



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

Nuwat Nookhwun<sup>1</sup>, Jettawat Pattararangrong<sup>1</sup>, Kittichai Saelee<sup>2</sup>, Wisarut Suwanprasert<sup>3</sup>

<sup>1</sup>Puey Ungphakorn Institute for Economic Research, Bank of Thailand

<sup>2</sup>Thammasat University

<sup>3</sup>Middle Tennessee State University

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- ▶ The 2018 U.S.–China trade war significantly disrupted global trade flows, creating substantial uncertainty for exporters worldwide.
  - ⇒ Elevated tariffs covered 360 and 110 billion dollars of Chinese and U.S. exports.
  - ⇒ Continued over Biden administration
- ▶ While much of the literature has focused attention on the U.S. and China, spillover effects on third countries are less well understood.
  - ⇒ Bystander countries may gain or lose from the trade war, depending on degrees of product substitutability and production responses (Fajgelbaum et al., 2024).
  - ⇒ *Thailand* emerges as an interesting study case due to high trade dependency, strong trade ties with both the U.S. and China, and strategic location within ASEAN

- ▶ We investigate **how Thailand's exports respond to bilateral tariff shocks** using detailed **Customs data** from 2013–2023.
- ▶ Our analysis exploits **cross-product variations in tariff exposure** to identify the spill-over effects on Thailand's exports to major destinations.
- ▶ This paper also examines:
  - Dynamic responses of Thai exports
  - Impact heterogeneity across sectors
  - Whether firms' export reactions reflect **potential transshipment or supply chain link with China**, which potentially limits gains from trade

## Preview of Empirical Results

- ▶ Significant **trade diversion effects due to U.S. tariffs** on Chinese products, which raise Thai exports to the U.S., but with some delay
  - Larger effects for capital goods in the **machinery, electrical and transportation sectors**, i.e., goods with high participation in GVCs
- ▶ Suggestive **evidence of both transshipment** of Chinese goods to the U.S. and **increased supply-chain integration** with China
  - Accounting for these channels, trade diversion still results in domestic value-added expansion.
- ▶ Rather limited spillover effects from China retaliation, with some negative responses of exports to China

- ▶ This paper mainly contributes to the literature on **third-country spillovers** of trade policy shocks.
  - ⇒ Global reallocation: Fajgelbaum et al (2024), Alfaro and Chor (2023)
- ▶ On **supply chain links to China & potential transshipment**: Freund et al (2024), Iyoha et al (2024), Hayakawa (2024), Utar et al (2023), Beason et al. (2025)
  - ⇒ Our paper identifies both channels in the same empirical setting & quantifies net benefits on Thai exporters
- ▶ Impact of trade war on the U.S. and Chinese economies: Amiti et al (2020), Cavallo et al. (2021), Fajgelbaum et al (2020), Handley et al (2020), Jiao et al.(2024)

# Overview of the 2018 U.S.–China Trade War

- ▶ From July 6, 2018, the U.S. implemented five waves of tariff hikes against China.



Figure: U.S.–China Tariff Rates from Bown (2021)

# Thai Exports to Major Export Destinations

- ▶ Since 2018, exports to the U.S. have expanded strongly from 10% to almost 20%.

