The US-China Trade War and Relocation of Global Value Chains to Mexico

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ABFER, Singapore

Readjustment of Global Value Chains

- Tightly integrated world economy
  - Multinationals (MNEs) account for 1/3 of global GDP
  - Global value chains (GVCs) account for 2/3 of world trade
- US-China trade war: a **major shock** forcing GVCs readjust
  - covered $450 billion in trade flows
  - wide range of industries from agriculture, textile to machinery
- Q. Are the **tides turning** in favor of Mexico with the recent protectionist turn in US trade policy w.r.t. China?
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The U.S. Touts Big Investments for Mexico, Testing Its Nationalist Policies

U.S. officials are looking south for a strategic partner to create a regional manufacturing hub that can rival China. But there are still doubts over Mexico's willingness to cater to foreign industry.

By Ana Swanson

The New York Times | https://www.nytimes.com/2023/02/03/business/china-mexico-trade.html

Why Chinese Companies Are Investing Billions in Mexico

Alarmed by shipping chaos and geopolitical fractures, exporters from China are setting up factories in Mexico to preserve their sales to the United States.

By Peter S. Goodman

Peter Goodman reported this story from Monterrey and Salinas Victoria, Mexico, Mexico City and Laredo, Texas.

Published Feb. 3, 2023 Updated Feb. 7, 2023

6 MIN READ

President Biden
@POTUS

I just imposed a series of tariffs on goods made in China:

25% on steel and aluminum,
50% on semiconductors,
100% on EVs,
And 50% on solar panels.

China is determined to dominate these industries.

I'm determined to ensure America leads the world in them.

9:14 AM · May 14, 2024 · **11.8M** Views

This Paper

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- Examine the nature of GVC adjustment in response to the US-China trade war.

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- Causal analysis
  - **cohort analysis**—all firms that export as of 2016 over 2015-2021.
  - sudden and abrupt **shift in US trade policy as an exogenous shock**

Preview of Main Findings

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7. US-Mexico tariffs do not have major effect on GVC trade as firms rely on firm-specific duty-free permits

Related Literature

- Economic Impacts of the 2018-2019 Trade War:
  - Impact on the US economy: Amiti et al. 2019, 2020, Cavallo et al. 2021, Fajgelbaum et al. 2020, Flaaen and Pierce, 2021, Handley et al. 2020, Huang et al. 2023, Waugh, 2019,...

⋆ This paper: Missing link –US-Mexico production sharing via IMMEX

  - China + Third country effects and global relocations: Fajgelbaum et al. 2021, Freund et al. 2020, Jiao et al. 2023, Ju et al. 2020, Chor and Li 2021, Rotunno et al. 2023,...

⋆ This paper: firm-level evidence of the nuanced occurrence of nearshoring in response to the trade war, highlighting crucial role of Mexico in GVC relocation

- Trade Policy w/ GVCs : Blanchard, et al. 2021; Grossman, et al. 2023; Antras, Fort, et al. 2022, Heise, Schott, et al. 2017

⋆ This paper: Role of GVC firms in creating trade policy spillovers

GVC Firms in Mexico

- Participation in GVCs is longstanding and crucial economic development strategy pursued by Mexico.
- IMMEX—Manufacturing, Maquila and Export Services:
  Maquiladoras + PITEX in 2007
- Registration: a **waiver of** the **16% tax** on imported inputs
  - Foreign owned or domestic
  - imported inputs and capital equipment essential for their activities
  - Includes: Volkswagen, Abbott Labs, Ruhrpumpen, LG Electronics, United Technologies, Toyata, Sun Belle, Novartis, Ford, Honeywell, Panasonic, Pepsi,...
  - accounts for **88 % of export** & **67% of import** over 2012-2021 more
- $\sim$ 35,000 exporters in 2016, $\sim$ 6,000 of them are GVCs more

Empirical Strategy

1. Creating firm-level tariff exposures

Firm-Level Exposures to the US-China Trade War

X_{ijk}^{2016}: value of export of Mexican **firm** i in **good** j to **destination** k in year 2016

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- Section 232 and retaliatory tariffs by Mexico

$$\underbrace{\frac{\sum_{j \in USIT^{MX}} X_{ij}^{2016,US} \times \Delta\tau_j^{USIT^{MX}}}{\sum_j \sum_k X_{ijk}^{2016}}}_{\mathbf{TM_i^{US-MX}}}, \quad \overbrace{\frac{\sum_{j \in USRT^{MX}} M_{ij}^{2016,US} \times \Delta\tau_j^{USRT^{MX}}}{\sum_j \sum_k M_{ijk}^{2016}}}^{\mathbf{TX_i^{MX-US}}}$$

▸ Tariff Exposed Inputs from China ▸ Tariff Exposed Inputs from the US

Mexican Firms' Reaction to the US-China Trade War

	(1)	(2)	(3)	(4)
Sample	All Exporters as of 2016			
Dep. Var.	Log US Exports		Log Worldwide Exports	
$TM_i^{US-CHN} \times Post2018_t$	0.559^a	0.462^a	0.616^a	0.530^a
	(0.107)	(0.113)	(0.094)	(0.100)
$TX_i^{CHN-US} \times Post2018_t$	-0.157^c	-0.152^c	-0.147^c	-0.165^c
	(0.091)	(0.092)	(0.084)	(0.085)
Controls for:				
US-Mexico tariff escalation		✓		✓
Inputs from China in affected goods		✓		✓
Inputs from the US in affected goods		✓		✓
Firm FEs	✓	✓	✓	✓
(Initial) Firm Size × Year FEs	✓	✓	✓	✓
Observations	123,698	123,698	159,378	159,378
R-squared	0.886	0.886	0.882	0.882

Notes: Sample: Firms with positive export as of 2016. Sample period: 2015-2021. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% levels respectively.

▸ Go to Triple DD eqn

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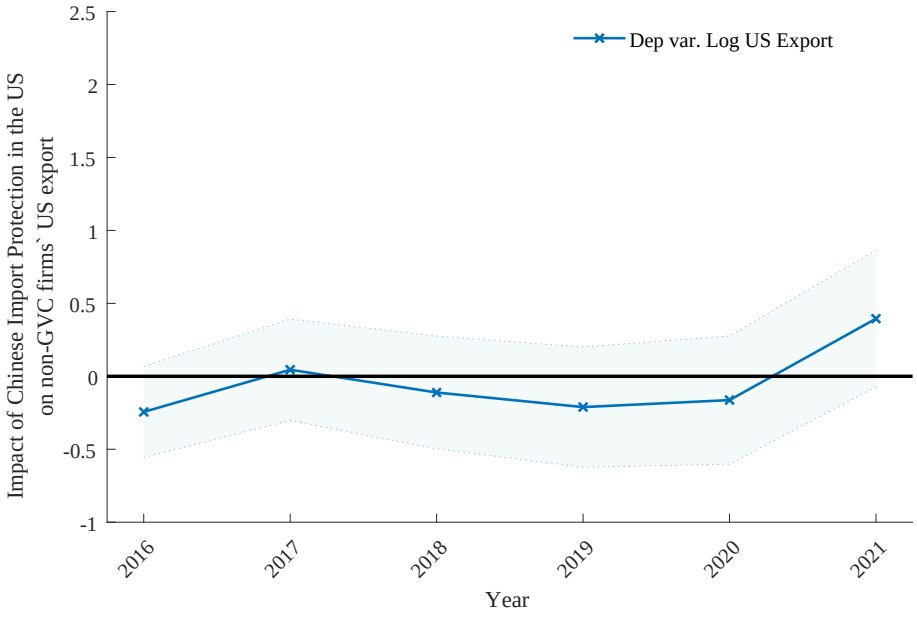
- China's tariffs: $(e^{-0.15*0.13} - 1 =)$ 2% relative ↓ in firms' US exports

▸ Go to Triple DD eqn

The Effect of US Import Tariffs on Chinese Goods on Mexican Firms' US Exports

Firms' US Exports



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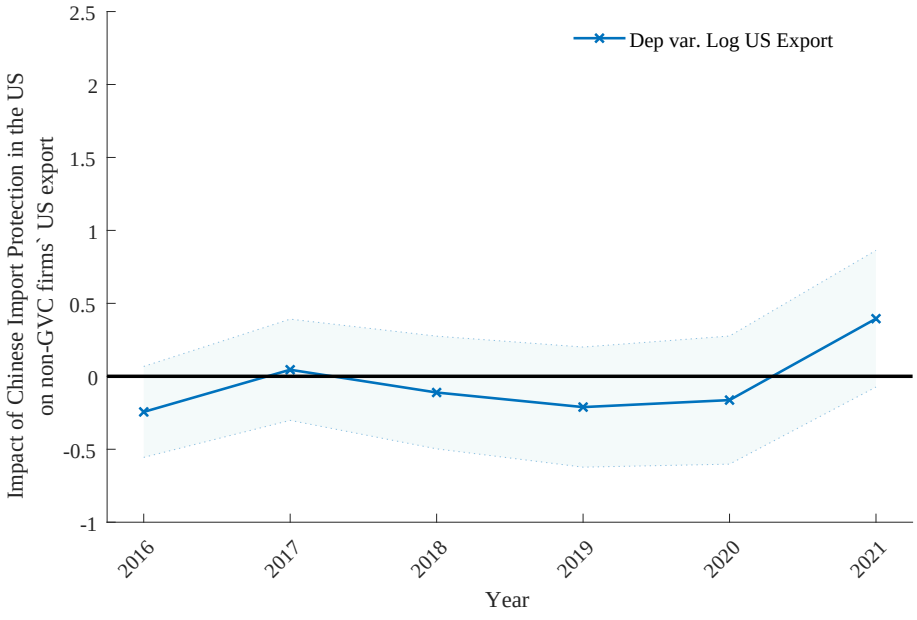
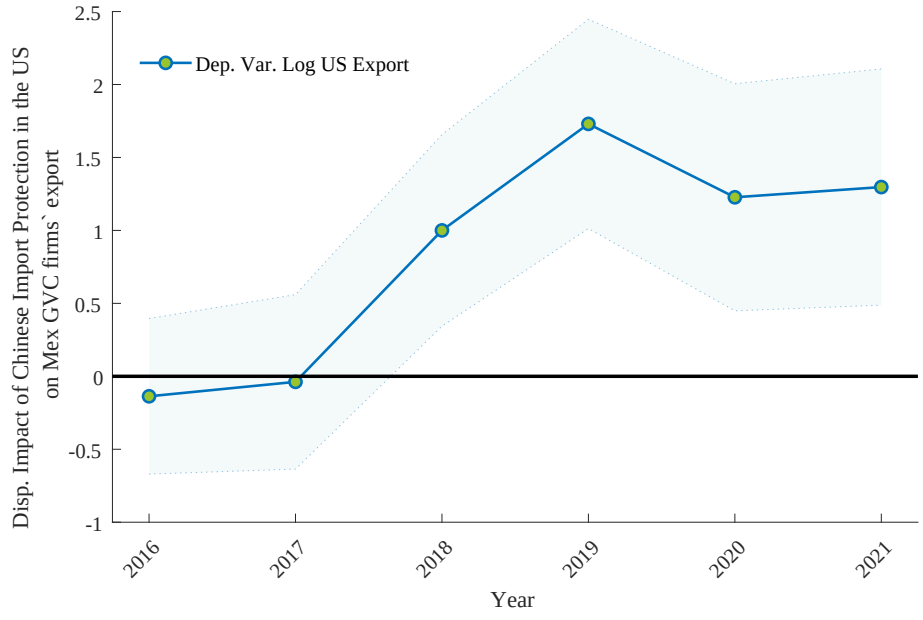


Disp. effect on GVC (IMMEX) firms



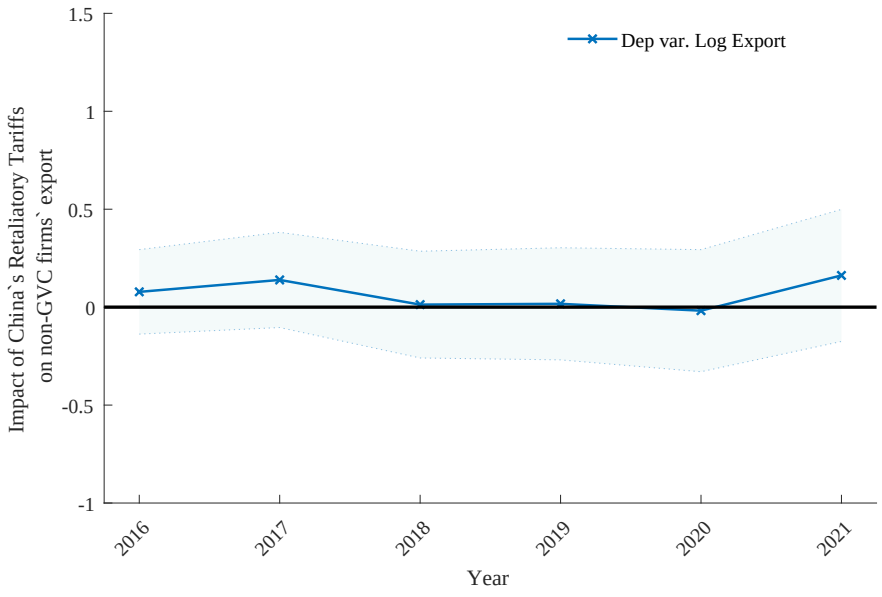
Notes: N=123,698 The shaded area indicate the confidence interval at the 95% level. All regressions include firm, size-specific, and IMMEX-specific time fixed effects and other trade policy controls. The right axis shows the coefficient values of the respective DD or DDD coefficients.

