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

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Motivation

- 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 attention has focused 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 and large trade with both the U.S. and China.

This Paper

- We investigate how Thailand's exports responded 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
  - Product heterogeneity
  - Whether export reactions reflect potential transshipment or supply chain link with China

Preview of Empirical Results

- Significant trade diversion effects due to U.S. tariffs on Chinese products, which raised Thai exports to the U.S., but with some delay
- Larger effects for manufacturing goods in electronic and transportation sectors, i.e., goods with high participation in GVCs.
- Suggestive evidence of both transshipment of Chinese goods to the U.S. and supply-chain integration with China
- Rather limited spillover effects from China retaliation

Related Literature

- 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)
- Impact of trade war on the U.S. and Chinese economies:
  - ⇒ The U.S.: Amiti et al (2020), Fajgelbaum et al (2020), Handley et al (2020)
  - ⇒ China: 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.

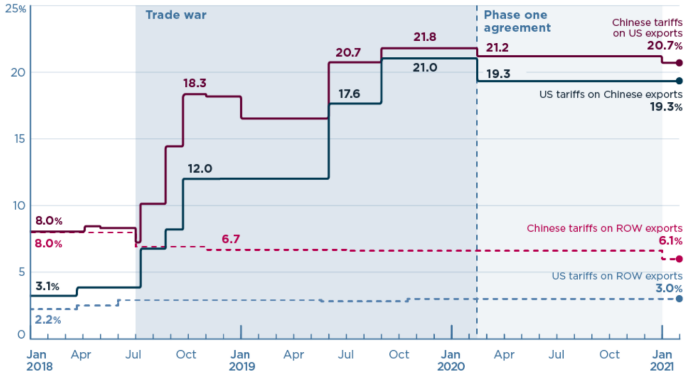
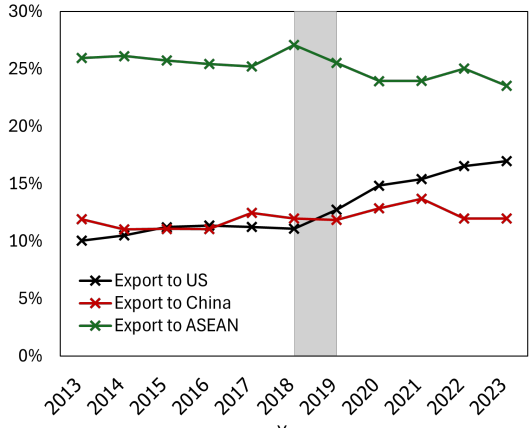


Figure: U.S.–China Tariff Rates from Bown (2021)

Thai Exports by Major Destinations

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



Trade and Tariff Data

- Thai exports data: from Customs Database
  - We aggregate these transaction-level data into annual data at the HS-6 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 averages of the 10-digit or 8-digit tariff rates end of 2019 relative to the pre-war period.

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

$$\Delta\tau_i^{CN\to US} = \sum_{j\in i} w_{j,17}^{CN\leftarrow US}\Delta\tau_j^{CN\to US} \tag{2}$$

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

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

- U.S. tariff exposure, mostly at 25%, exceeds that of China across all sectors.
- Significant variations in additional tariffs within and across industries

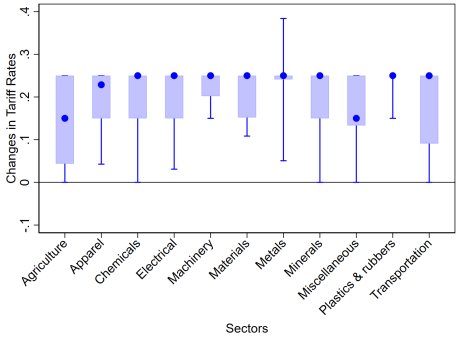


Figure: U.S. tariffs: $\Delta\tau^{US\to CN}$

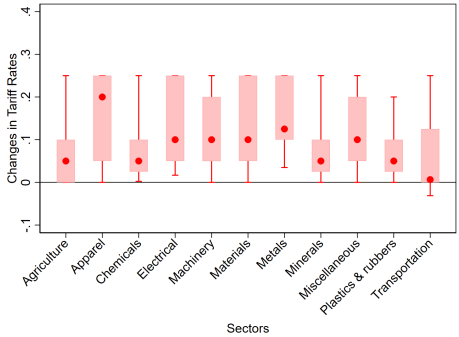


Figure: China tariffs: $\Delta\tau^{CN\to US}$

Baseline Specification

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

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

  - EX_{it}^{d} - log of export value to destination d for product i in year t
  - $Post_t$ - the dummy variable for the period that product i faces tariff hikes
  - $\mathbf{X}_{it}$ includes tariff rates the destination country imposes on Thai exports
  - Time and product fixed effects
- Focus on four export destinations: U.S., China, ASEAN and 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
$\text{Post}_{it} \times \Delta\tau_i^{US \to CN}$	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)
$\text{Direct Tariff}_{it}$	0.629	-1.527**	-2.366***	0.294	0.742*
	(0.527)	(0.735)	(0.824)	(0.311)	(0.397)
Observations	33,990	15,235	13,299	29,601	22,770
R-squared	0.868	0.814	0.793	0.822	0.824
HS6 FEs & Time FEs	Yes	Yes	Yes	Yes	Yes