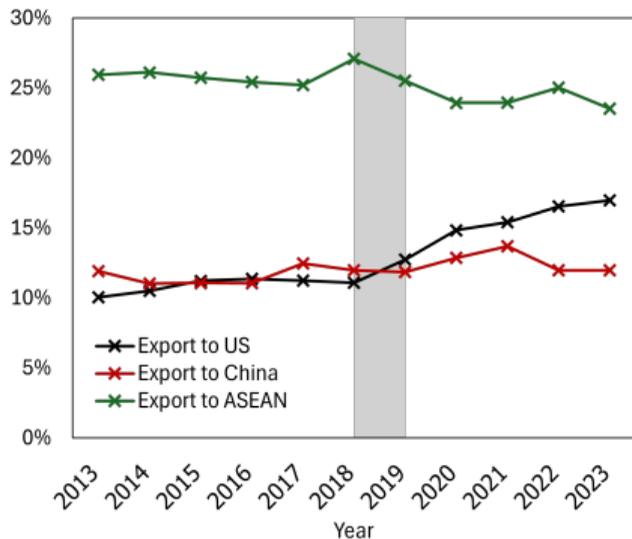


Figure: Share of Thai Exports by Export Destinations

- ▶ **Thai exports data:** from Customs database
  - We aggregate these transaction-level data into annual data at the HS 6-digit product level (3,765 products).
- ▶ **U.S.-China tariff data:** from Fajgelbaum et al. (2024) and Bown (2021)
  - For each HS-6 product  $i$ , we compute weighted-average changes in the HS 10-digit tariff rates between Dec 2017 and Dec 2019:

$$\Delta \tau_i^{US \rightarrow CN} = \sum_{j \in i} w_{j,1317}^{US \leftarrow CN} \Delta \tau_j^{US \rightarrow CN} \quad (1)$$

$$\Delta \tau_i^{CN \rightarrow US} = \sum_{j \in i} w_{j,1317}^{CN \leftarrow US} \Delta \tau_j^{CN \rightarrow US} \quad (2)$$

- $w_{j,1317}^{US \leftarrow CN}$  - the share of U.S. imports of Chinese products  $j$  within the corresponding HS-6 product category  $i$  during 2013–17 ( $w_{j,1317}^{CN \leftarrow US}$  - share of Chinese imports of U.S. products).

# Additional Tariffs from the 2018 U.S.–China Trade War

- ▶ Significant variations in additional tariffs within and across industries

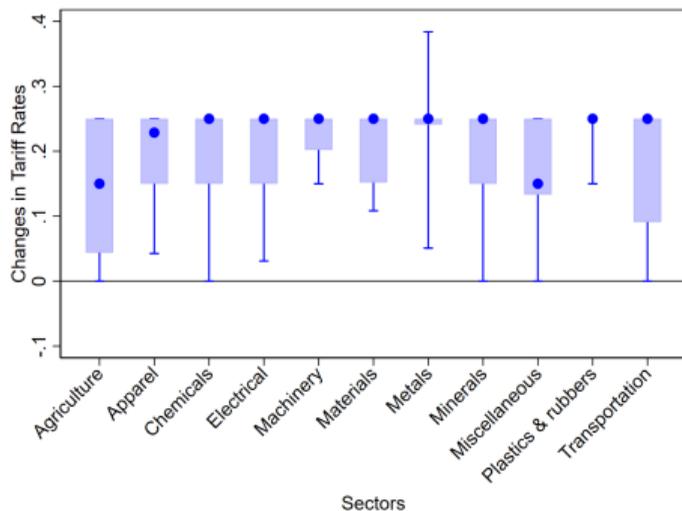


Figure: U.S. tariffs on Chinese goods:  
 $\Delta T_i^{US \rightarrow CN}$

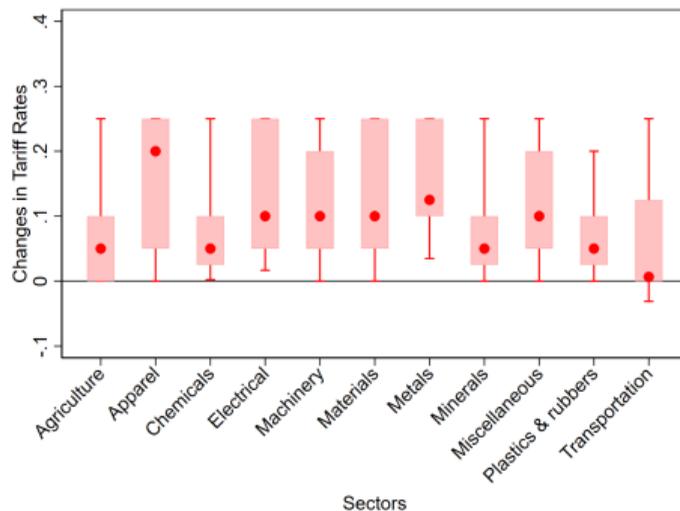


Figure: China tariffs on U.S. goods:  
 $\Delta T_i^{CN \rightarrow US}$

- ▶ Panel regression at the HS-6 product-year level to be separately estimated for each export destination

