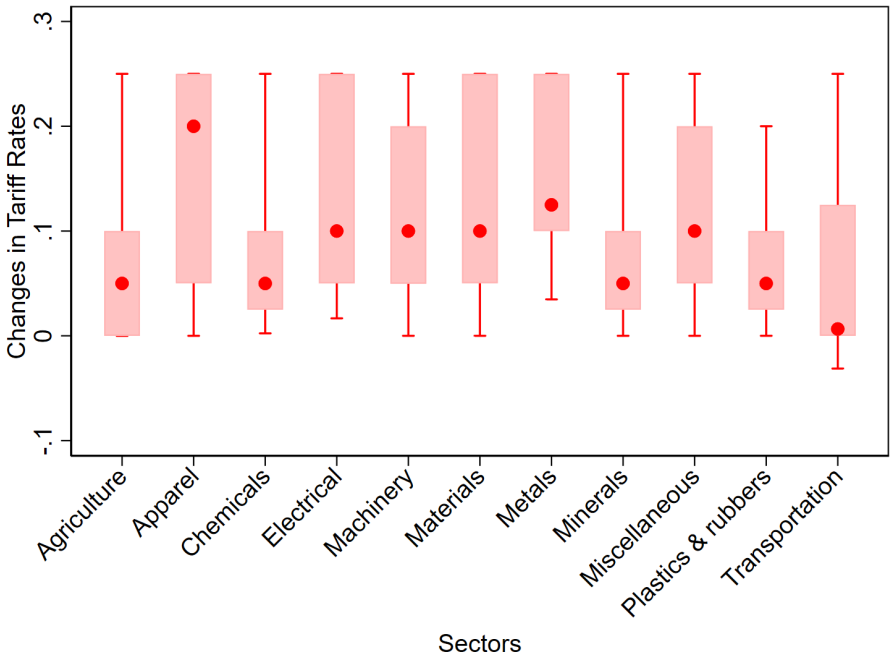
Building on these findings, future research could explore several avenues to deepen the understanding of trade war impacts. First, it would be valuable to identify further channels underlying the trade war's effects, especially those related to global supply chains. For instance, investigating whether reduced US demand for Chinese products subsequently lowers Chinese demand for inputs or upstream products from Thailand, which would require the integration of input-output tables to map supply linkages across countries. Second, a firm-level analysis could also offer granular insights into the types of firms that increased exports to the U.S., the roles of extensive versus intensive margins in this expansion, and whether firms of Chinese nationality played a part. Such analysis could also shed further light on observable trade re-routing at the firm level.

Figure 1: Additional Tariffs from the 2018 U.S.–China Trade War

(a) U.S. tariffs on Chinese Products ($\Delta\tau^{US\to CN}$)



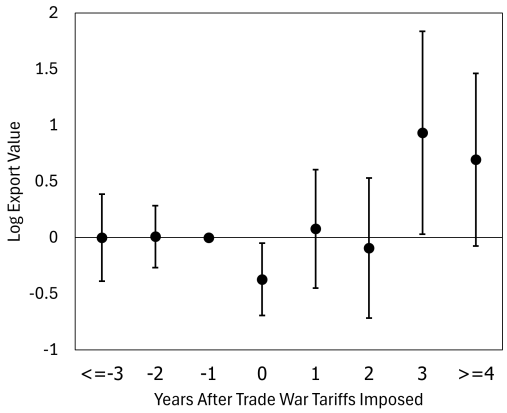
(b) Chinese tariffs on U.S. Products ($\Delta\tau^{CN\to US}$)



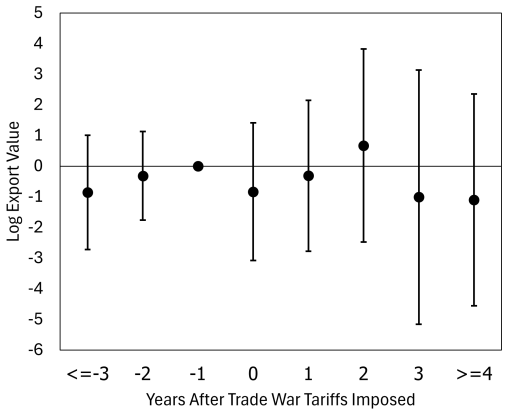
Note: This Figure reports the set of tariff changes imposed by the U.S. (Panel A) and China (Panel B), by sectors. The solid dots indicate the median tariff increase, the boxes denote the 25^{th} and 75^{th} percentiles, and whiskers show the 10^{th} and 90^{th} percentiles based on tariff changes at the end of 2019 relative to the pre-war period at HS-6 product levels. Sectors are classified according to two-digit HS codes: Agriculture (1-24), Minerals (25-27), Chemicals (28-38), Plastics & rubbers (39-40), Materials (41-49, 68-71), Apparel (50-67), Metals (72-83), Machinery (84), Electrical (85), Transportation (86-89), Miscellaneous (90-97).