Dynamic Specification

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

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

  - EX_{it}^{d} - log of export value to destination d for product i in year t
  - Dur_{it}^{k} - the dummy variables indicating the number of years relative to the treatment period
  - $\mathbf{X}_{it}$ includes tariff rates the destination country imposes on Thai exports
  - Time and product fixed effects

Dynamic Effects of the U.S.–China Trade War

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

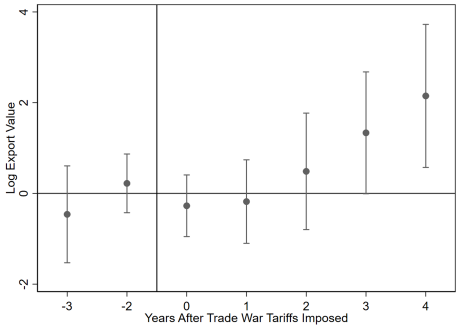


Figure: US Export Responses to $\Delta\tau^{US\to CN}$

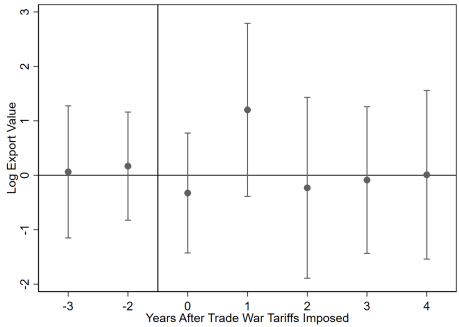


Figure: China Export Responses to $\Delta\tau^{CN\to US}$

Heterogeneous Effects of U.S. Tariffs on the U.S. Exports

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

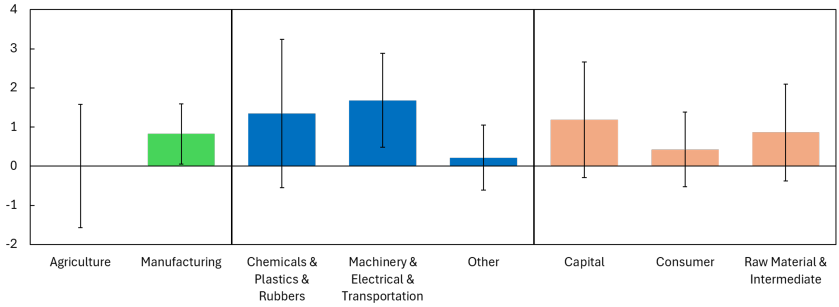


Figure: Heterogenous Effects of $\Delta\tau^{US\to CN}$: Export to the U.S.

Heterogeneous Effects of U.S. Tariffs on ASEAN Exports

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

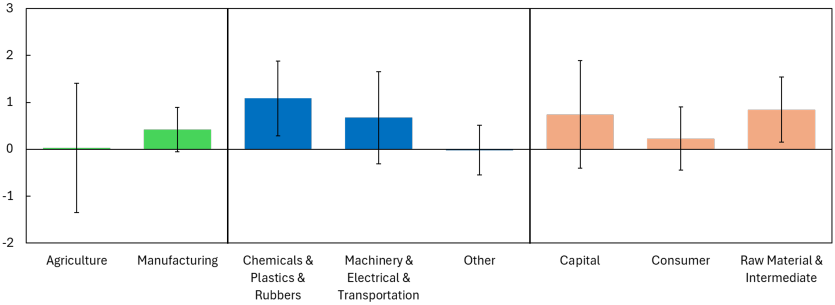


Figure: Heterogenous Effects of $\Delta\tau^{US\to CN}$: Export to ASEAN

Underlying factors

- Explore three potential factors to explain positive responses of exports to U.S.:
  - Comparative advantage of Thai products in the U.S. or global markets
    $\rightarrow$ Use Revealed Comparative Advantage index
  - China's lost market share in U.S. market
    $\rightarrow$ Dummy $= 1$ if product i's lost market share $>$ average
  - Supply chain integration with China or ASEAN
    $\rightarrow$ Use Grubel-Lloyd index of intra-industry trade