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

- $EX_{it}^d$  - log of export value of product  $i$  to destination  $d$
  - $\text{Post}_{it}$  - the dummy variable for the period that product  $i$  faces tariff hikes
  - $\mathbf{X}_{it}^d$  includes tariff rates the destination country imposes on imports of product  $i$  from Thailand
  - Time and product fixed effects
- ▶ Focus on four export destinations: U.S., China, ASEAN and the rest of the world (ROW)

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

- ▶ Thai exports may gain from the Trade War, as Thai goods substitute for Chinese products in the U.S. market.

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

	Total	U.S.	China	ASEAN	ROW
$\text{Post}_{it} \times \Delta \tau_i^{US \rightarrow CN}$	0.400* (0.207)	0.628* (0.354)	0.629 (0.457)	0.387* (0.224)	0.544* (0.278)
$\text{Post}_{it} \times \Delta \tau_i^{CN \rightarrow US}$	-0.119 (0.227)	-0.467 (0.377)	-1.115** (0.434)	-0.049 (0.262)	0.077 (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 & Time FEs	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses are clustered at the HS-6 product level.

- ▶ We extend the baseline specification by replacing the post-treatment indicator with a set of year-specific indicators.

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

- $\text{Dur}_{it}^k$  - the dummy variables indicating the number of years relative to the treatment period

# Dynamic Effects of the U.S. Tariffs on Chinese Products

- ▶ Exports to the U.S. exhibit a delayed but pronounced response to  $\Delta_T^{US \rightarrow CN}$ .

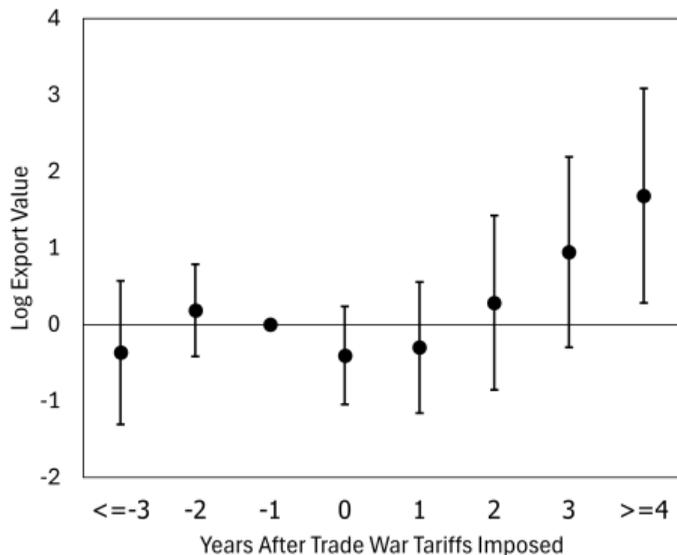


Figure: Responses of Exports to U.S. to  $\Delta_T^{US \rightarrow CN}$

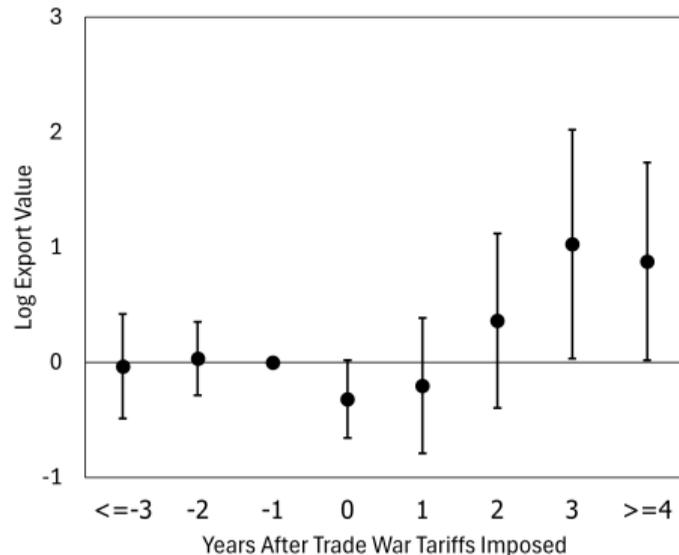


Figure: Responses of Exports to ASEAN to  $\Delta_T^{US \rightarrow CN}$

# Dynamic Effects of China's Tariffs on U.S. Products

- ▶ Thai exports barely respond to  $\Delta\tau^{CN \rightarrow US}$ .