Figure 2: Dynamic Effects of the 2018 U.S.–China Trade War on Thai Exports

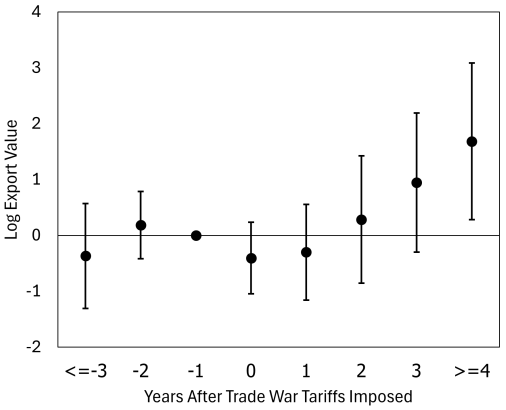
(a) Total Export ($\Delta\tau_i^{US\to CN}$)



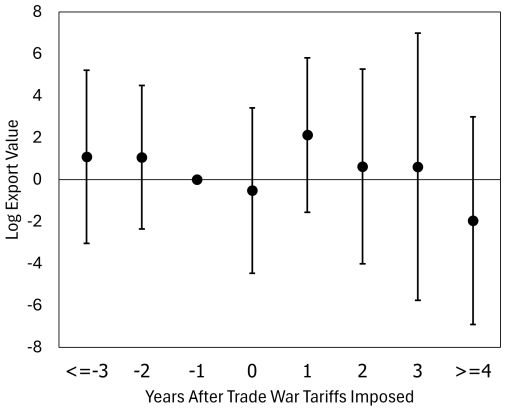
(b) Total Export ($\Delta\tau_i^{CN\to US}$)



(c) Export to the U.S. ($\Delta\tau_i^{US\to CN}$)



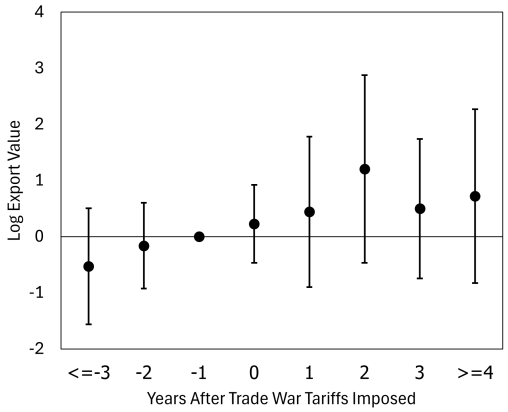
(d) Export to the U.S. ($\Delta\tau_i^{CN\to US}$)



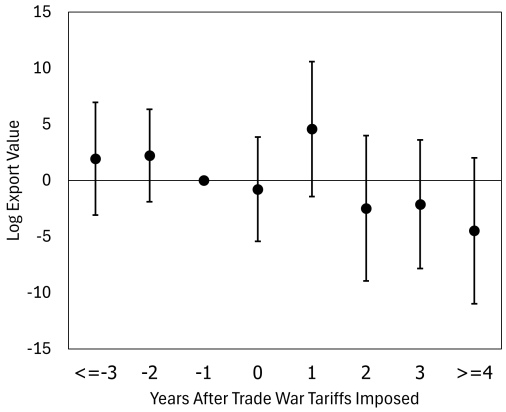
Note: Each panel plots the event-study coefficients based on estimating the dynamic impact of weighted tariff rates on Thai exports using Equation (4). The bands represent 95-percent confidence intervals.

Figure 2: Dynamic Effects of the U.S.–China Trade War on Thai Exports (continued)

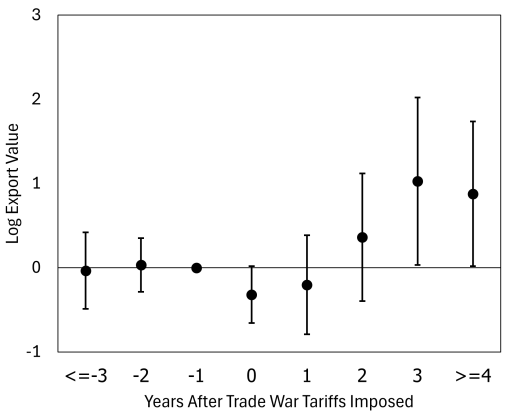
(e) Export to China ($\Delta\tau_i^{US\to CN}$)



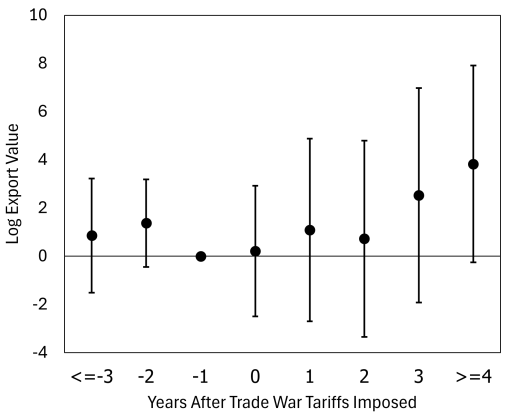
(f) Export to China ($\Delta\tau_i^{CN\to US}$)