Underlying Regression : ▸ Triple Difference-in Differences with two-sided fixed effects

controls for: GVC-specific time trends, firm-size specific time trends, firm FE, I-O channels, US-Mexico

The Effect of China's Retaliatory Tariffs on US Goods on Mexican Firms' Exports

Firms' Exports



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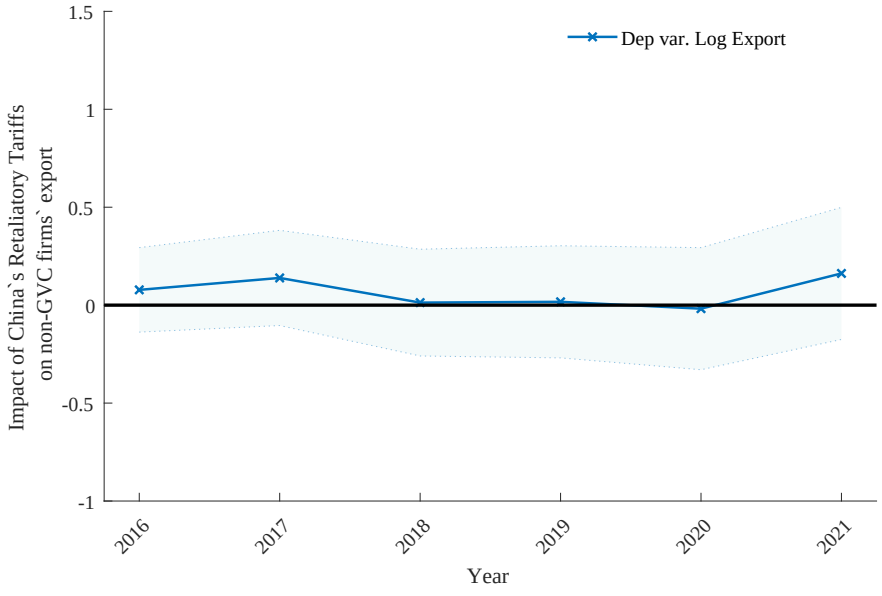

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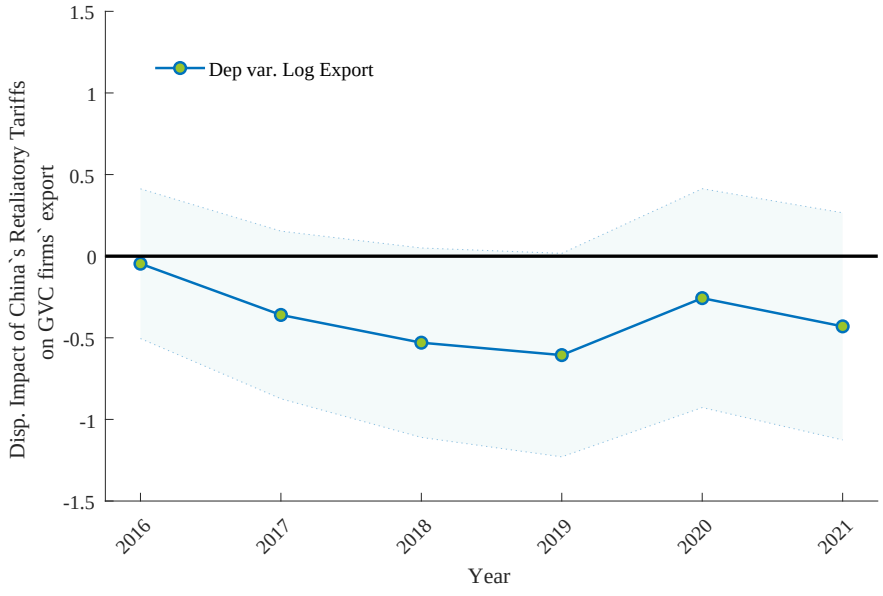

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GVC Firms

- Sample: GVC participant firms (IMMEX) as of 2016, 2015-2021

$$Y_{ist} = \beta_0 + \sum_{h=2016}^{2021} \alpha_h \mathbb{1}_{h=t} \times \mathbf{TM_i^{US-CH}} + \sum_{h=2016}^{2021} \beta_h \mathbb{1}_{h=t} \times \mathbf{TX_i^{CH-US}} + Z_{it} + \xi_{st} + \eta_i + \varepsilon_{ist}$$

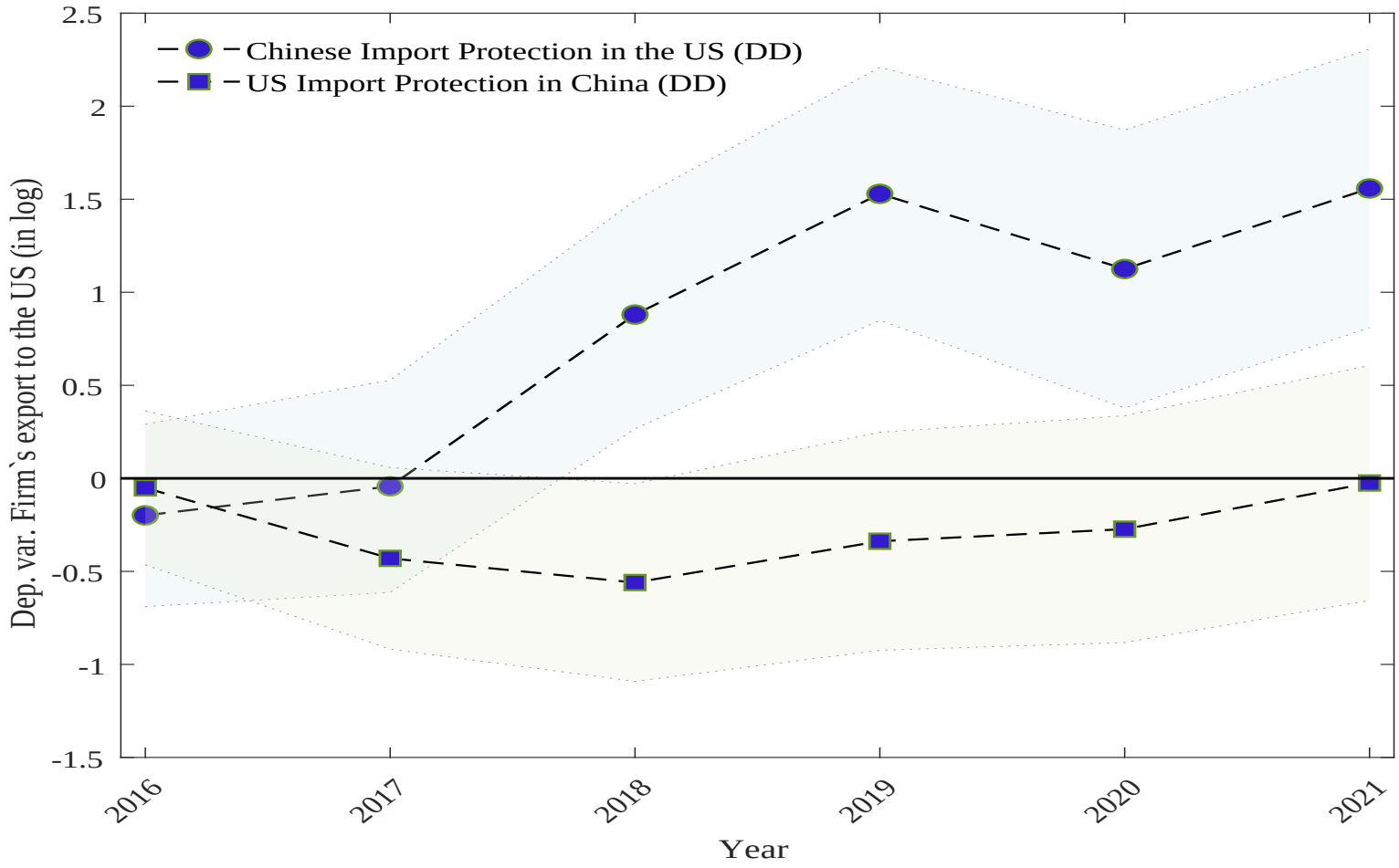
Industry $\times$ Year FEs

Z_{it} includes

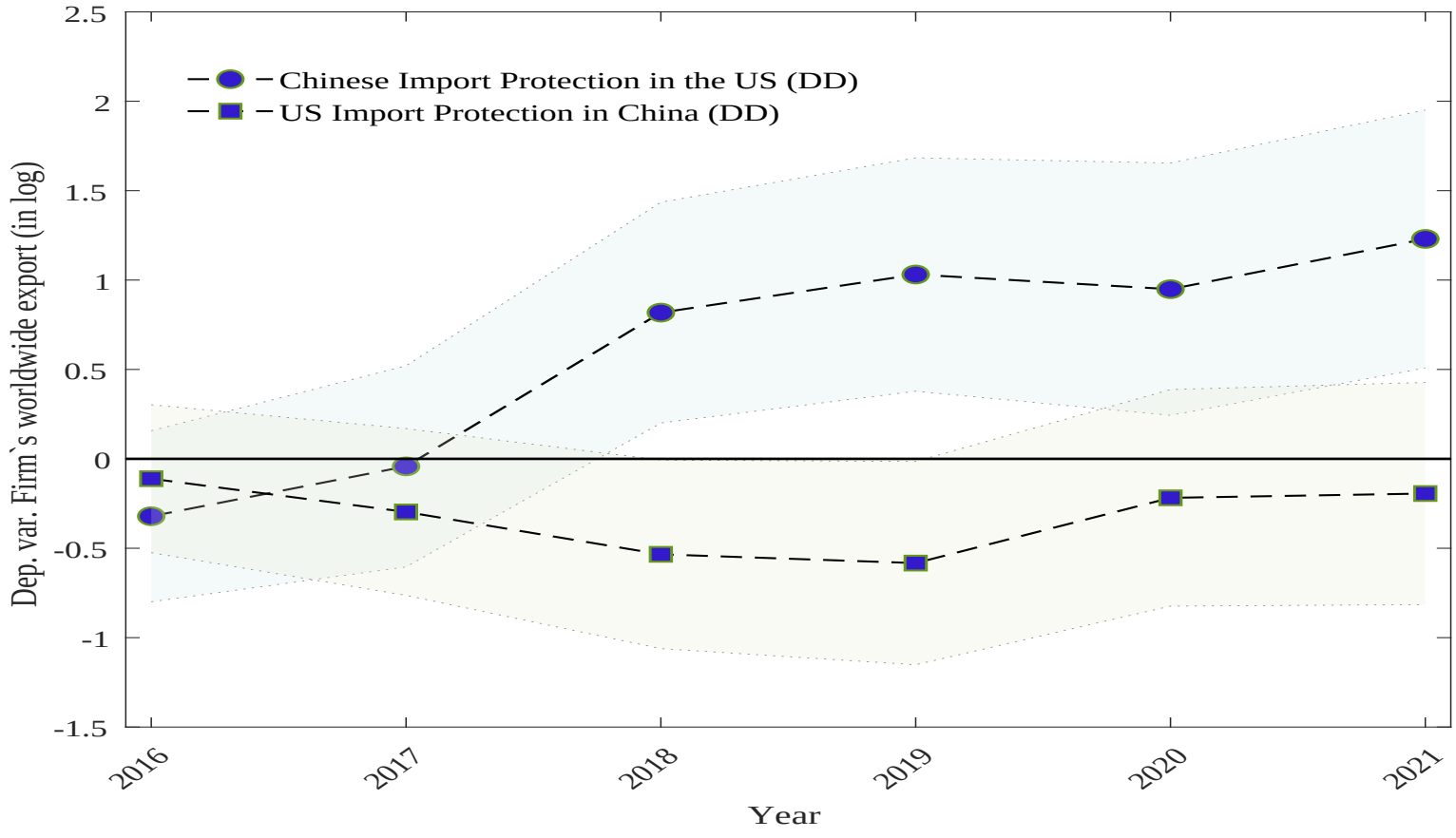
- Tariff exposures via inputs: US inputs + Chinese inputs
  - separately interacted w/ year FEs
- US tariff exposure on Mexico interacted w/ year FEs
- Mexican tariff exposure on US goods interacted w/ year FEs
- Year FEs $\times$ Firm Size as of 2016

Does the Increased Import Protection towards China in the US cause Nearshoring?

In 2021, the estimate of 1.56 indicates $(e^{1.56\times 0.1}-1)$ ↑ 17% in firms' exports to the US.

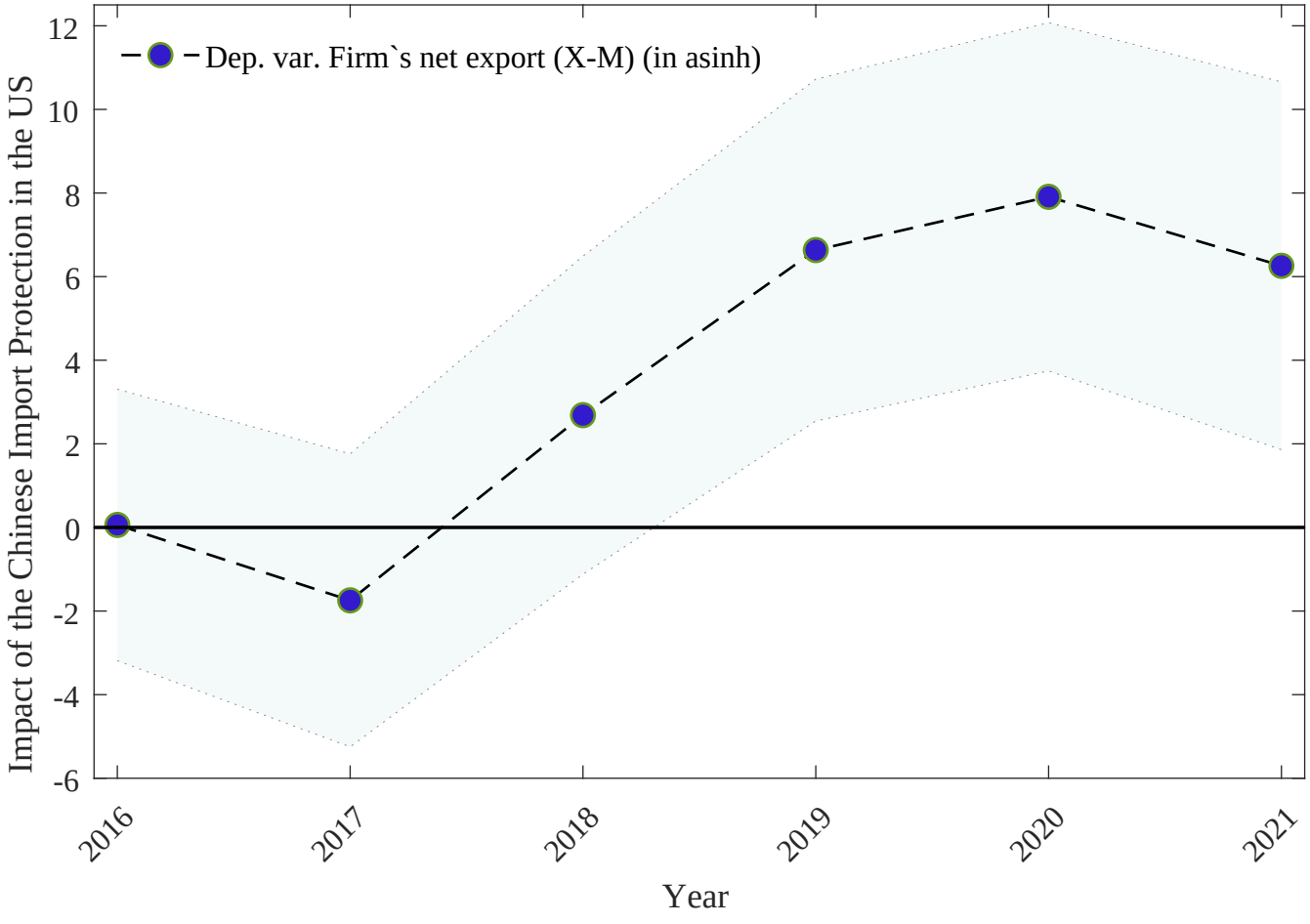


The US-China Trade War's Impact on Firms' Exports



- GVC firms' worldwide exports, magnitudes based on 25/75 perc diff :
  - ↑ **2019**: $(e^{1.03\times0.10}-1)$ 11% ↑ **2021**: 13%
  - ↓ **2019**: $(e^{-0.58\times0.13}-1)$ 7% ∼ **2021**: 0%

Net exports ($X_i - M_i$) in response to the US tariffs on China

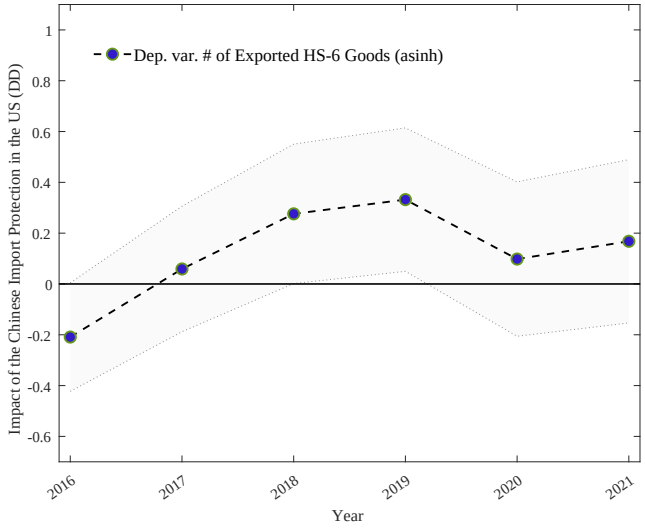


domestic value-added ↑

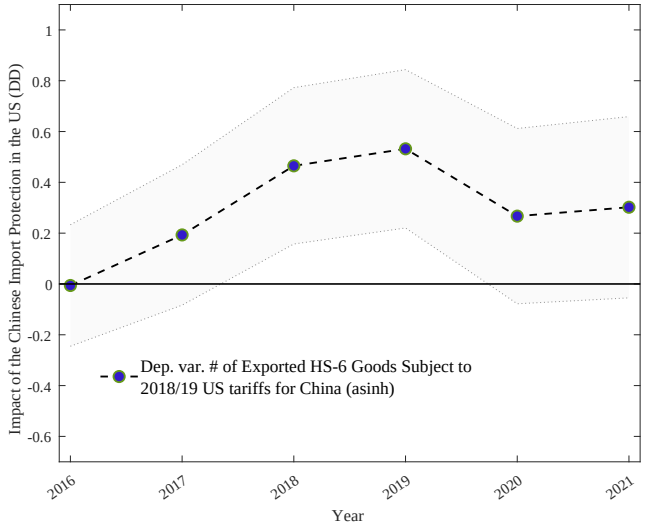
New Products

- Is the expansion of exports entirely driven by the existing product lines?
- We examine if US tariffs on China prompt Mexican firms to export new products.