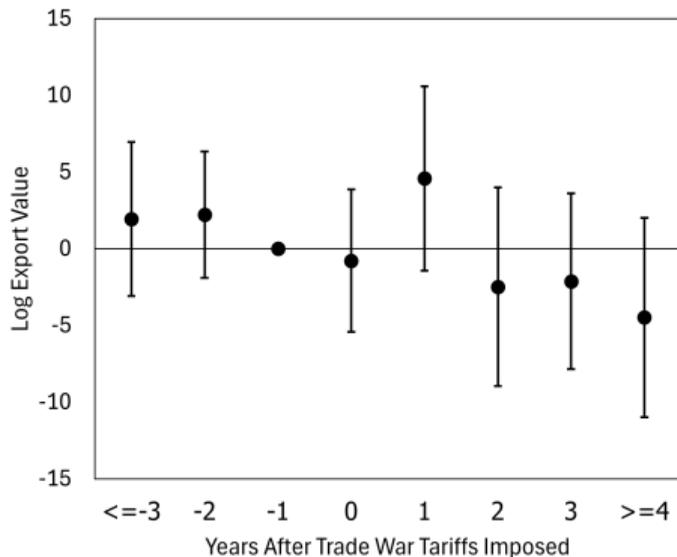


Figure: Responses of Exports to China to  $\Delta\tau^{CN \rightarrow US}$

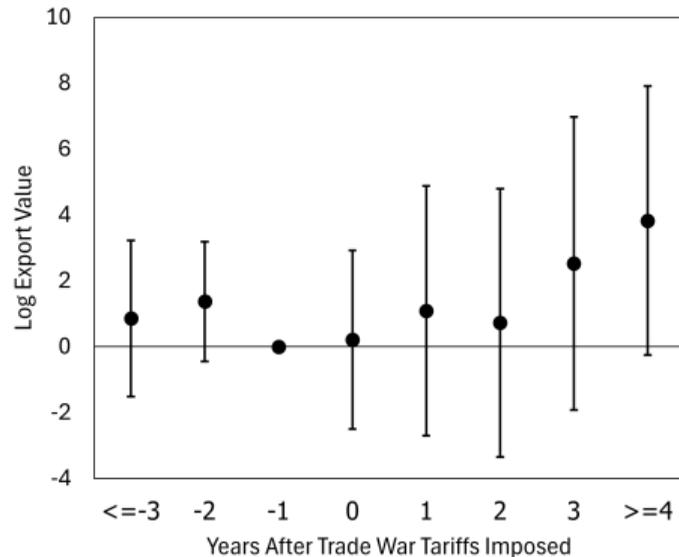


Figure: Responses of Exports to ASEAN to  $\Delta\tau^{CN \rightarrow US}$

# Heterogeneous Effects of U.S. Tariffs on Exports to U.S.

- ▶ Larger, significant impact found in the machinery & electrical & transportation sectors.