(g) Export to ASEAN ($\Delta\tau_i^{US\to CN}$)



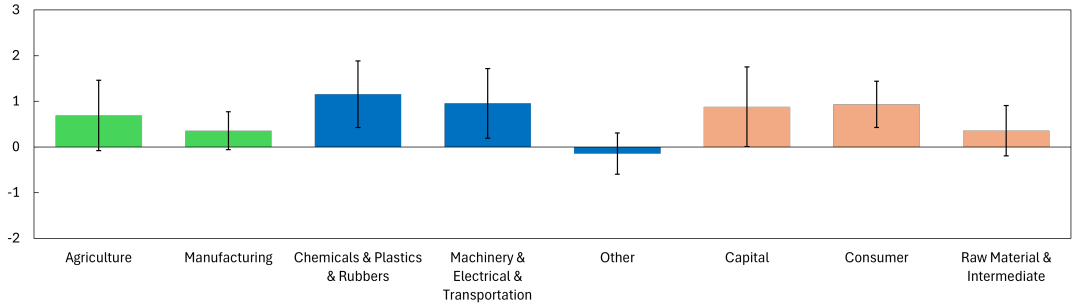
(h) Export to ASEAN ($\Delta\tau_i^{CN\to US}$)



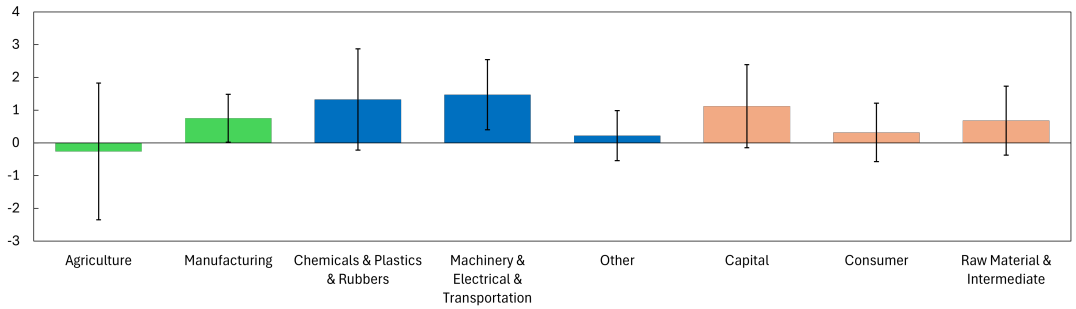
Note: Each panel plots the event-study coefficients based on estimating the dynamic impact of weighted tariff rates on Thai exports using Equation (4). The bands represent 95-percent confidence intervals.

Figure 3: Heterogeneous Effects of U.S. tariffs on Chinese Products ($\Delta\tau_i^{US\to CN}$) on Thai Exports across Different Product Groups