Mexican firms expands their product lines



Number of Exported Products



Products Subject to the US Tariffs for China

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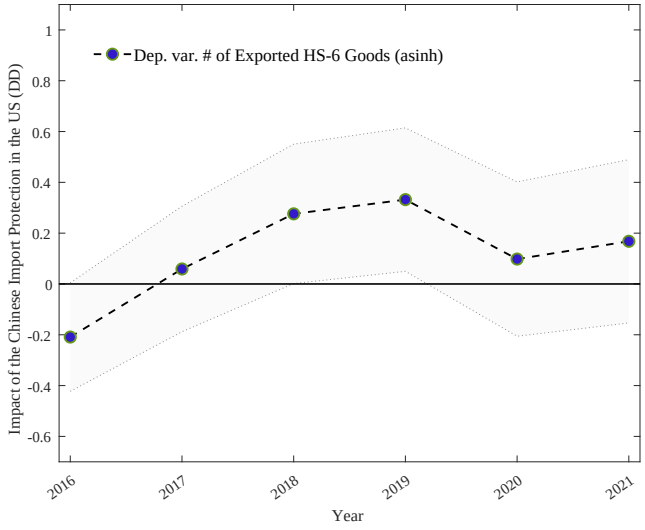

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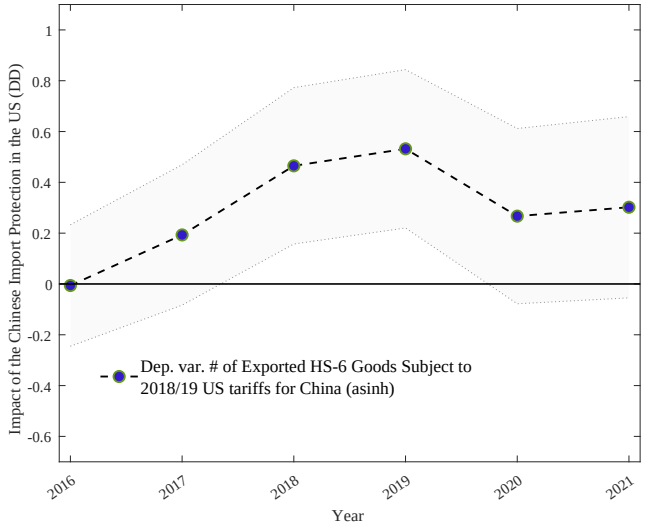

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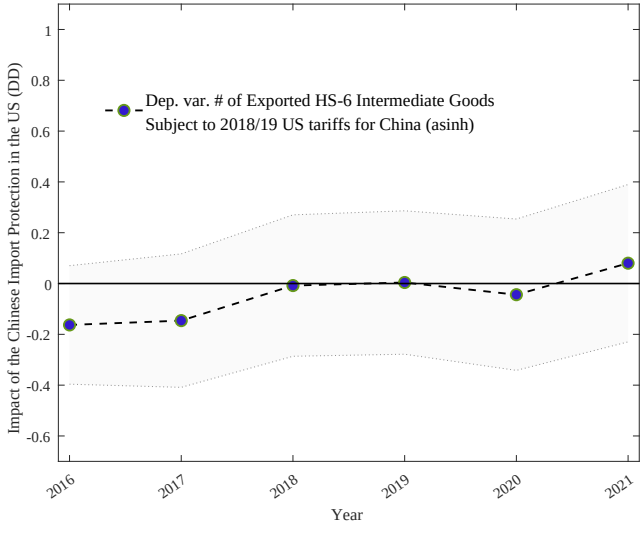

Targeted Intermediate Products

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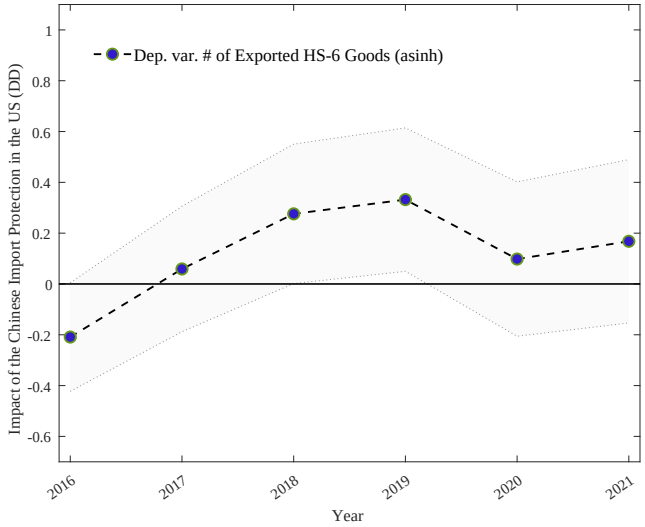

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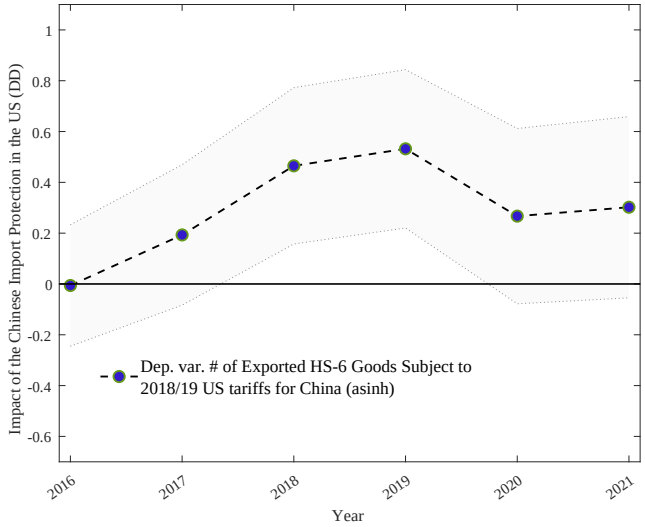

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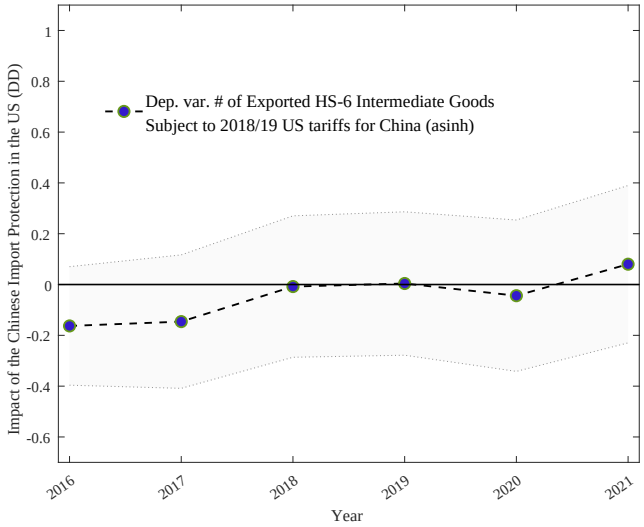

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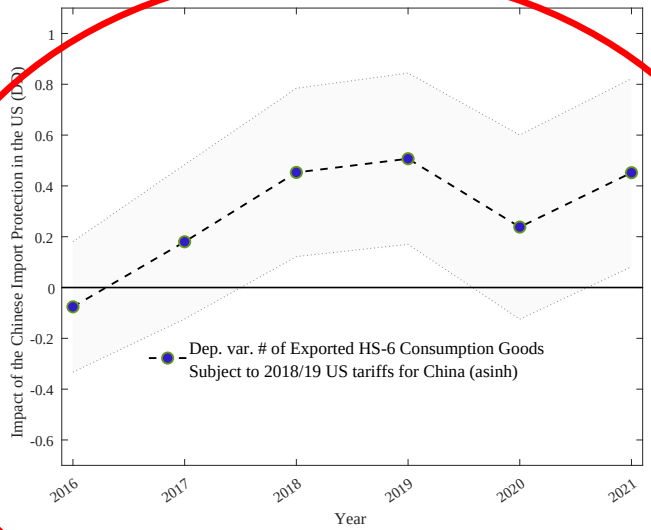

Targeted Consumption Products

Changing Sourcing Patterns in response to the US tariffs on China

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  Antràs, et al. 2022

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  We study:

  1. Firms' imports across different regions

  2. Firms' imports via special duty-free permits

Mexican GVC Firms' Inputs Increases from the US and Asia

Dep Var.	Imports from				
	US (1)	Europe (2)	LAC (3)	China (4)	Other Asia (5)
$TM_i^{US-CHN} \times$ 2016	0.263	0.331	0.337	0.312	0.180
	(0.243)	(0.386)	(0.733)	(0.391)	(0.394)
$TM_i^{US-CHN} \times$ 2017	0.345	0.756^{c}	-0.006	0.469	0.532
	(0.270)	(0.396)	(0.774)	(0.432)	(0.449)
$TM_i^{US-CHN} \times$ 2018	0.664^{b}	0.709^{c}	0.105	0.873^{c}	0.911^{c}
	(0.308)	(0.422)	(0.844)	(0.457)	(0.488)
$TM_i^{US-CHN} \times$ 2019	0.731^{b}	0.690	0.841	1.039^{b}	0.896^{c}
	(0.333)	(0.448)	(0.883)	(0.490)	(0.500)
$TM_i^{US-CHN} \times$ 2020	0.742^{b}	0.399	-0.548	1.393^{a}	1.223^{b}
	(0.377)	(0.473)	(0.901)	(0.525)	(0.517)
$TM_i^{US-CHN} \times$ 2021	0.763^{b}	0.717	-0.233	1.517^{a}	1.274^{b}
	(0.389)	(0.511)	(0.930)	(0.558)	(0.529)
China's Retaliatory Tariff Exposure × Year FEs	✓	✓	✓	✓	✓
Section 232 Tariff Exposure × Year FEs	✓	✓	✓	✓	✓
Mexico's Retaliatory Tariff Exposure × Year FEs	✓	✓	✓	✓	✓
Chinese Import Exposure ($CHNIM_i^{USIT}$) × Year FEs	✓	✓	✓	✓	✓
Firm Size × Year FEs	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Industry × Year FEs	✓	✓	✓	✓	✓
Observations	34,352	27,642	17,047	30,178	28,699
R-squared	0.898	0.859	0.802	0.855	0.865

Notes: Sample: IMMEX firms as of 2016 over 2015-2021. Europe refers to the EU-28. Other Asia refers to the following set of countries: Taiwan, Thailand, Vietnam, Japan, Korea, and India. LAC refers to the Latin American Countries excluding Mexico. ^{c}, ^{b} and ^{a} indicate significance at the 10%, 5% and 1% levels respectively.

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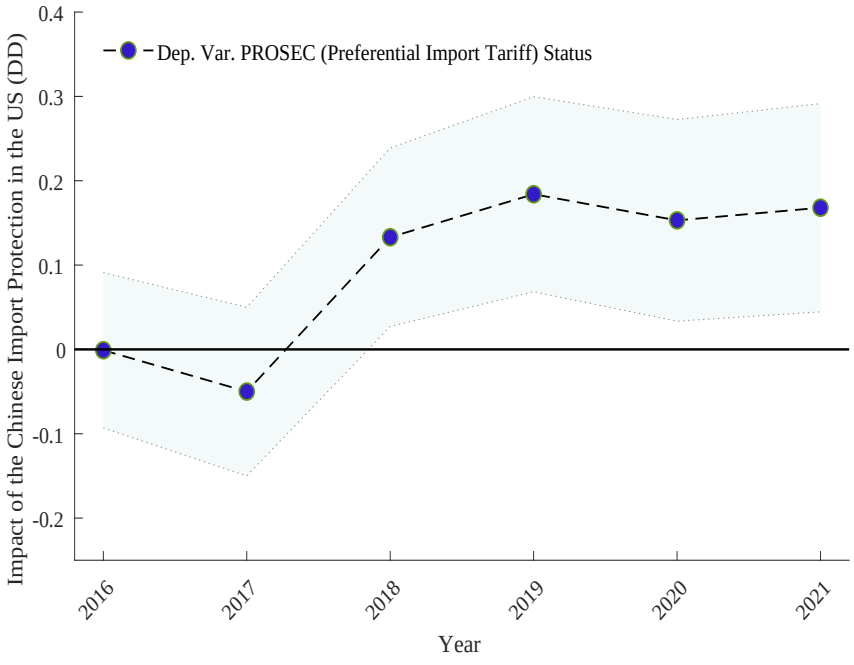
GVC firms start purchasing new inputs

- Purchasing new critical inputs from non-NAFTA countries
- Applications for Preferential Duty Permits, called the Eight Rule (Regla Octava)
    - allows duty-free access to non-NAFTA originated inputs and machinery
    - Regla Octava authorization increases from 25 to 30 % among GVC firms between 2016-2021.

Preferential Duty Permits in Response to US Tariffs on China



Notes: N= 38,226. The shaded area indicate the confidence interval at the 95% level. All regressions include firm, size-specific, and industry-specific time fixed effects.