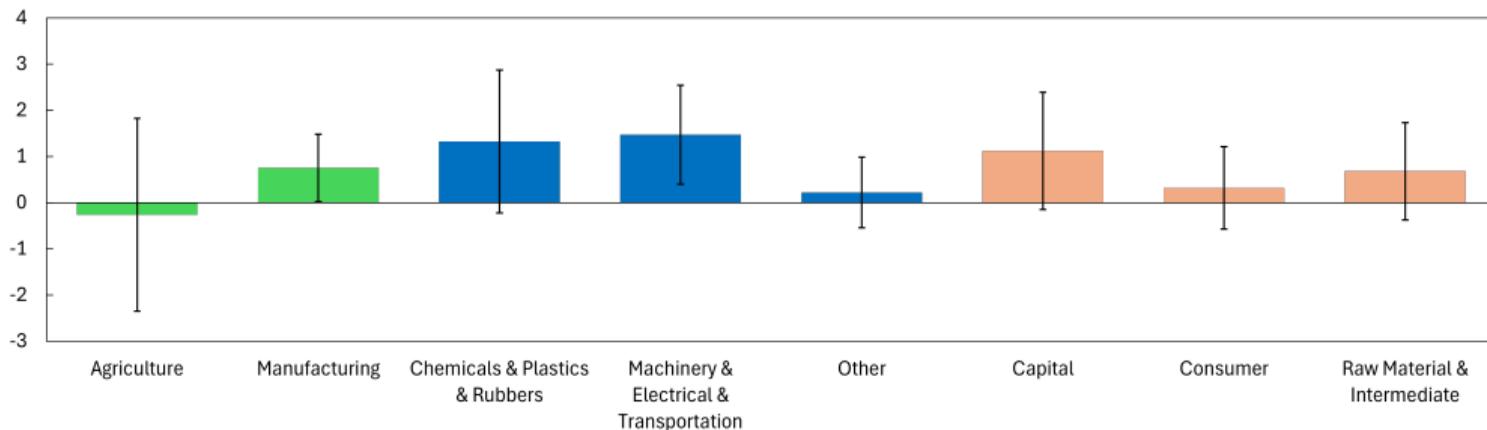


Figure: Heterogeneous Effects of  $\Delta\tau^{US \rightarrow CN}$ : Exports to the U.S.

# Heterogeneous Effects of U.S. Tariffs on Exports to ASEAN

- ▶ The trade war may have strengthened regional supply chain integration, as Thailand exports more raw material inputs to ASEAN.

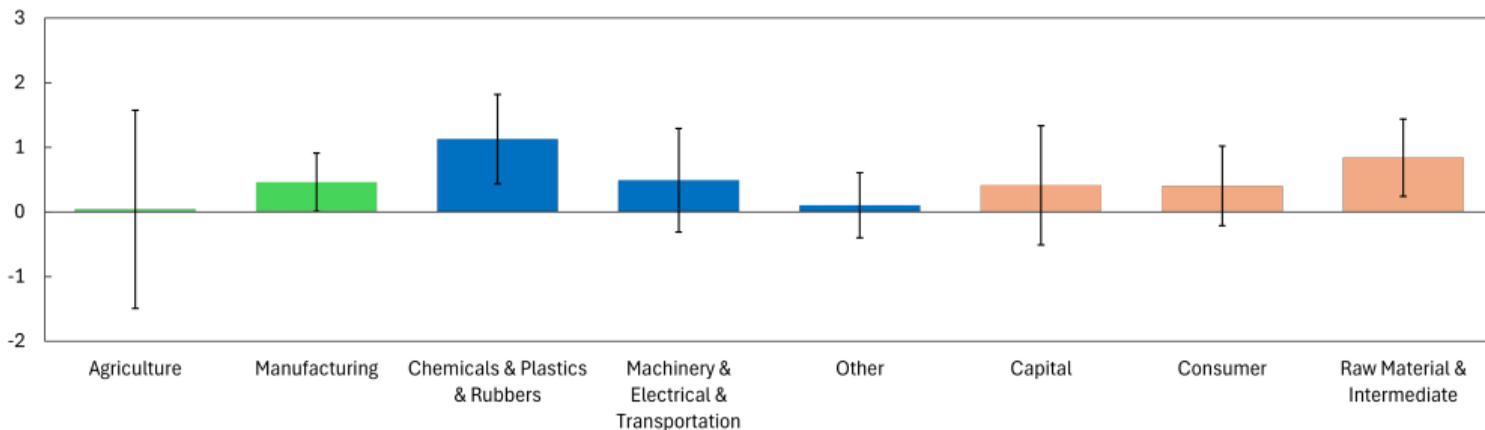


Figure: Heterogeneous Effects of  $\Delta\tau^{US \rightarrow CN}$ : Exports to ASEAN

- ▶ Explore three potential factors to explain positive responses of exports to the U.S.:
  - Comparative advantage of Thai products in the U.S. or global market
    - Use Revealed Comparative Advantage (RCA) index
  - China's lost market share in the U.S. market
    - Dummy variable = 1 if product  $i$ 's lost market share > average
  - Products with supply chain link to China or ASEAN
    - Use Grubel-Lloyd index (GLI) of intra-industry trade

Table: Effects of U.S. Tariffs on Thai Exports to the U.S. by Product Characteristics.