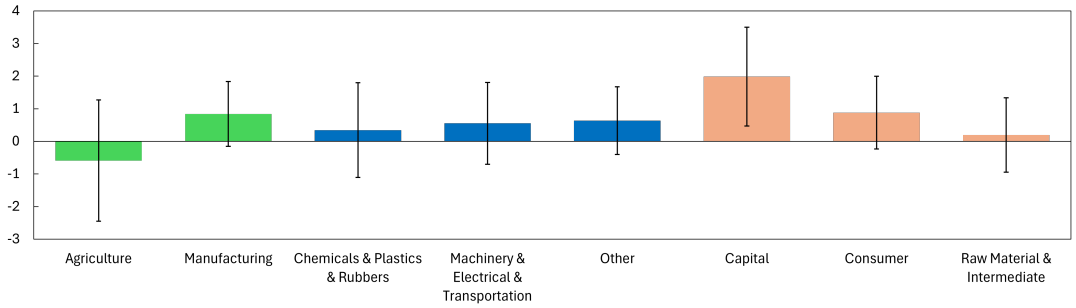
(a) Total Export



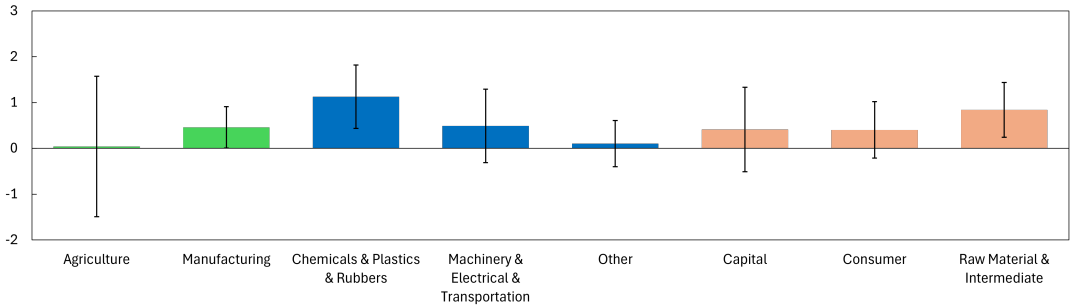
(b) Export to the US



(c) Export to China



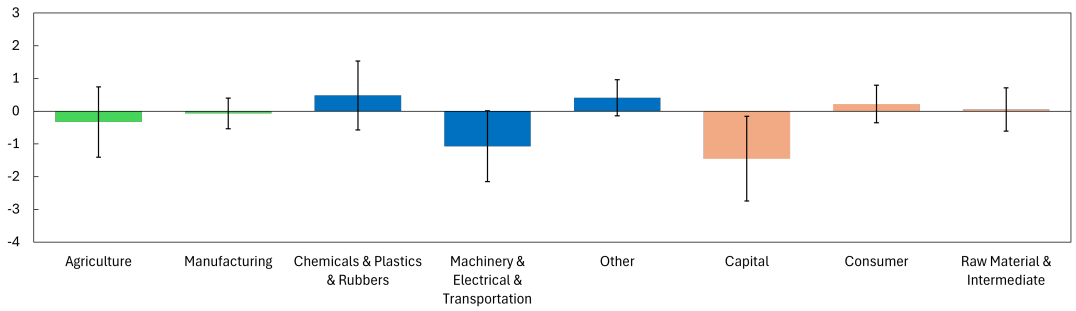
(d) Export to ASEAN



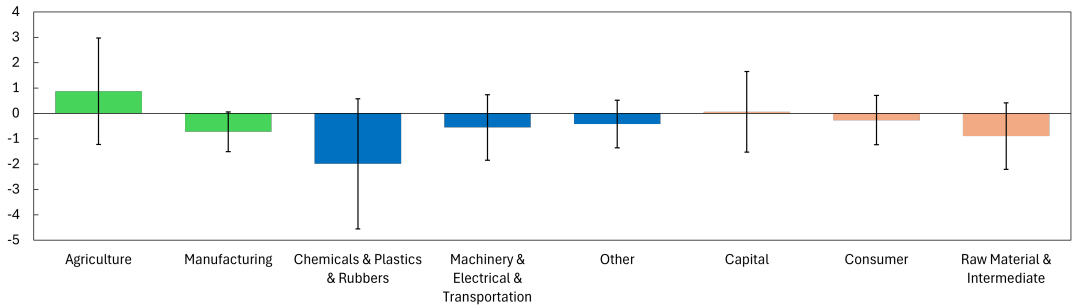
Note: This Figure reports the effects of U.S. tariff changes on Thai exports of each product group. 95-percent confidence intervals are computed based on standard errors, which are clustered at the HS-6 product level. Details of coefficient estimates are shown in Tables A.3.

Figure 4: Heterogeneous Effects of China tariffs on U.S. Products ($\Delta\tau_i^{CN\to US}$) on Thai Exports across Different Product Groups

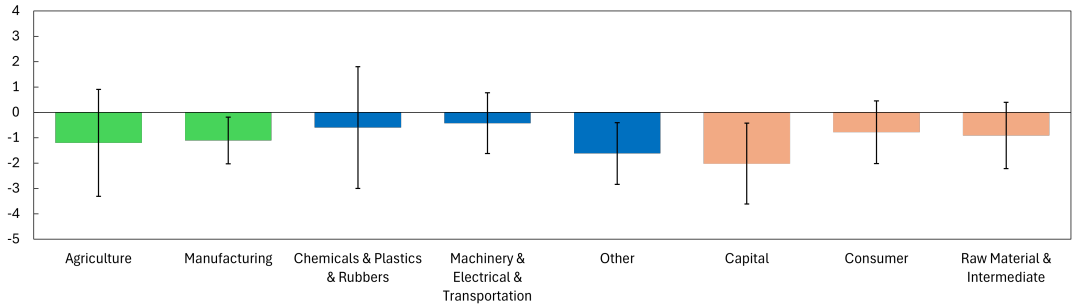
(a) Total Export



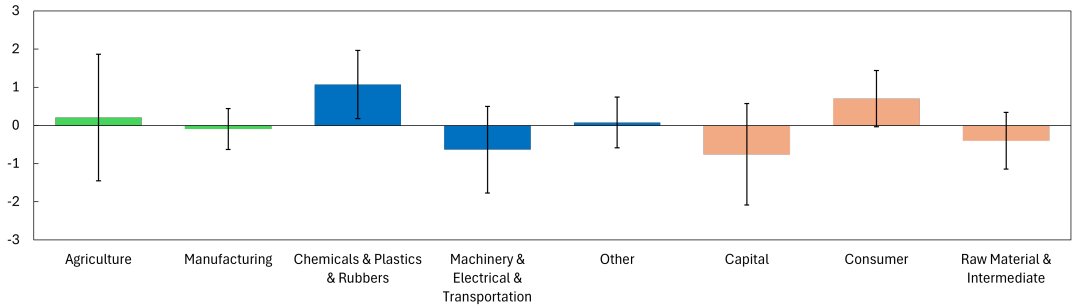
(b) Export to the US



(c) Export to China



(d) Export to ASEAN



Note: This Figure reports the effects of China tariff changes on Thai exports of each product group. 95-percent confidence intervals are computed based on standard errors, which are clustered at the HS-6 product level. Details of coefficient estimates are shown in Tables A.3.