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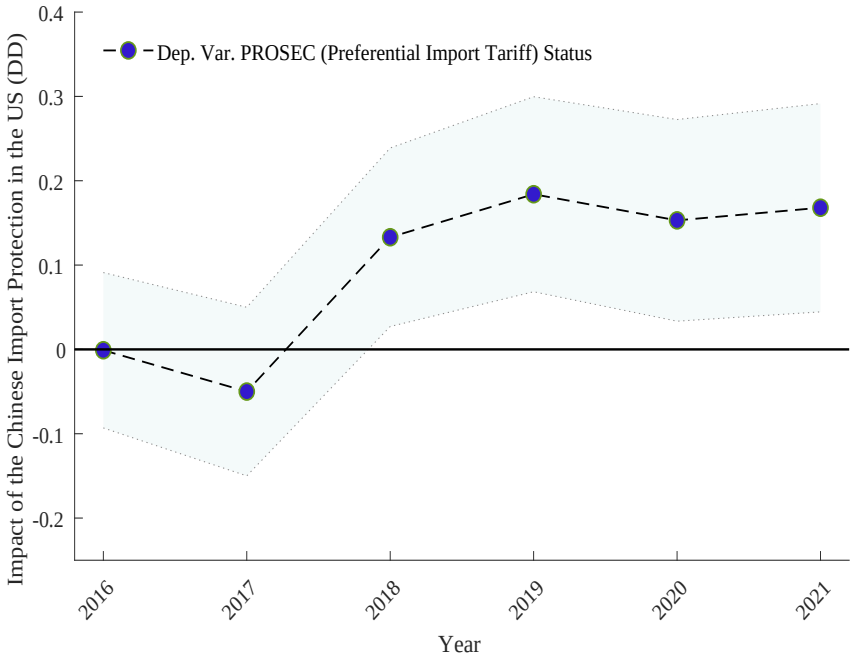

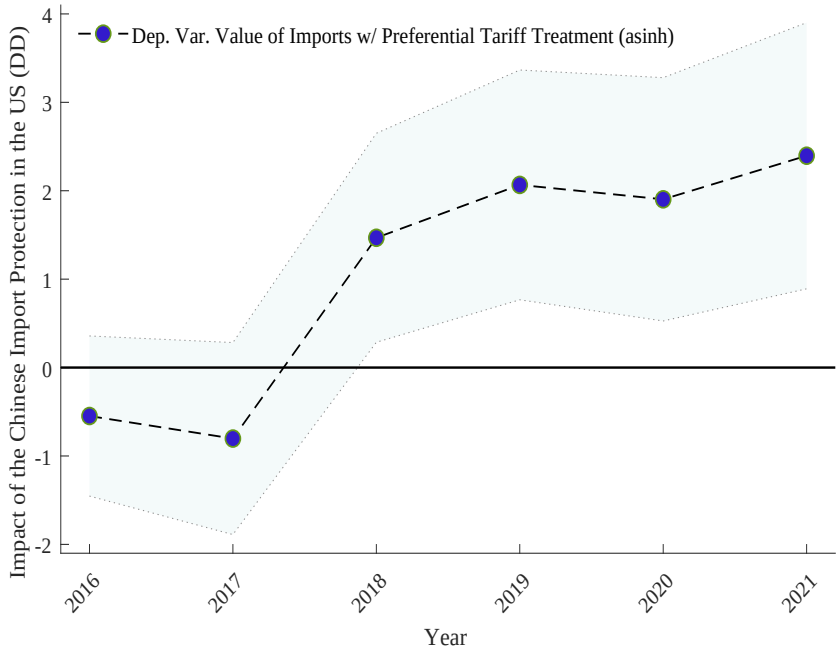

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Duty-free inputs depending on the Source Country

GVC firms

Dep Var.	(1)	(2)	(3)	(4)	(5)	(6)
	Preferentially Treated Import					
	Total	USA	Europe	LAC	China	Other Asia
$TM_i^{US-CHN} \times$ 2016	-0.548	-0.185	-0.097	0.181	0.154	-0.059
	(0.462)	(0.414)	(0.349)	(0.314)	(0.354)	(0.389)
$TM_i^{US-CHN} \times$ 2017	-0.803	-0.263	-0.197	0.379	-0.229	-0.427
	(0.554)	(0.457)	(0.394)	(0.349)	(0.414)	(0.490)
$TM_i^{US-CHN} \times$ 2018	1.468^b	0.528	0.400	0.204	0.396	1.064^b
	(0.603)	(0.526)	(0.429)	(0.394)	(0.480)	(0.522)
$TM_i^{US-CHN} \times$ 2019	2.066^a	0.520	0.948^b	0.417	0.421	1.324^b
	(0.663)	(0.589)	(0.465)	(0.396)	(0.544)	(0.575)
$TM_i^{US-CHN} \times$ 2020	1.903^a	0.318	0.796	0.647	1.270^b	1.582^b
	(0.702)	(0.637)	(0.500)	(0.422)	(0.554)	(0.614)
$TM_i^{US-CHN} \times$ 2021	2.396^a	0.315	1.249^b	0.830^b	1.033	1.679^b
	(0.768)	(0.668)	(0.529)	(0.461)	(0.629)	(0.675)
China's Retaliatory Tariff Exposure × Year FEs	✓	✓	✓	✓	✓	✓
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Firm Size × Year FEs	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Industry × Year FEs	✓	✓	✓	✓	✓	✓
Observations	38,226	38,226	38,226	38,226	38,226	38,226
R-squared	0.860	0.811	0.835	0.756	0.843	0.837

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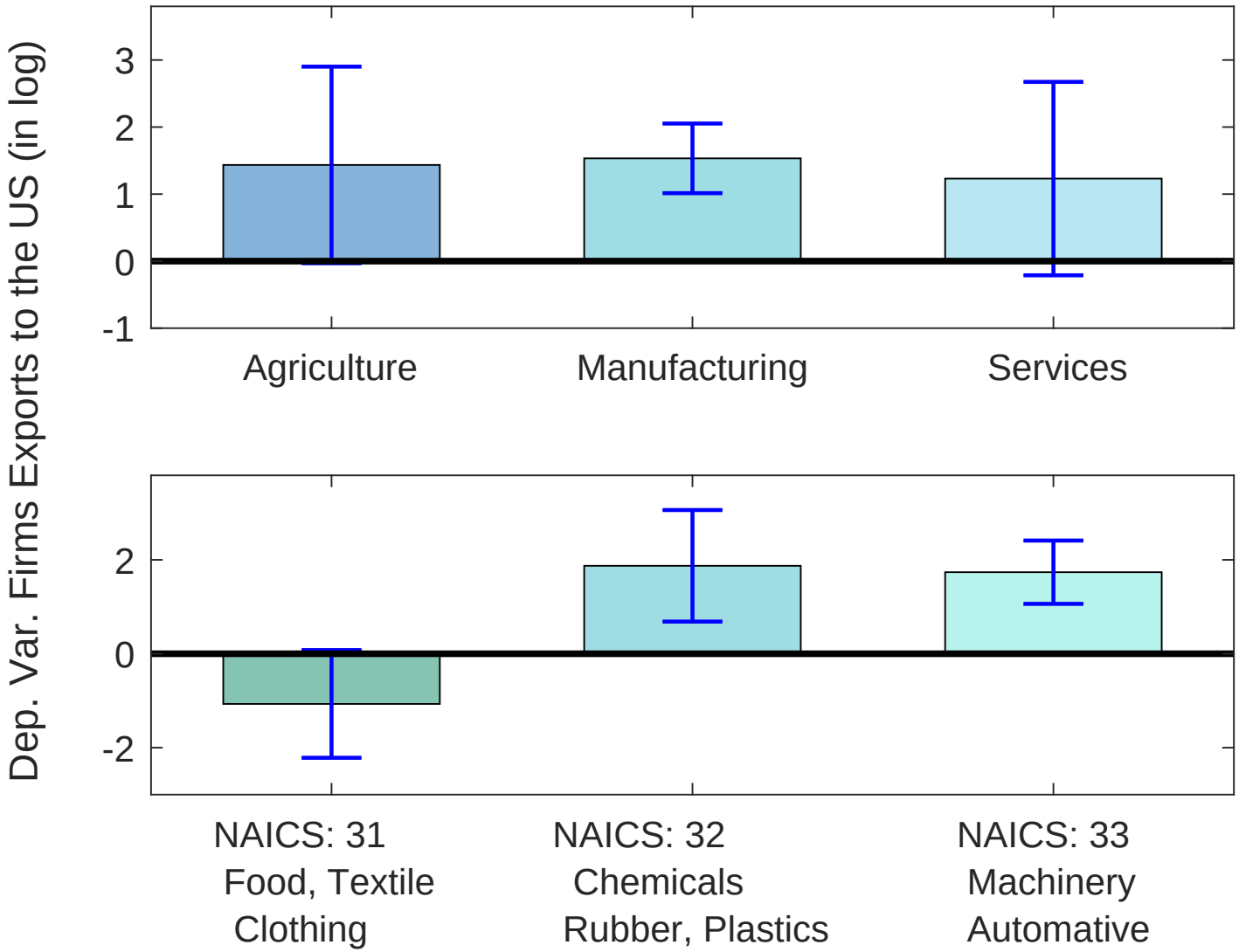
Heterogeneity

Sectoral Heterogeneity–US Tariffs on Chinese Imports

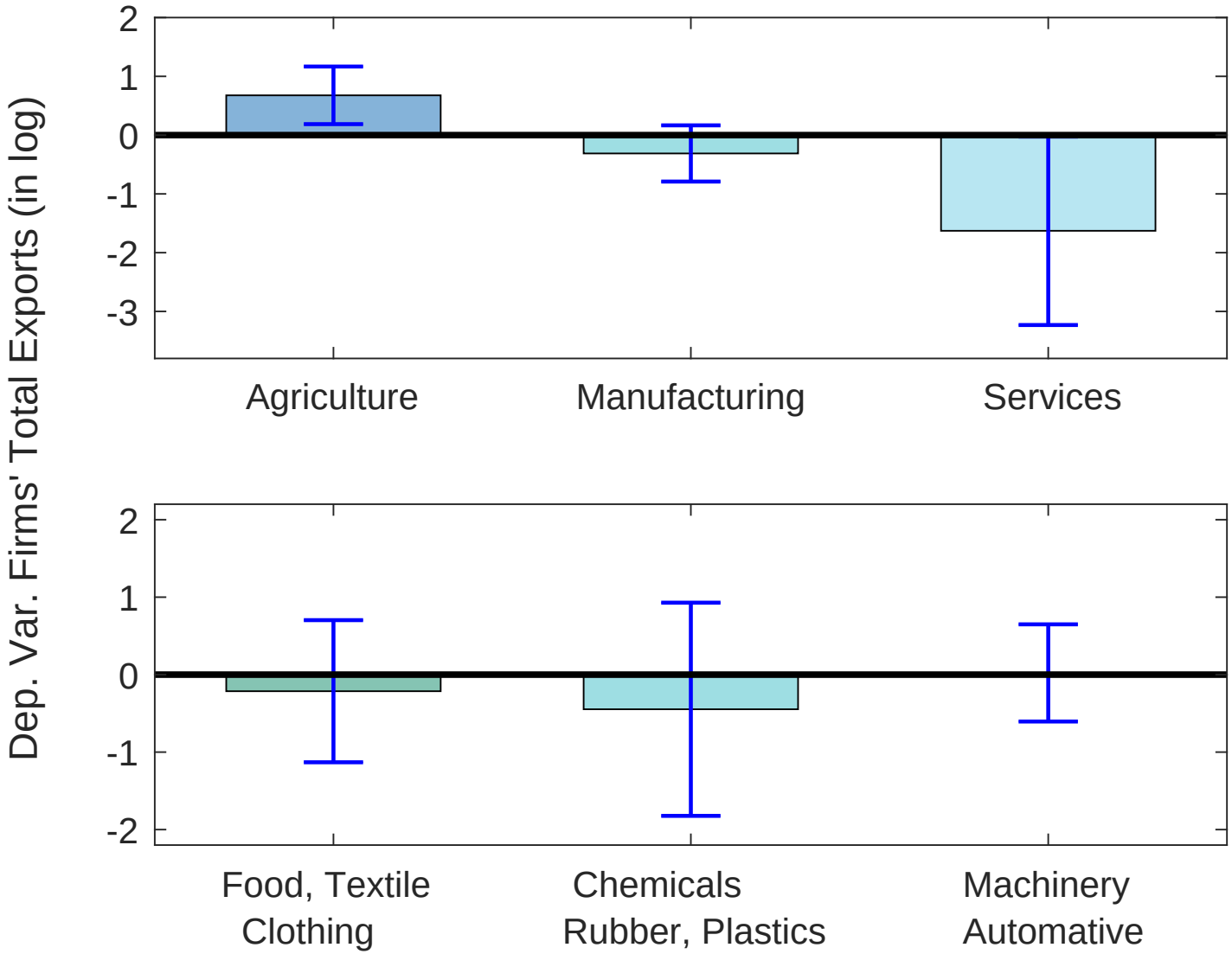
▸ Go to Total Exports



Estimation separately across IMMEX companies based on their industry of operations. All regressions include firm FEs, initial-firm-size by year FEs, and the other trade exposure variables. Error bars indicate 95% confidence intervals.

Sectoral Heterogeneity–China's Retaliatory Tariffs

▸ Go to US Exports



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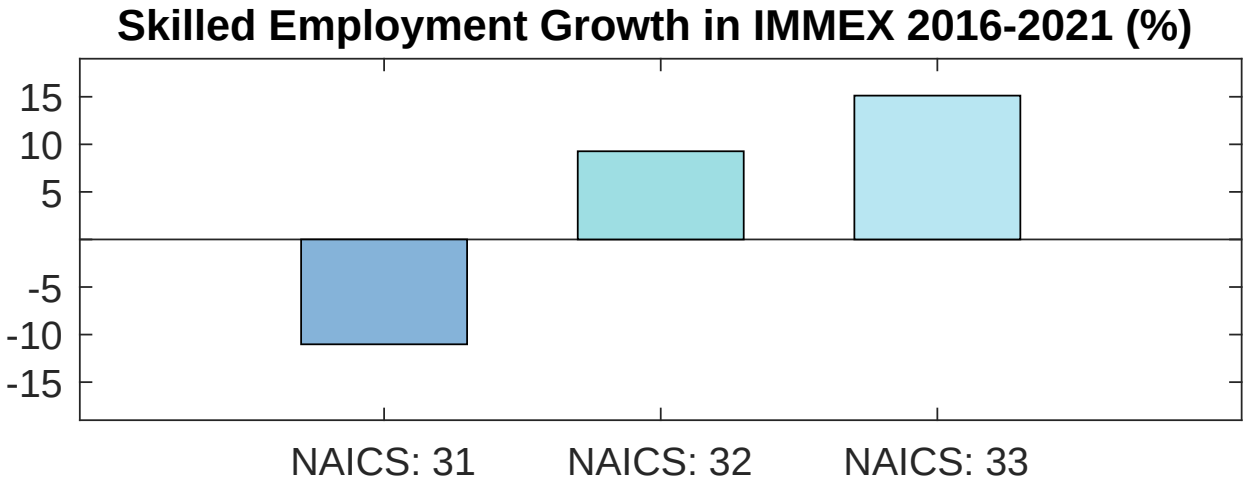
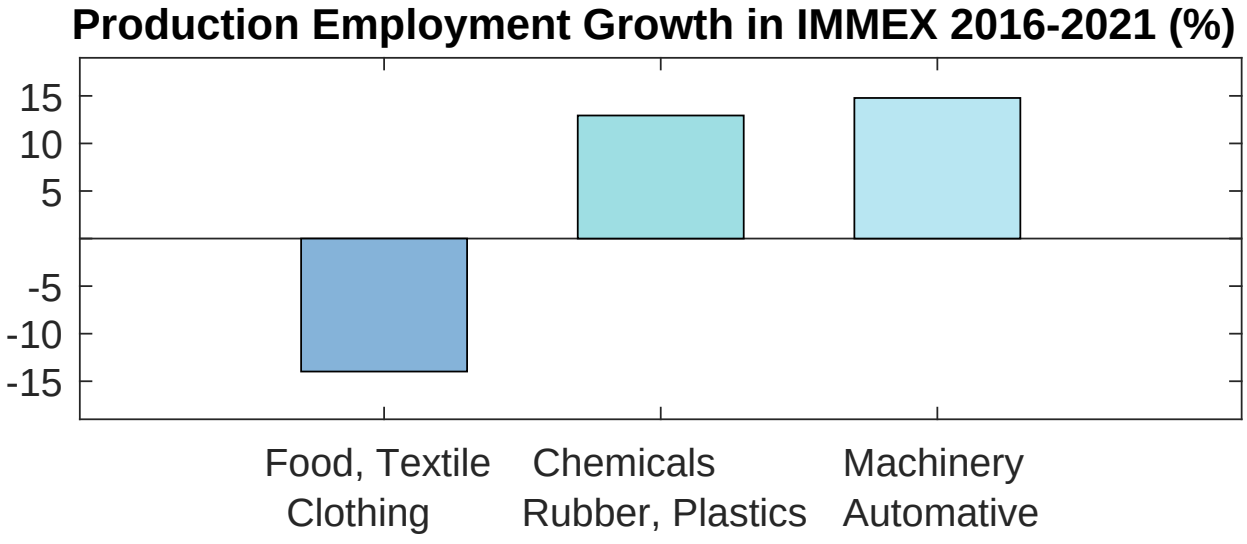
Heterogeneity within Manufacturing–Employment Growth