	(1)	(2)	(3)	(4)	(5)
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN}$	0.362 (0.388)	0.631 (0.401)	0.500 (0.544)	0.243 (0.409)	0.064 (0.467)
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN} \times RCA_i^{US}$	0.618* (0.325)				
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN} \times RCA_i^{Global}$		-0.005 (0.323)			
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN} \times CN\ Loss_i$			0.297 (0.339)		
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN} \times GLI_i^{China}$				1.371** (0.629)	
$Post_{it} \times \Delta \tau_i^{US \rightarrow CN} \times GLI_i^{ASEAN}$					1.144* (0.607)
Observations	15,235	15,235	15,235	15,224	15,235
Adjusted $R^2$	0.795	0.795	0.795	0.795	0.795
HS6 FEs & Time FEs	Yes	Yes	Yes	Yes	Yes

# Rising Trend of Chinese Imports

- ▶ Thailand may be serving as a link in the supply chain for Chinese products or a route for the transshipment of Chinese goods to the U.S.

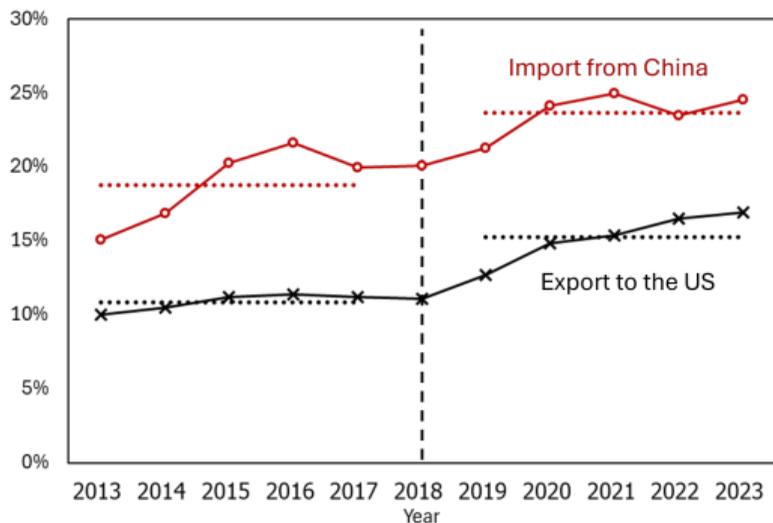


Figure: Thai Export Share to the U.S. versus Thai Import Share from China

# Firm-level analyses to examine the role of Chinese imports

- ▶ Construct **firm-level exposure** to the U.S.-China trade war, in particular **U.S. tariffs on Chinese goods**:

$$\Delta \tau_f^{US \rightarrow CN} = \frac{\sum_i EX_{i,1317}^f \Delta \tau_i^{US \rightarrow CN}}{\sum_i EX_{i,1317}^f} \quad (5)$$

- ▶ And also firm exposure to U.S. tariffs on Thai products:

$$\tau_{f,t}^{US \rightarrow TH} = \frac{\sum_i EX_{i,1317}^{f \rightarrow US} \tau_{it}^{US \rightarrow TH}}{\sum_i EX_{i,1317}^{f \rightarrow US}} \quad (6)$$

- ▶ Focus on firms that export their products to the U.S. market

# Firm-level Regression Specification

$$y_{ft} = \beta_1 Post_{ft} \Delta \tau_f^{US \rightarrow CN} + \beta \cdot \mathbf{X}_{ft} + \gamma_f + \delta_{jt} + \epsilon_{ft} \quad (7)$$

► Dependent variables ( $y_{ft}$ ):