Underlying factors: Results

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

	Dum=RCA^{US}	Dum=RCA^{Global}	Dum=CN Loss	Intra-industry trade with China	Intra-industry trade with ASEAN
$Post_{it} \times \Delta\tau_i^{US \to CN}$	0.483	0.755*	0.594	0.334	0.139
	(0.420)	(0.435)	(0.409)	(0.441)	(0.497)
$Post_{it} \times \Delta\tau_i^{US \to CN} \times Dum_i$	0.605*	-0.021	0.335		
	(0.327)	(0.326)	(0.342)		
$Post_{it} \times \Delta\tau_i^{US \to CN} \times GLI_i$				1.422**	1.221**
				(0.635)	(0.615)
Observations	15,235	15,235	15,235	15,224	15,235
R-squared	0.814	0.814	0.814	0.814	0.814
HS6 FEs & Time FEs	Yes	Yes	Yes	Yes	Yes

Products with Strong Export Growth After Trade War

Table: Products with Large Contributions to Growth of Exports to US (2017–2023)

HS-6 Code	Description	Growth Rate
854140	SOLAR PANELS	660%
851762	TELEPHONE SETS	425%
850440	ELECTRICAL STATIC CONVERTERS	474%
401120	RUBBER NEW PNEUMATIC TIRES	263%
847150	DIGITAL PROCESSING UNITS	803%
852580	TV CAMERAS, DIGITAL CAMERA	178%
847330	PARTS FOR AUTOMATIC DATA PROCESSING MACHINES	135%
841510	AIR CONDITIONING MACHINES	490%
853710	BOARDS FOR ELECTRICITY CONTROL OR DISTRIBUTION	167%
854370	ELECTRICAL MACHINES WITH INDIVIDUAL FUNCTIONS	390%
870870	PARTS FOR MOTOR VEHICLES	856%
230910	DOG AND CAT FOOD	98%
100630	RICE	64%

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.

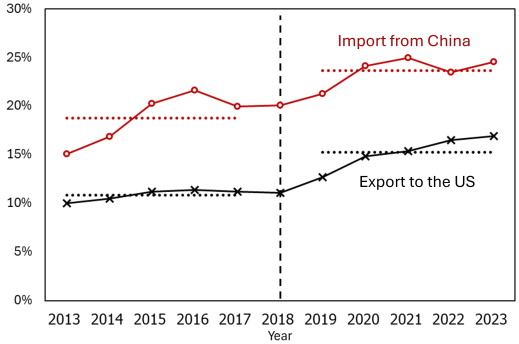


Figure: Thai Export Share to the U.S. and Import Share from China

Firm-level analyses on the link with China

- Focus on firms that export products to the US market
- Construct firm-level exposure to the US-China trade war:

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

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

- And also firm exposure to US tariffs on Thai products:

$$\tau_{f,t}^{US\to TH} = \frac{\sum_i EX_{i,1317}^{f\to US} \tau_{it}^{US\to TH}}{\sum_i EX_{i,1317}^{f\to US}} \tag{7}$$

Regression Specification

$$y_{f,t} = \beta_1 \Delta\tau_{f,t}^{US \to CN} + \beta_2 \Delta\tau_{f,t}^{CN \to US} + \boldsymbol{\beta} \cdot \mathbf{X}_{it} + \gamma_f + \delta_t + \epsilon_{it} \quad (8)$$

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

Transshipment and Supply Chain Effects

- Larger role of supply chain effects from China, while transshipment through Thailand occurs to some extent.

Table: Transshipment and Supply Chain Effects

	EX^{US}	Transshipment		Imports of Chinese Inputs		
		Value	Ratio to EX^{US}	Value	Ratio to EX^{Total}	Ratio to Revenue
$\Delta\tau_{f,t}^{US\to CN}$	10.811***	2.972***	0.060***	5.796***	0.137***	0.035***
	(1.119)	(0.542)	(0.022)	(0.847)	(0.032)	(0.010)
$\Delta\tau_{f,t}^{CN\to US}$	-2.100*	-1.089**	-0.025	-2.878***	-0.008	0.014
	(1.162)	(0.554)	(0.023)	(0.817)	(0.030)	(0.008)
Observations	78,672	76,616	76,616	76,616	76,616	62,808
R-squared	0.550	0.670	0.477	0.674	0.431	0.666
Firm FEs & Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

Conclusion

- Robust evidence of trade diversion: Thailand experienced a substantial increase in exports to the U.S..
- The positive effects on US exports emerged with a delay and varied across sectors, while potentially reflecting both transshipment and supply chain links with China.
- Limited responses of exports to China to retaliatory actions