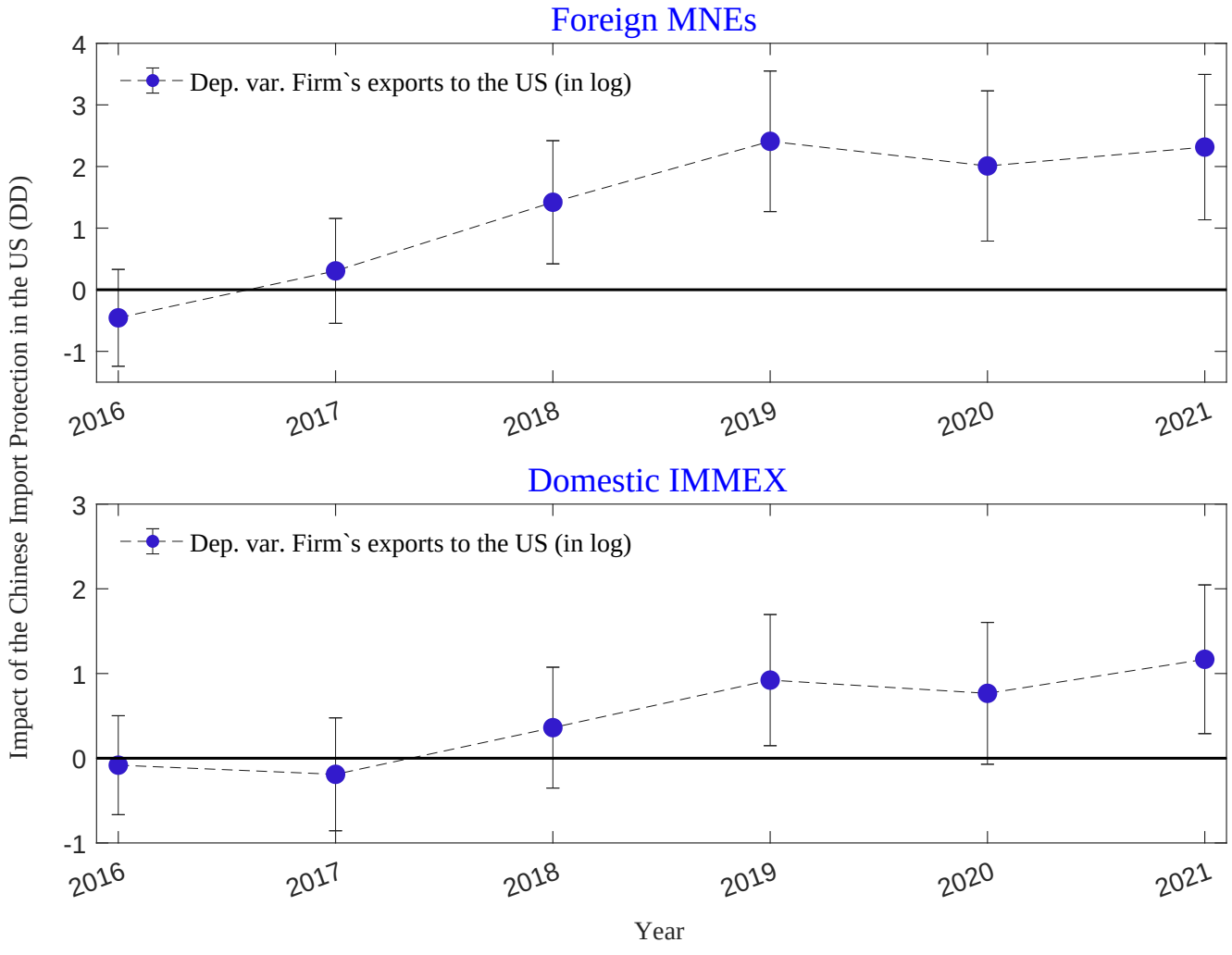


Production and Non-production Employment Growth among GVCs

Heterogeneity by Ownership

- We match the companies in the IMMEX directory with S&P Global database, and identify their global ultimate parent company if owned.
- Match about 3,000 firms, among them around 2,000 of them identified as a subsidiary of foreign multinationals.
- Out of ∼2,000 MNEs, around 1,100 of them are US MNEs.

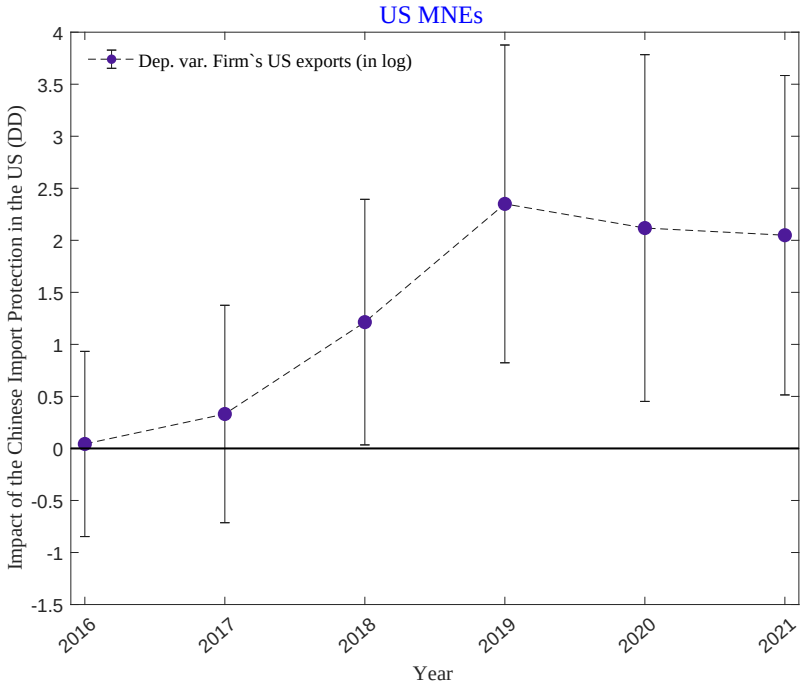
Foreign versus Local GVC firms' US exports due to Increased US Tariffs on China



Foreign MNEs versus Local GVC firms in Mexico

All regressions include firm, industry by year, and firm size by year FEs. Foreign MNEs: N=15,584, Domestic GVCs: N=20,011

US versus Asia based GVC firms in Mexico



Mexican subsidiaries owned by US MNEs

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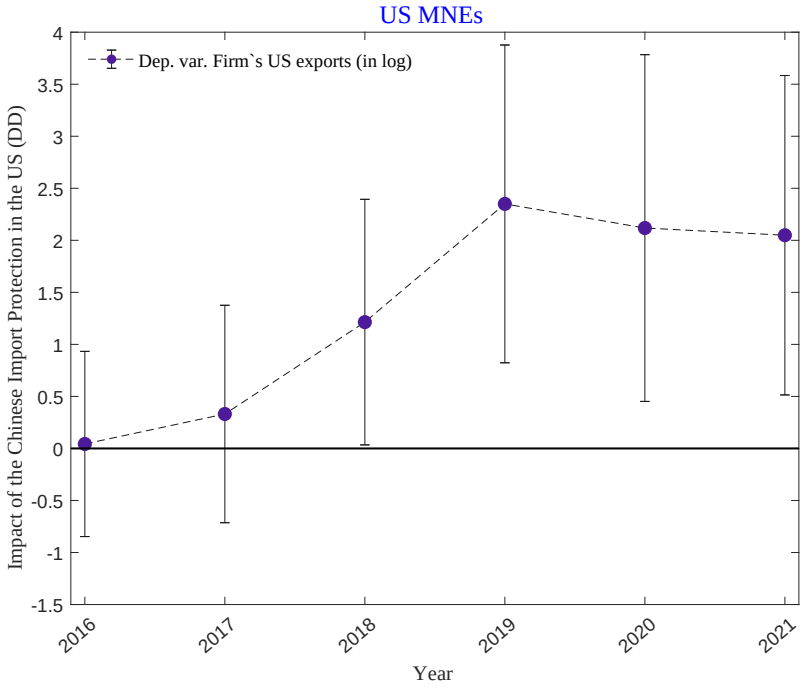
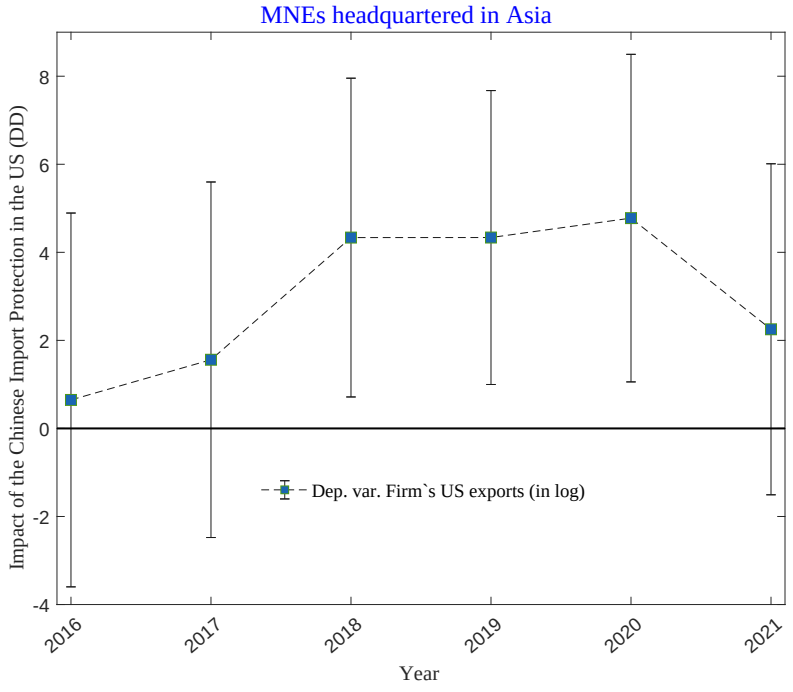




Mexican subsidiaries owned by US MNEs

Mexican subsidiaries owned by Asian MNEs

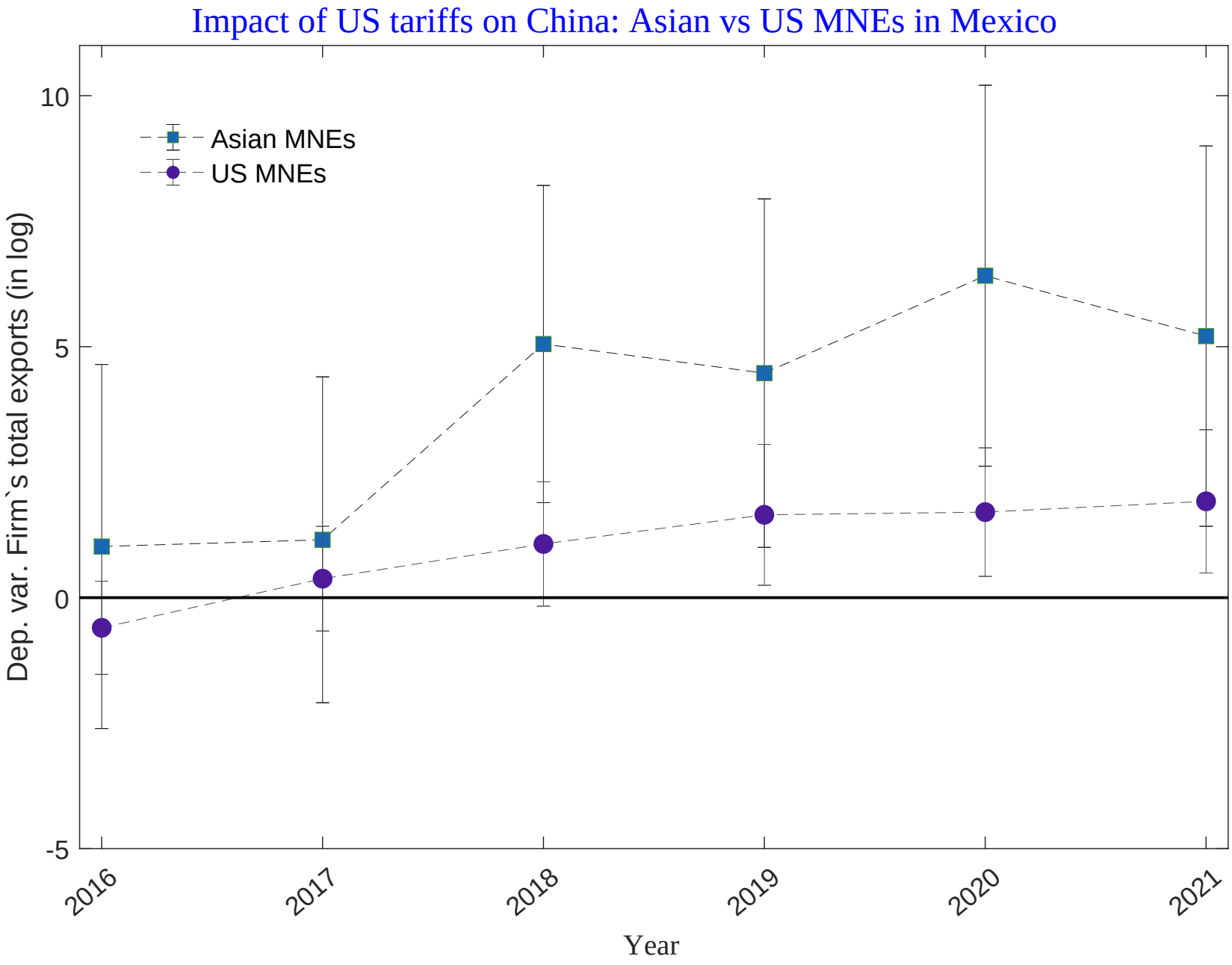
All regressions include firm and industry by year FEs. US MNEs: N=7,325, Asia MNEs: N=2,279