1. Firm  $f$ 's exports to the U.S.,  $EX_t^{f \rightarrow US}$
2. Firm  $f$ 's transshipment of Chinese products to the US,  $\sum_i \min\{EX_{i,t}^{f \rightarrow US}, IM_{i,t}^{CN \leftarrow f}\}$
3. Firm  $f$ 's imports of Chinese inputs,  $\sum_k IM_{k,t}^{CN \leftarrow f}$ 
  - Product  $k$  must be raw material, intermediate goods or capital good and is not the same product that firm  $f$  exports to the US

- ▶ Significant evidence of both the increased supply chain integration with China and the transshipment of Chinese products through Thailand
  - Estimates driven mainly by **extensive margins**

**Table:** Transshipment and Supply Chain Integration with China

	(1) $EX^{US}$	(2) Transshipment	(3) Ratio to $EX^{US}$	(4)	(5) Import of Chinese Inputs	(6)
	Value	Value	Ratio to $EX^{US}$	Value	Ratio to $EX^{Total}$	Ratio to Revenue
<b>Full:</b>						
$Post_{f,t} \times \Delta \tau_f^{US \rightarrow CN}$	7.879*** (1.159)	2.614*** (0.560)	0.066*** (0.023)	5.018*** (0.884)	0.074 (0.059)	0.027** (0.013)
Observations	62,975	62,975	62,975	62,975	62,975	54,339
Adjusted $R^2$	0.442	0.632	0.452	0.630	0.466	0.604
<b>Intensive Margins:</b>						
$Post_{f,t} \times \Delta \tau_f^{US \rightarrow CN}$	1.002*** (0.261)	1.922** (0.754)	0.035 (0.028)	2.051*** (0.755)	-0.013 (0.066)	-0.002 (0.014)
Observations	34,162	34,162	34,162	34,162	34,162	32,307
Adjusted $R^2$	0.815	0.737	0.650	0.831	0.720	0.761

- ▶ Impact concentrated in certain manufacturing sectors

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

	(1) $EX^{US}$	(2) Transshipment	(3) Import of Chinese Inputs
	Value	Ratio to $EX^{US}$	Ratio to Revenue
$Post_{ft} \times \Delta \tau_f^{US \rightarrow CN} \times \mathbf{Sector}_j$			
Food	7.741***	0.045	0.007
Apparel	-5.056*	0.004	0.042*
Rubber&Wood	8.499***	0.040	-0.001
Petrochemical	10.970***	0.115***	0.045**
Metal	14.761***	0.136***	0.088***
Electrical Appliances	11.745***	-0.070	0.136**
Electronics	20.227***	0.072	0.203***
Machinery	11.542***	0.144**	0.067***
Automotive	9.573***	0.126**	0.034*
Other Manufacturing	0.711	-0.008	0.037*
Observations	62,975	62,975	54,339
Adjusted $R^2$	0.447	0.453	0.606
Firm FEs & Industry $\times$ Time FEs	Yes	Yes	Yes

# Did trade diversion lead to domestic value-added gains?

- ▶ Compute the **domestic content** of exports to the U.S.

$$DOMCON_{f,t}^{f \rightarrow US} = EX_t^{f \rightarrow US} - \underbrace{\sum_j INPUT_{f,t}^{US \leftarrow f \leftarrow j}}_{\text{Imported Input from all countries } j} - \underbrace{TRSM_t^{US \leftarrow f \leftarrow CN}}_{\text{Product transshipped from China}}$$

- ▶ Also examine effects on a firm's net total exports and the **number of employed workers**