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Appendix

Appendix A More Figures and Tables

Table A.1: Thai Exports by Sectors

	Total		U.S.		China		ASEAN	
Sector	Value	Share	Value	Share	Value	Share	Value	Share
Agriculture	1204	17.6%	140	9.7%	336	33.6%	287	18.3%
Apparel	189	2.8%	40	2.8%	12	1.2%	50	3.2%
Chemicals	389	5.7%	23	1.6%	63	6.3%	154	9.8%
Electrical	1508	22.0%	511	35.5%	104	10.4%	268	17.1%
Machinery	1298	19.0%	346	24.0%	116	11.6%	251	16.0%
Materials	502	7.3%	47	3.3%	26	2.6%	166	10.6%
Metals	429	6.3%	84	5.83%	48	4.8%	104	6.6%
Minerals	73	1.1%	1	0.0%	8	0.8%	46	3.0%
Miscellaneous	275	4.0%	72	5.0%	25	2.5%	38	2.4%
Plastics & rubbers	976	14.3%	175	12.2%	260	26.0%	202	12.9%
Transportation	1006	14.7%	67	4.6%	29	2.9%	303	19.4%
All sectors	6845	100%	1439	100%	999	100%	1566	100%

Note: The table reports average values (in billions of Thai baht) and the share of Thai exports to the world, the U.S., China and ASEAN between 2022 and 2023 across sectors. Sectors are classified according to two-digit HS codes: Agriculture (1-24), Minerals (25-27), Chemicals (28-38), Plastics & rubbers (39-40), Materials (41-49, 68-71), Apparel (50-67), Metals (72-83), Machinery (84), Electrical (85), Transportation (86-89), Miscellaneous (90-97).

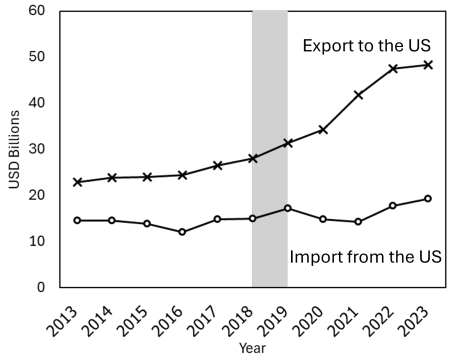
Table A.2: Thai Sectoral Exports by Destination Countries

Sector	U.S.	China	ASEAN	ROW	Total
Agriculture	11.6%	27.9%	23.8%	36.6%	100%
Apparel	21.2%	6.4%	26.3%	46.0%	100%
Chemicals	5.9%	16.3%	39.6%	38.3%	100%
Electrical	33.9%	6.9%	17.8%	41.4%	100%
Machinery	26.7%	8.9%	19.3%	45.1%	100%
Materials	9.4%	5.2%	33.1%	52.4%	100%
Metals	19.5%	11.3%	24.2%	45.0%	100%
Minerals	0.7%	10.3%	63.1%	25.9%	100%
Miscellaneous	26.3%	9.2%	13.7%	50.8%	100%
Plastics & rubbers	17.9%	26.6%	20.7%	34.7%	100%
Transportation	6.6%	2.9%	30.1%	60.3%	100%

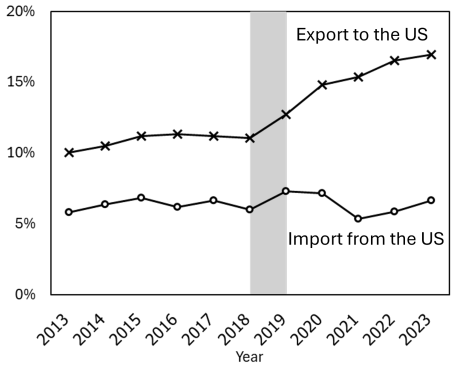
Note: The table reports the average share of Thai sectoral exports to the U.S., China and ASEAN between 2022 and 2023 across destination countries. Sectors are classified according to two-digit HS codes: Agriculture (1-24), Minerals (25-27), Chemicals (28-38), Plastics & rubbers (39-40), Materials (41-49, 68-71), Apparel (50-67), Metals (72-83), Machinery (84), Electrical (85), Transportation (86-89), Miscellaneous (90-97).

Figure A.1: Values and Shares of Thai Exports and Imports by Destination and Source Countries

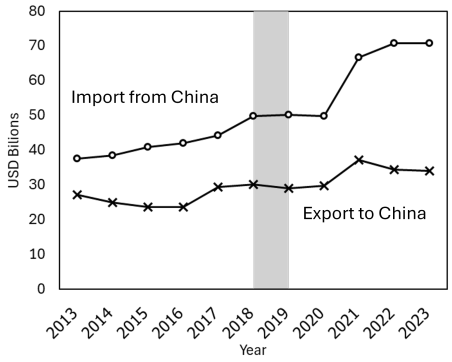
(a) Trade Value with the U.S.