↑ US exports

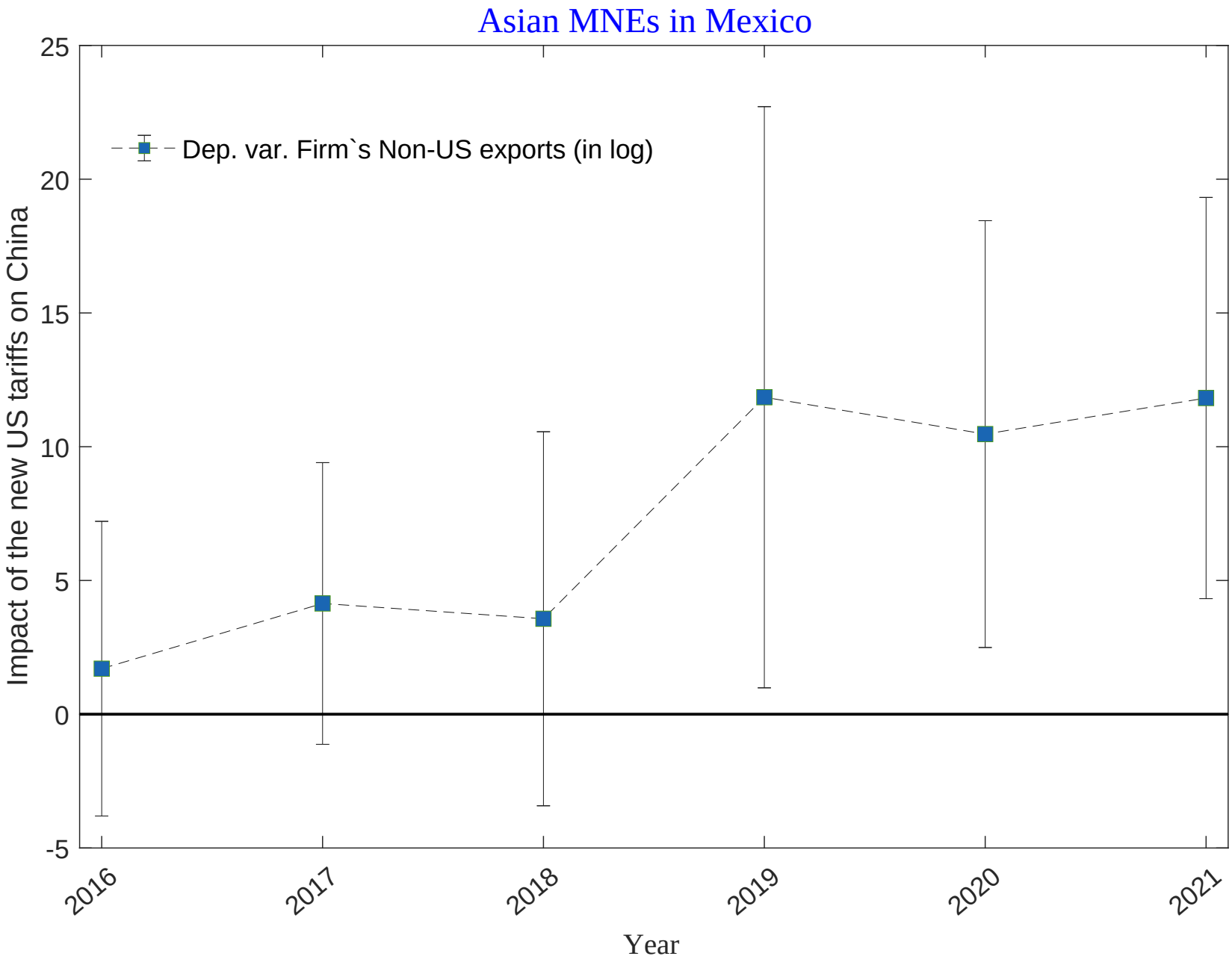
US MNEs: 26% vs. Asian MNEs: 54%

$(e^{2.350*0.1} - 1)$ $(e^{4.336*0.1} - 1)$

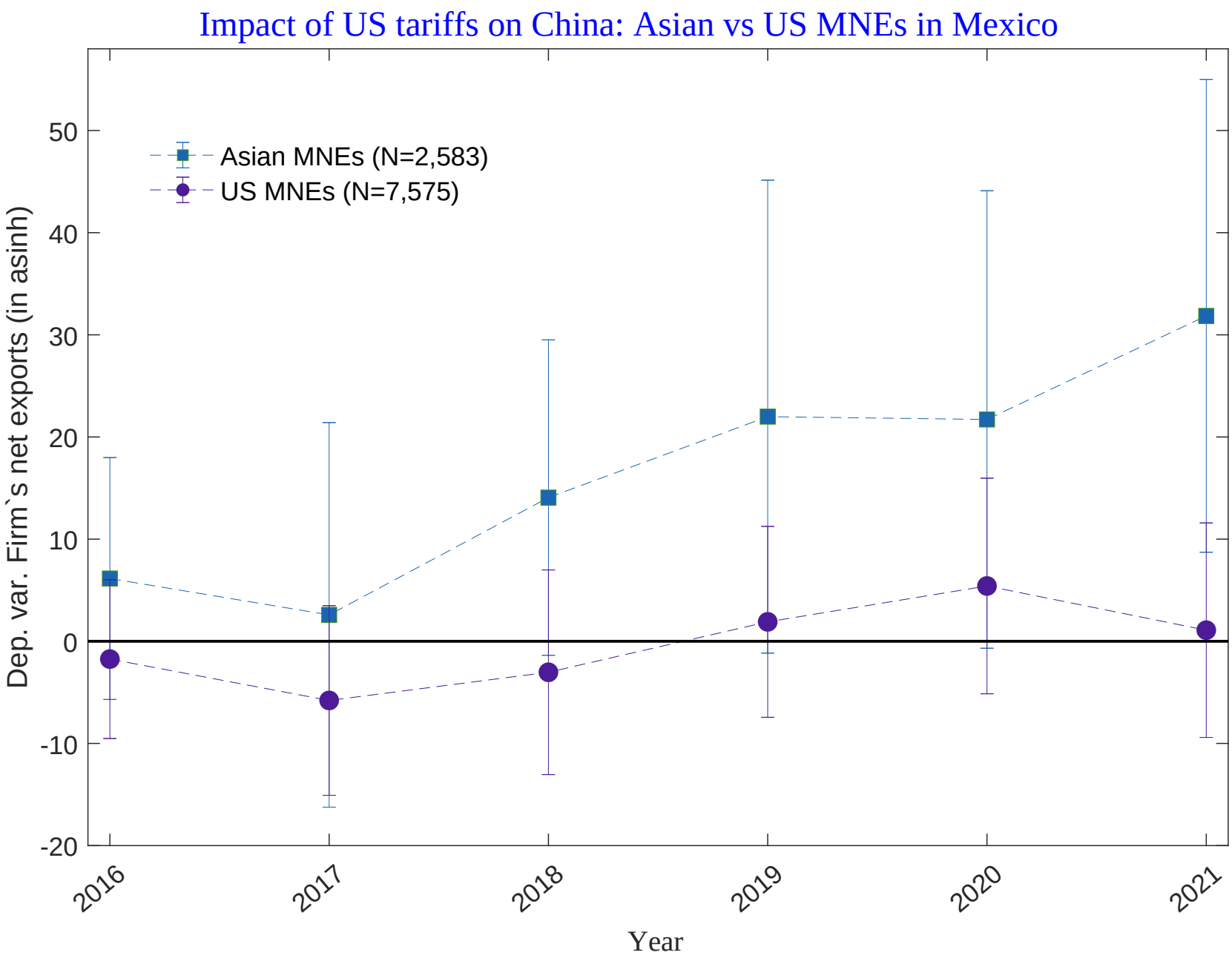
US vs. Asia based GVC firms in Mexico: **Total Exports**



Asia based GVC firms in Mexico: **Non-US Exports**



US versus Asia based GVC firms in Mexico: **Net Exports**



Summary and Questions

- US tariffs towards China is causing relocations favoring Mexico
  - Manufacturing specific results ▸ GO
  - Additional confounds? Focus on within 3-digit industries ▸ GO
  - The role of USMCA ▸ GO
  - Firm Heterogeneity ? Especially mid-size and younger firms benefit ▸ GO
  - Can firm size explain the difference between GVC firms and other exporters? ▸ GO
  - US industries were hurt by US tariffs through intermediate goods (Flaan and Pierce + Handley et al)
    - Is Mexico relieving it by bringing new intermediate products? No.. ▸ GO

Summary and Questions

- China's retaliatory tariffs have a negative effect on Mexico's GVC exports. Mechanism?
  - Negative effect is most pronounced on: Warehousing, Distribution, Repairing, Finishing, Designing, Engineering Services
    - Depressed demand on US goods spills over to Mexico via production sharing
  - Positive effect of retaliatory tariffs on agricultural companies' worldwide exports

- Importing targeted goods from China GO

- US-Mexico
  - Mexico's retaliatory tariffs: ↑ use of firm-specific duty-free permits GO

- Covid-related local labor market shocks or local demand shocks GO

Concluding Remarks

- Δ in US tariffs on China
  - Mexican firms' exports ↑ imports ↑ net exports ↑ products ↑

  ↑ **20%** in **manufacturing exports** to the US

  long-term, mostly in **skilled manufacturing**

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- Δ in China's tariffs on US goods

  ↓ Mexican firms' exports : transitory + heterog., esp. on exp. services
  - Counterbalancing effects will dampen the strong + response in aggregate data

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  - Counterbalancing effects will dampen the strong + response in aggregate data

- **GVC firms** are entirely responsible for the **trade policy spillovers**

Concluding Remarks

- Δ in US tariffs on China
  - Mexican firms' exports ↑ imports ↑ net exports ↑ products ↑

    ↑ **20%** in **manufacturing exports** to the US

    long-term, mostly in **skilled manufacturing**

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- **GVC firms** are entirely responsible for the **trade policy spillovers**

- **Nearshoring** via existing companies

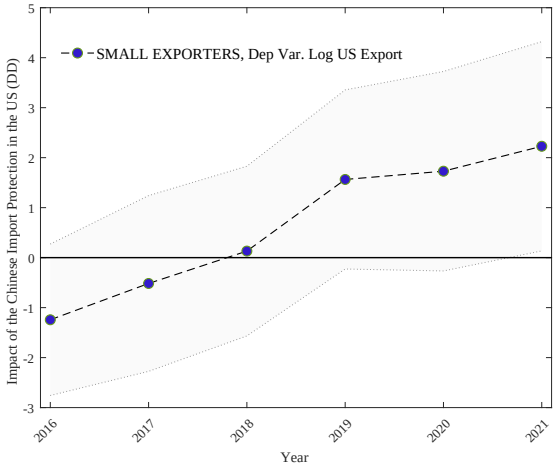
- Within GVCs: Foreign MNEs play more important role (27% vs 10%)

  ↑ inputs purchase from Asia (China, Taiwan, Thailand, Vietnam, Japan, Korea, and India)
  - Among foreign: US (26% ↑) and Asian MNEs (54% ↑)

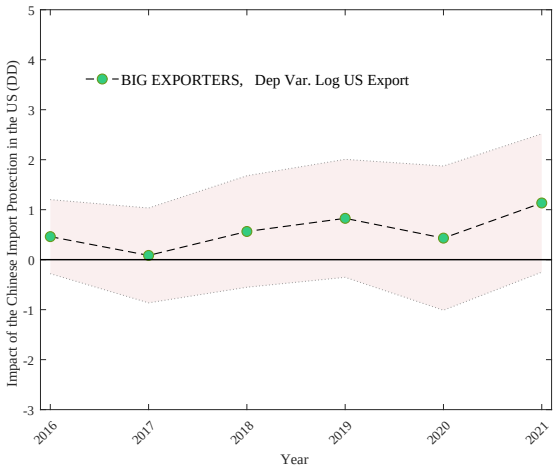
Next Steps

- Refining parent company analysis
  - also integrating Duns and Bradstreet database (via firms' unique tax IDs)
- Extensive margin: **firm entry** to IMMEX/Mexico
  - industry level exposure
- Extensive margin: **plant entry** within firms
  - firm level exposure

Firm Heterogeneity

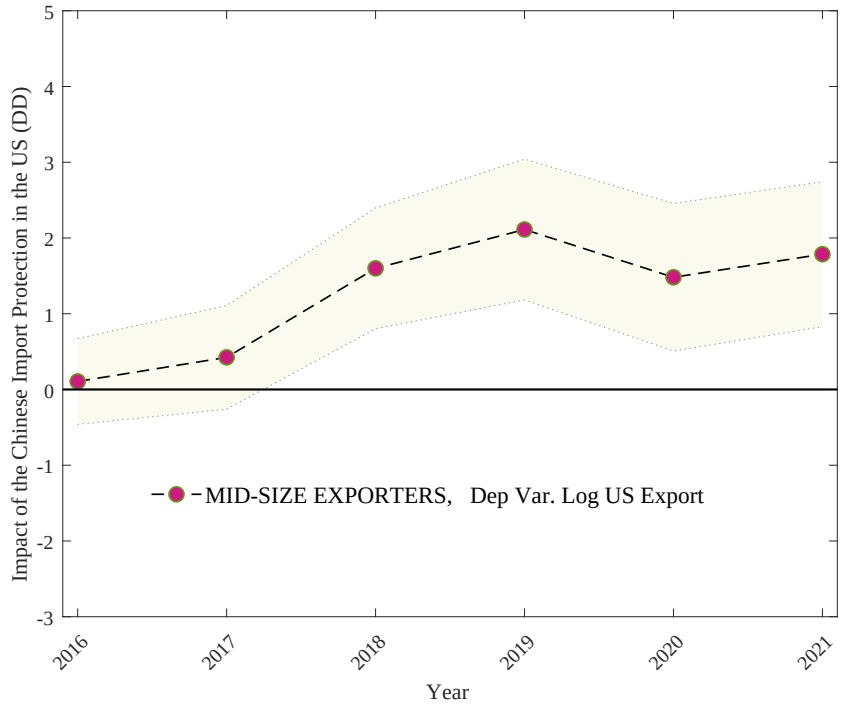


Small (<=p25)



Big (>=p75)

- Mid size IMMEX firms: 23 % ↑ US export

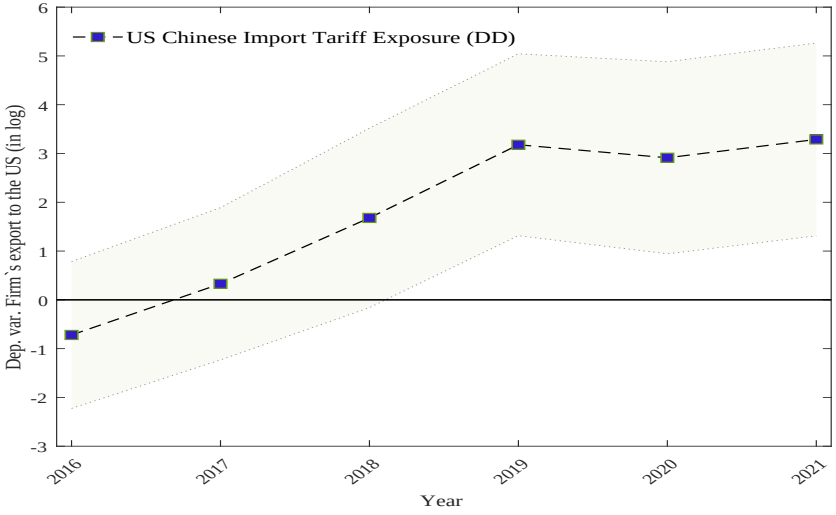


Mid-size (p25-p75)

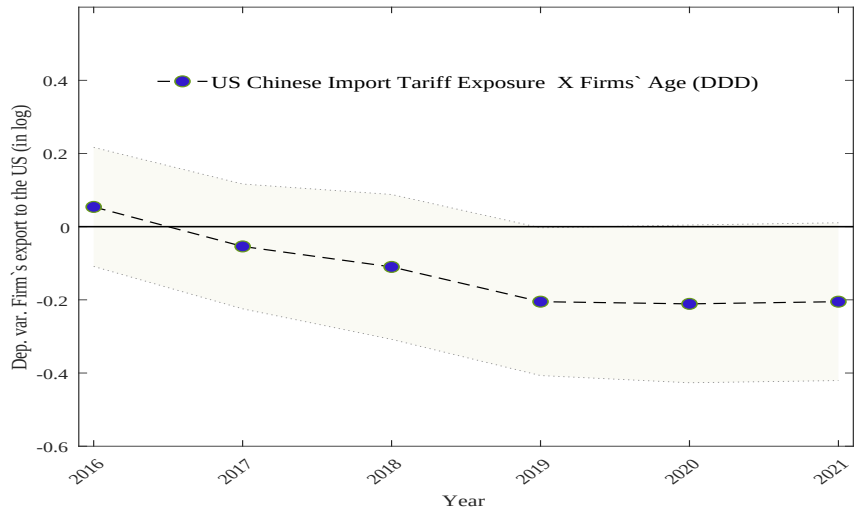
Sample: Dep Var. US Export (in log) The shaded area indicates the confidence interval at the 95% level. All regressions include firm, size-specific, and industry-specific time fixed effects and other trade policy controls.