# Evolution of Domestic vs. Foreign Input Content

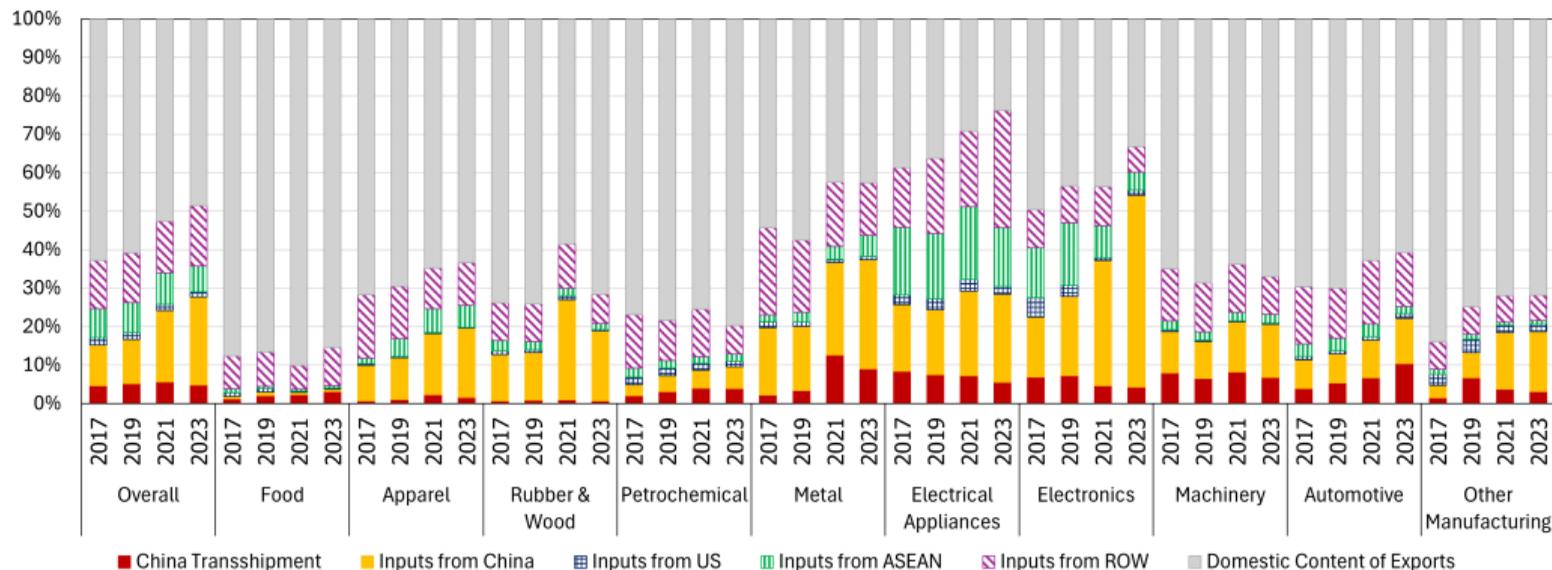


Figure: Decomposition of Thai Exports to US by Input Source

# Results on Domestic Value-added of Exports to the U.S.

- ▶ Still a positive net benefit from trade diversion

Table: Domestic Value Added of Exports

	(1) Domestic Content of $EX^{US}$	(2) $EX^{Total} - IM^{Total}$	(3) Domestic Content of $EX^{Total}$	(4) Employment
<b>Full:</b>				
$Post_{f,t} \times \Delta \tau_f^{US \rightarrow CN}$	7.322*** (1.120)	8.204*** (1.505)	5.363*** (1.027)	0.542*** (0.091)
Observations	62,975	62,975	62,975	48,816
Adjusted R-squared	0.463	0.712	0.514	0.950
<b>Intensive Margins:</b>				
$Post_{f,t} \times \Delta \tau_f^{US \rightarrow CN}$	1.206*** (0.311)	3.103* (1.587)	0.913*** (0.253)	0.605*** (0.098)
Observations	32,757	36,034	36,034	28,367
Adjusted R-squared	0.727	0.755	0.794	0.968
Firm FEs	Yes	Yes	Yes	Yes
Industry x Time FEs	Yes	Yes	Yes	Yes

- ▶ Robust evidence of **trade diversion**: Thailand experiences an increase in exports to the U.S..
- ▶ The positive effects on exports to the U.S. emerge with a delay and vary across sectors, while potentially reflecting both **transshipment of Chinese products and increases in supply chain links with China**.
- ▶ Even when controlling for these rerouting and supply chain channels, large and positive trade-diversion effects persist.
  - Thailand's role as a bystander in the trade war has resulted in meaningful economic contributions