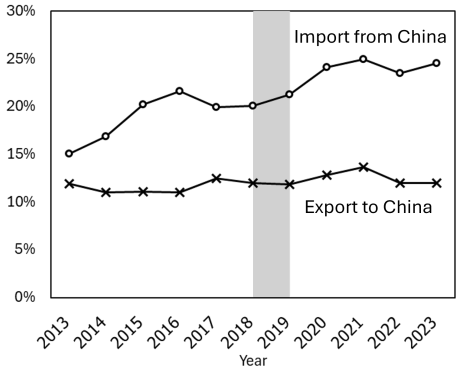
(b) Trade Share with the U.S.



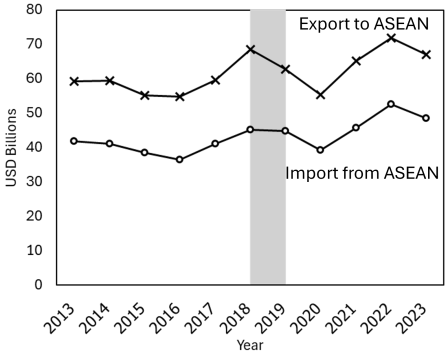
(c) Trade Value with China



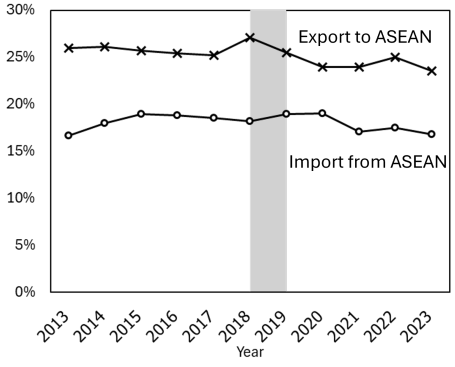
(d) Trade Share with China



(e) Trade Value with ASEAN



(f) Trade Share with ASEAN



Note: The left-hand panels show the annual values of Thai exports in US dollar terms to (imports from) certain destination (source) countries over time. The right-hand panels report their shares to the corresponding total Thai exports or imports.
Source: The Bank of Thailand

Table A.3: Heterogeneous Effects of the Weighted U.S.-China Tariffs on Thai Exports

Dep. Var.:	Total Exports			Exports to the U.S.		
	Group	Sector	Type	Group	Sector	Type
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$						
... × Manufacturing_i	0.357*			0.752**		
	(0.211)			(0.374)		
... × Agricultural_i	0.691*	0.783**		-0.264	-0.226	
	(0.392)	(0.393)		(1.066)	(0.671)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		1.157***			1.328*	
		(0.372)			(0.789)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		0.956**			1.472***	
		(0.389)			(0.547)	
... × $\text{Other manufacturing}_i$		-0.145			0.220	
		(0.231)			(0.391)	
... × Capital good_i			0.881**			1.120*
			(0.445)			(0.647)
... × Consumer good_i			0.934***			0.319
			(0.258)			(0.454)
... × $\text{Raw material and Intermediate input}_i$			0.359			0.680
			(0.281)			(0.537)
... × Other_i			0.728			0.319
			(0.568)			(0.913)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$						
... × Manufacturing_i	-0.068			-0.729*		
	(0.240)			(0.401)		
... × Agricultural_i	-0.331	-0.260		0.866	0.929	
	(0.547)	(0.548)		(1.071)	(0.957)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		0.481			-1.991	
		(0.537)			(1.308)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		-1.071*			-0.559	
		(0.553)			(0.661)	
... × $\text{Other manufacturing}_i$		0.409			-0.424	
		(0.282)			(0.478)	
... × Capital good_i			-1.453**			0.057
			(0.660)			(0.810)
... × Consumer good_i			0.222			-0.271
			(0.293)			(0.496)
... × $\text{Raw material and Intermediate input}_i$			0.052			-0.898
			(0.337)			(0.668)
... × Other_i			-0.261			-0.255
			(0.721)			(1.200)
Observations	33,990	33,990	33,990	15,235	15,235	15,235
Adjusted R^2	0.854	0.855	0.855	0.795	0.796	0.795
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions include tariffs the destination country imposes on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Table A.3: Heterogeneous Effects of the Weighted U.S.-China Tariffs on Thai Exports (continued)