Firm Heterogeneity

Younger GVC firms respond to US tariffs on China stronger.



Common effect, DD



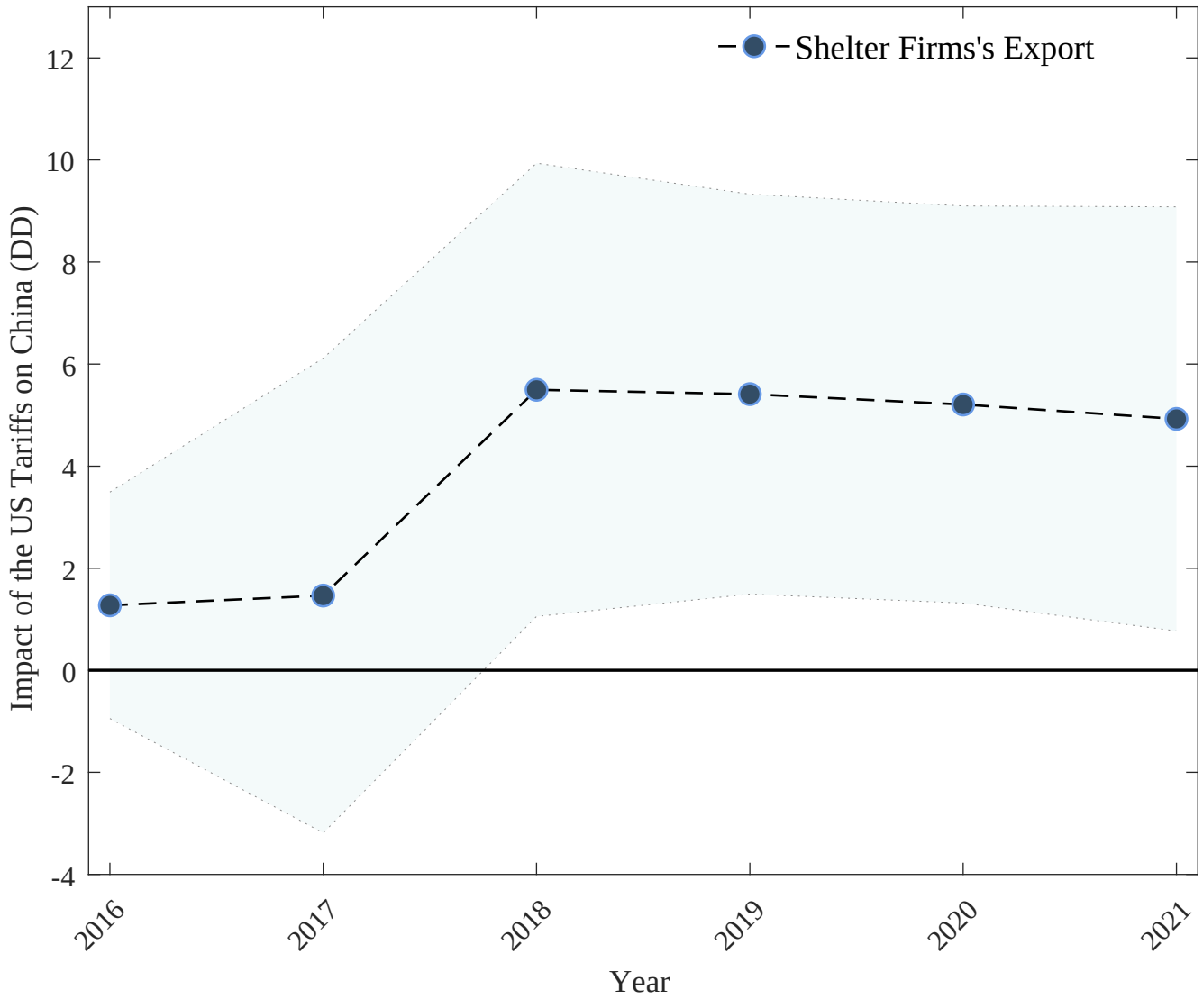
Disp. effect on older firms, DDD
TWM_i^{US-CHN} × Firm Age as of 2016

▸ Back

Sample: IMMEX firms (as of 2016) over 2015-2021. Dep Var. US Export (in log). The shaded area indicates the confidence interval at the 95% level. The number of observations is 35,519. All regressions include firm, size-specific, age-specific and industry-specific time fixed effects and other trade policy controls.

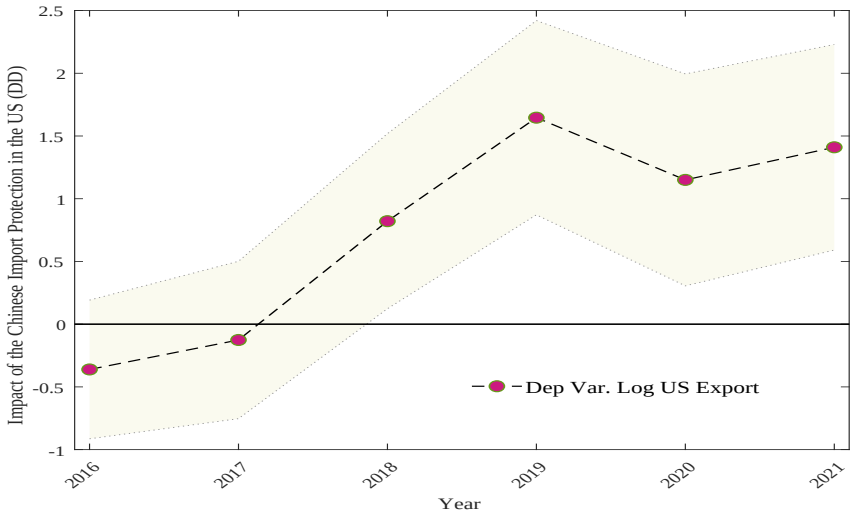
Shelter firms' export responds strongly to the US tariffs on China

export ↑ $e^{6.1\times0.1} - 1 = \%84$ in 2019

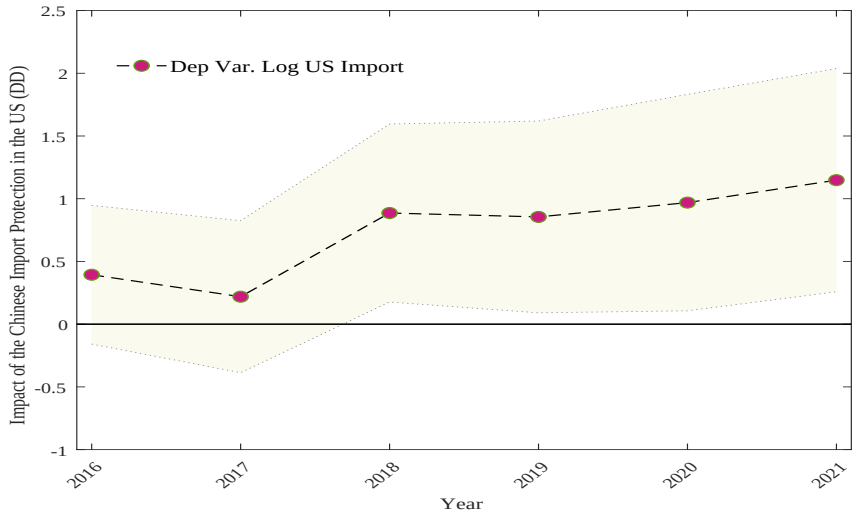


Manufacturing IMMEX Companies Only

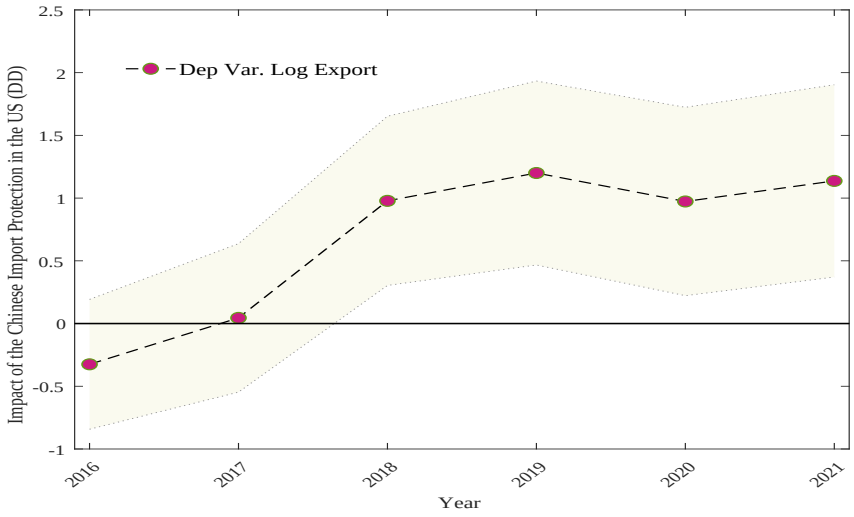
Back



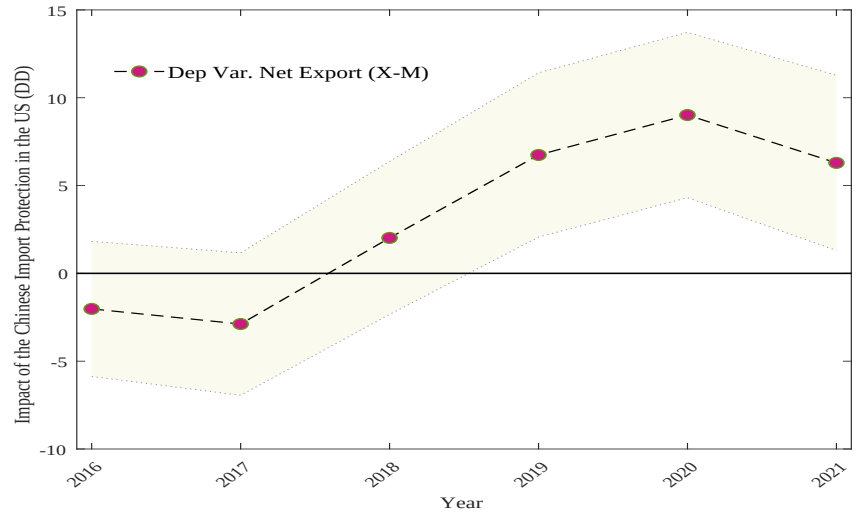
US Export



US Import



Export

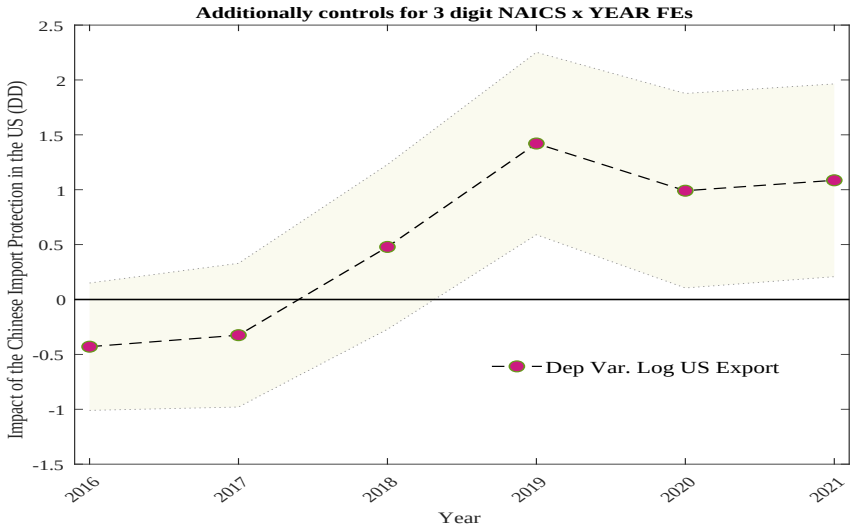


Net Export

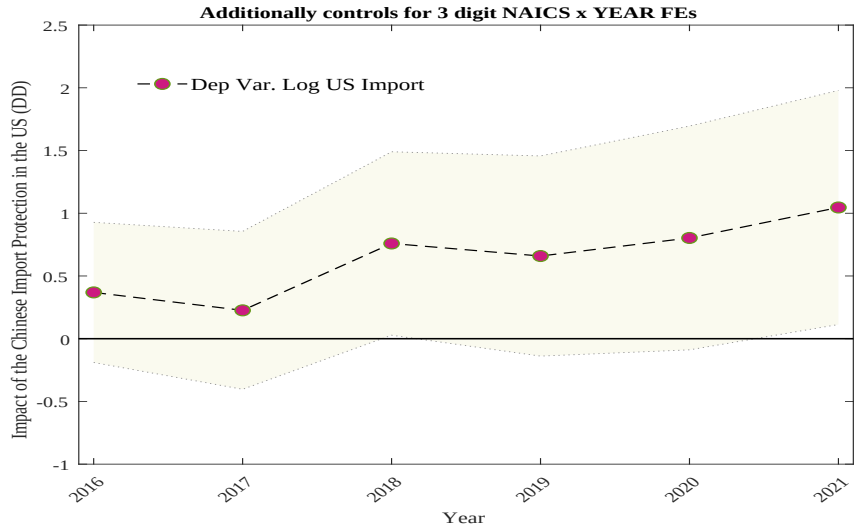
Manufacturing IMMEX Companies Only

Additionally controls for 3-digit NAICS by YEAR FEs.