Dep. Var.:	Exports to China			Exports to ASEAN		
	Group (1)	Sector (2)	Type (3)	Group (4)	Sector (5)	Type (6)
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$						
... × Manufacturing_i	0.839*			0.460**		
	(0.507)			(0.231)		
... × Agricultural_i	-0.588	0.491		0.040	0.234	
	(0.949)	(0.823)		(0.782)	(0.569)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		0.344			1.127***	
		(0.741)			(0.352)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		0.552			0.489	
		(0.639)			(0.409)	
... × $\text{Other manufacturing}_i$		0.635			0.105	
		(0.530)			(0.257)	
... × Capital good_i			1.988**			0.412
			(0.773)			(0.470)
... × Consumer good_i			0.881			0.403
			(0.568)			(0.315)
... × $\text{Raw material and Intermediate input}_i$			0.196			0.838***
			(0.583)			(0.305)
... × Other_i			1.130			0.631
			(1.386)			(0.678)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$						
... × Manufacturing_i	-1.110**			-0.095		
	(0.470)			(0.273)		
... × Agricultural_i	-1.206	-0.497		0.208	0.404	
	(1.075)	(0.915)		(0.845)	(0.703)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		-0.600			1.074**	
		(1.224)			(0.456)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		-0.427			-0.636	
		(0.611)			(0.580)	
... × $\text{Other manufacturing}_i$		-1.624***			0.078	
		(0.619)			(0.339)	
... × Capital good_i			-2.023**			-0.757
			(0.813)			(0.678)
... × Consumer good_i			-0.782			0.702*
			(0.630)			(0.377)
... × $\text{Raw material and Intermediate input}_i$			-0.912			-0.400
			(0.667)			(0.379)
... × Other_i			-2.262			-0.493
			(1.491)			(0.865)
Observations	13,299	13,299	13,299	29,601	29,601	29,601
Adjusted R^2	0.772	0.772	0.772	0.804	0.805	0.804
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions include tariffs the destination country imposes on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Table A.4: Heterogeneous Effects of the Unweighted U.S.-China Tariffs on Thai Exports

Dep. Var.:	Total Exports			Exports to the U.S.		
	Group (1)	Sector (2)	Type (3)	Group (4)	Sector (5)	Type (6)
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$						
... × Manufacturing_i	0.321			0.822**		
	(0.217)			(0.392)		
... × Agricultural_i	0.854	0.934*		0.002	0.008	
	(0.559)	(0.560)		(0.804)	(0.806)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		1.291***			1.345	
		(0.424)			(0.969)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		0.937*			1.682***	
		(0.479)			(0.611)	
... × $\text{Other manufacturing}_i$		-0.268			0.217	
		(0.237)			(0.422)	
... × Capital good_i			0.975*			1.181
			(0.548)			(0.753)
... × Consumer good_i			0.854***			0.428
			(0.299)			(0.486)
... × $\text{Raw material and Intermediate input}_i$			0.366			0.863
			(0.305)			(0.631)
... × Other_i			0.489			0.053
			(0.622)			(0.845)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$						
... × Manufacturing_i	0.341			-0.055		
	(0.268)			(0.419)		
... × Agricultural_i	-0.103	0.013		0.718	0.753	
	(0.598)	(0.599)		(0.846)	(0.847)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		0.689			-0.860	
		(0.564)			(1.347)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		-0.339			-0.130	
		(0.555)			(0.645)	
... × $\text{Other manufacturing}_i$		0.875***			0.186	
		(0.306)			(0.499)	
... × Capital good_i			-0.895			0.500
			(0.675)			(0.840)
... × Consumer good_i			0.521			0.160
			(0.336)			(0.493)
... × $\text{Raw material and Intermediate input}_i$			0.382			-0.396
			(0.361)			(0.683)
... × Other_i			0.491			0.893
			(0.670)			(0.984)
Observations	33,990	33,990	33,990	15,235	15,235	15,235
Adjusted R^2	0.854	0.855	0.855	0.795	0.796	0.795
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions include tariffs the destination country imposes on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Table A.4: Heterogeneous Effects of the Unweighted U.S.-China Tariffs on Thai Exports (continued)

Dep. Var.:	Exports to China			Exports to ASEAN		
	Group (1)	Sector (2)	Type (3)	Group (4)	Sector (5)	Type (6)
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$						
... × Manufacturing_i	0.515			0.422*		
	(0.486)			(0.242)		
... × Agricultural_i	0.271	0.206		0.027	0.110	
	(0.965)	(0.967)		(0.703)	(0.704)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		0.191			1.085***	
		(0.827)			(0.406)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		0.114			0.673	
		(0.737)			(0.502)	
... × $\text{Other manufacturing}_i$		0.566			-0.019	
		(0.582)			(0.271)	
... × Capital_i			2.231**			0.743
			(0.895)			(0.583)
... × Consumer_i			0.844			0.227
			(0.610)			(0.344)
... × $\text{Raw material and Intermediate input}_i$			0.135			0.842**
			(0.674)			(0.354)
... × Other_i			-0.954			0.173
			(1.958)			(0.751)
$\text{Post}_{it} \times \Delta\tau_i^{CN \to US}$						
... × Manufacturing_i	-0.692			0.190		
	(0.541)			(0.310)		
... × Agricultural_i	0.196	0.111		0.566	0.723	
	(1.037)	(1.044)		(0.679)	(0.681)	
... × $\text{Chemicals\&Plastics\&Rubbers}_i$		-0.252			1.490***	
		(1.269)			(0.506)	
... × $\text{Machinery\&Electrical\&Transportation}_i$		0.229			-0.352	
		(0.724)			(0.580)	
... × $\text{Other manufacturing}_i$		-1.253*			0.617	
		(0.702)			(0.377)	
... × Capital_i			-1.710*			-0.781
			(0.928)			(0.708)
... × Consumer_i			-0.453			0.980**
			(0.752)			(0.432)
... × $\text{Raw material and Intermediate input}_i$			-0.640			0.019
			(0.705)			(0.402)
... × Other_i			0.533			0.505
			(1.910)			(0.814)
Observations	13,299	13,299	13,299	29,601	29,601	29,601
Adjusted R^2	0.772	0.772	0.772	0.804	0.805	0.804
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

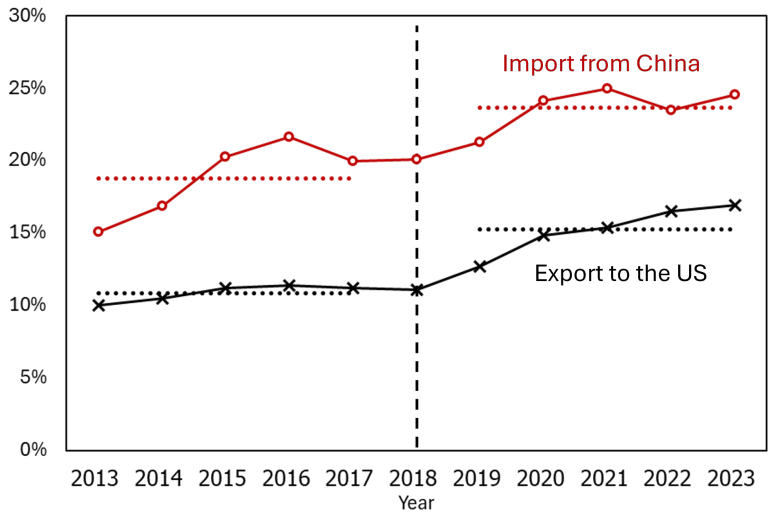
Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions include tariffs the destination country imposes on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Table A.5: The Effect of Unweighted U.S. Tariffs ($\Delta\tau_i^{US\to CN}$) on Thai Exports to the U.S. by Product Characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN}$	0.483	0.755*	0.594	0.515	0.334	0.139	-0.034	-0.098
	(0.420)	(0.435)	(0.409)	(0.577)	(0.441)	(0.497)	(0.482)	(0.526)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{RCA}_i^{US}$	0.605*						0.759*	0.609
	(0.327)						(0.402)	(0.389)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{RCA}_i^{Global}$		-0.021						
		(0.326)						
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{CN Loss}_i$			0.335				-0.044	-0.032
			(0.342)				(0.410)	(0.408)
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{GLI}_i^{Global}$				0.377				
				(0.640)				
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{GLI}_i^{China}$					1.422**		1.636**	
					(0.635)		(0.650)	
$\text{Post}_{it} \times \Delta\tau_i^{US\to CN} \times \text{GLI}_i^{ASEAN}$						1.221**		1.199*
						(0.615)		(0.613)
$\text{Post}_{it} \times \Delta\tau_i^{CN\to US}$	0.013	0.043	0.014	0.044	0.040	0.043	0.007	0.015
	(0.403)	(0.403)	(0.406)	(0.402)	(0.403)	(0.402)	(0.405)	(0.404)
Observations	15,235	15,235	15,235	15,235	15,224	15,235	15,224	15,235
Adjusted R^2	0.795	0.795	0.795	0.795	0.795	0.795	0.796	0.795
HS6 FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for U.S. tariffs on Thai exports. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.

Figure A.2: Thai Export Share to the U.S. versus Thai Import Share from China



Note: This Figure reports the annual shares of Thai exports to the U.S. (Thai imports from China) as a ratio of total Thai exports (imports).
Source: The Bank of Thailand

Table A.6: Evidence on Regional Supply Chain Effects

Import of U.S. Inputs:	Value	Ratio to EX^{Total}	Ratio to Revenue
$\text{Post}_{ft} \times \Delta\tau_f^{US \to CN}$	1.305**	0.011	0.000
	(0.516)	(0.016)	(0.004)
Observations	75,292	75,292	61,603
Adjusted R^2	0.634	0.352	0.590
Import of ASEAN Inputs:	Value	Ratio to EX^{Total}	Ratio to Revenue
$\text{Post}_{ft} \times \Delta\tau_f^{US \to CN}$	1.889***	0.040**	0.004
	(0.570)	(0.017)	(0.004)
Observations	76,075	76,075	62,296
Adjusted R^2d	0.665	0.403	0.560
Import of East Asia Inputs:	Value	Ratio to EX^{Total}	Ratio to Revenue
$\text{Post}_{ft} \times \Delta\tau_f^{US \to CN}$	3.304***	0.046*	0.004
	(0.688)	(0.026)	(0.008)
Observations	75,524	75,524	61,749
Adjusted R^2	0.691	0.471	0.654
Firm FEs	Yes	Yes	Yes
Industry x Time FEs	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level. All regressions control for a firm's exposure to U.S. tariffs on Thai exports. East Asia includes Japan, Korea and Taiwan. Industry × Time FEs are specified separately for non-manufacturing and manufacturing industries. *,**, and *** indicate the significance level of 0.10, 0.05, and 0.01, respectively.