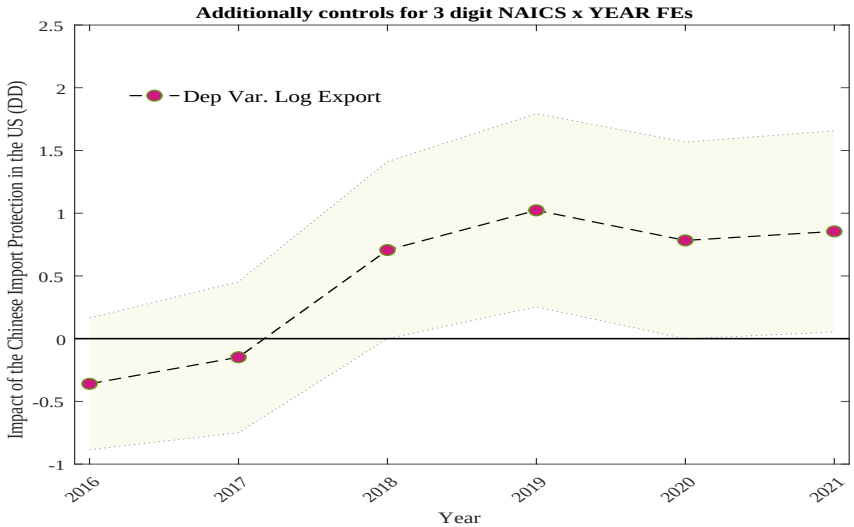
Back



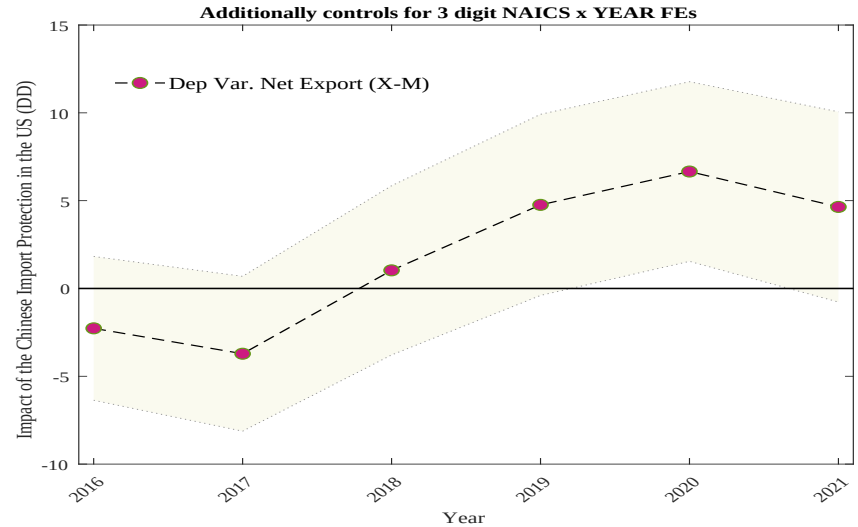
US Export



US Import



Export



Net Export

Manufacturing IMMEX Firms. All regressions include firm FEs, firm size x YEAR FEs, 3-digit NAICS x YEAR FEs and

USMCA

- The USMCA entered into force on July 1, 2020.
- Most significant provisions on automobile manufacturing regulations: the rules of origin (ROO).
- The regional value content (RVC) threshold ↑
  - Passenger cars: ↑from 66% to 75% by 2023 (66 by 2021)
  - Heavy trucks: ↑from 60% to 70% by 2027 (64 by 2024)

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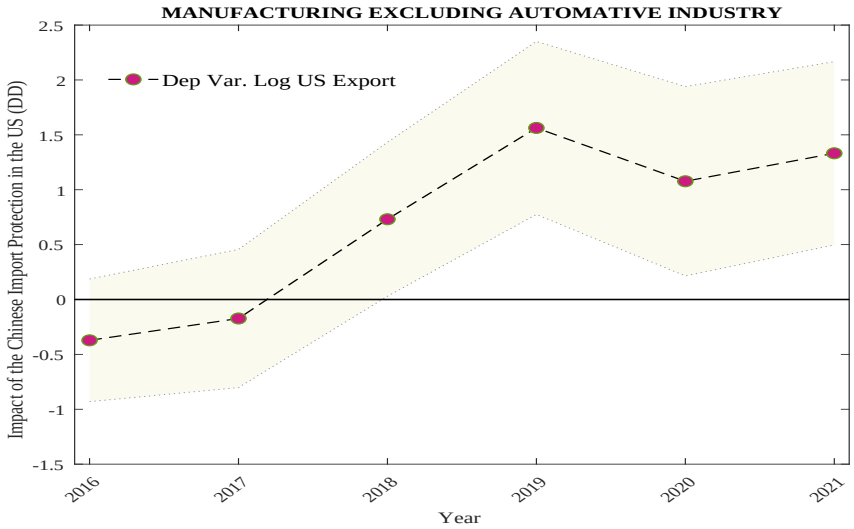
  - Heavy trucks: ↑from 60% to 70% by 2027 (64 by 2024)
- Loophole under NAFTA due to non-listed products
  - Under NAFTA, if an auto part was not identified on a list created in the early 1990s, it was deemed to be NA originating regardless of whether it was actually produced in North America (USTR, 2019).
- USMCA discarded the list and implemented a general rule that required parts to be produced in the region in order to be considered originating

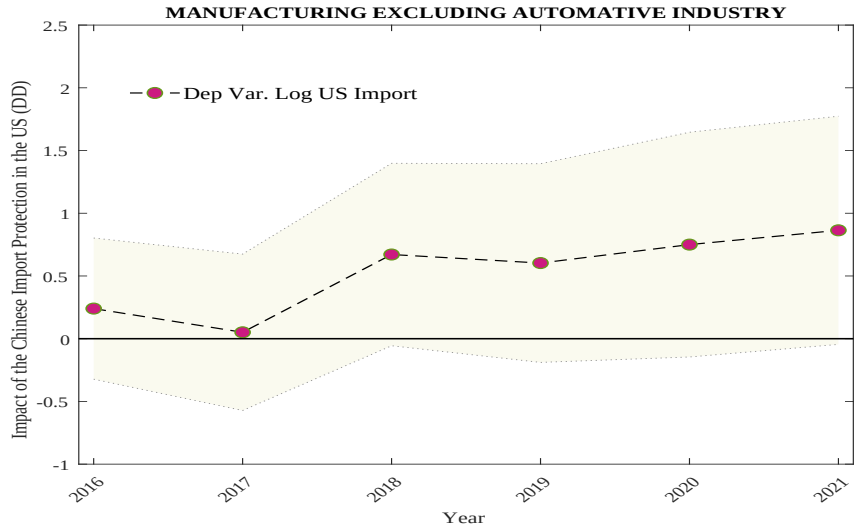
Manufacturing IMMEX Excluding Automotive Industry

Excludes Transportation Equipment Manufacturing

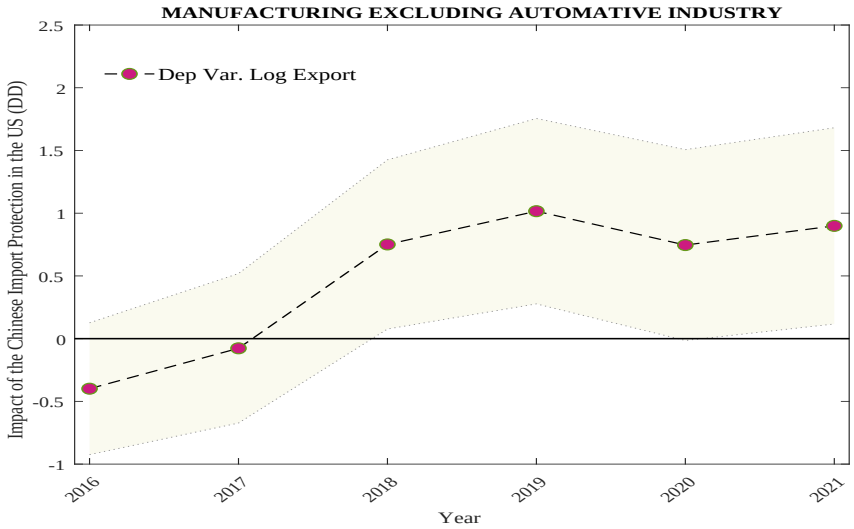
Back



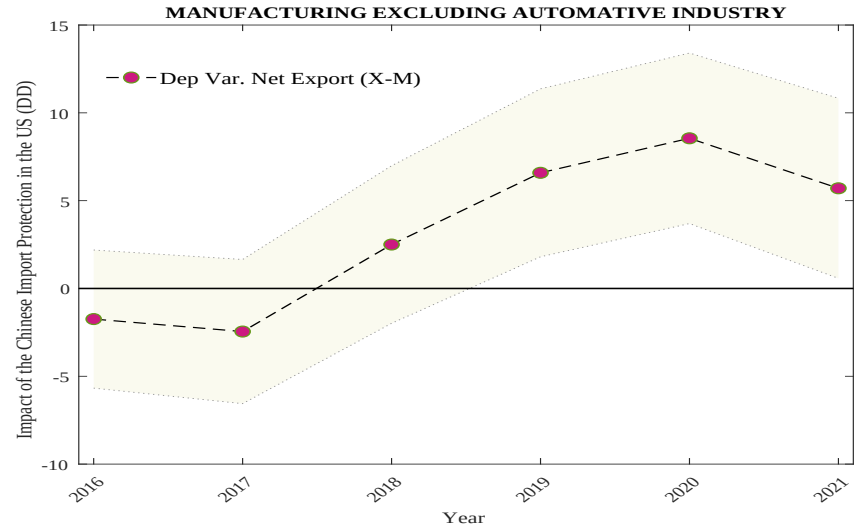
US Exports



US Imports



Exports

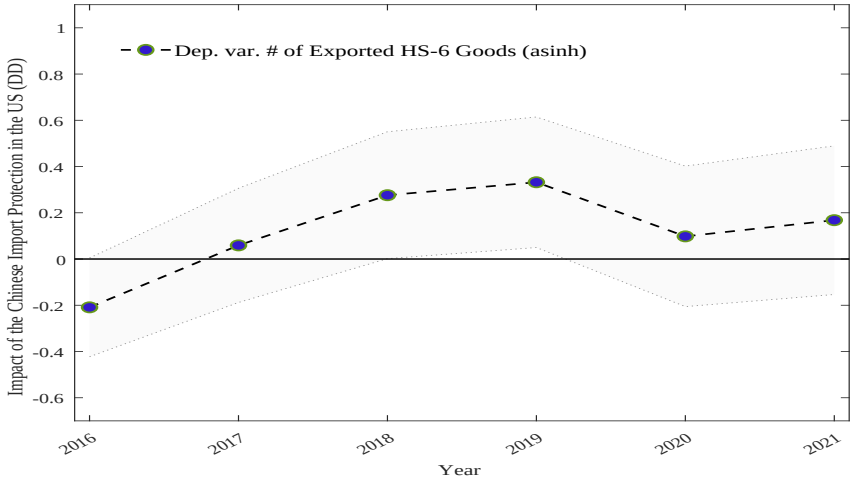


Net Exports

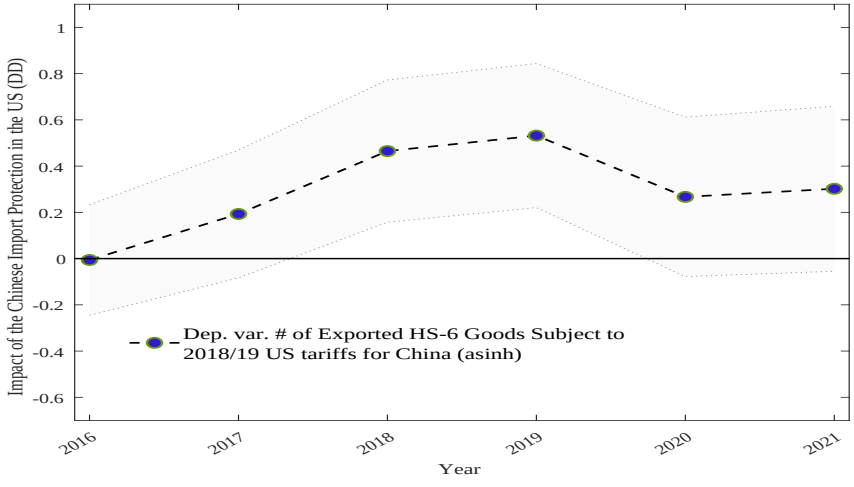
Manufacturing IMMEX Firms except firms in transportation equipment industry. All regressions include firm FEs, firm size

New Products

Firms in Mexico export new products in response to protectionist turn in the US towards China

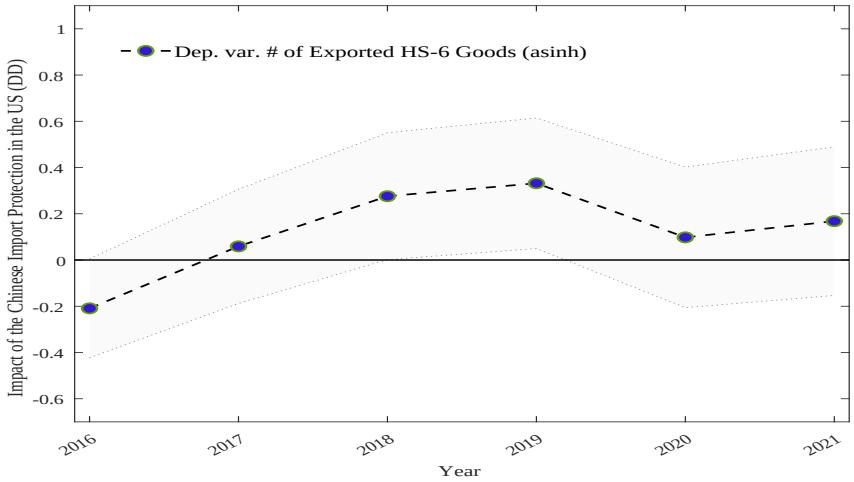


Number of products

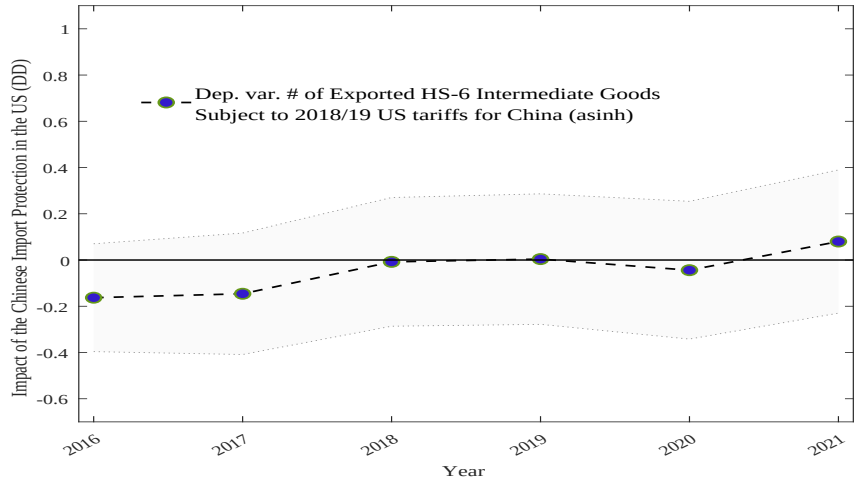


Number of targeted products

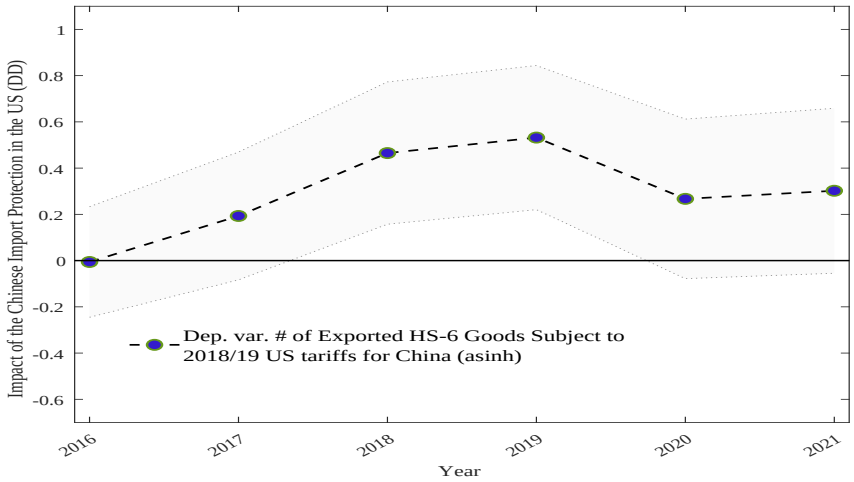
Firms in Mexico export new products in response to protectionist turn in the US towards China



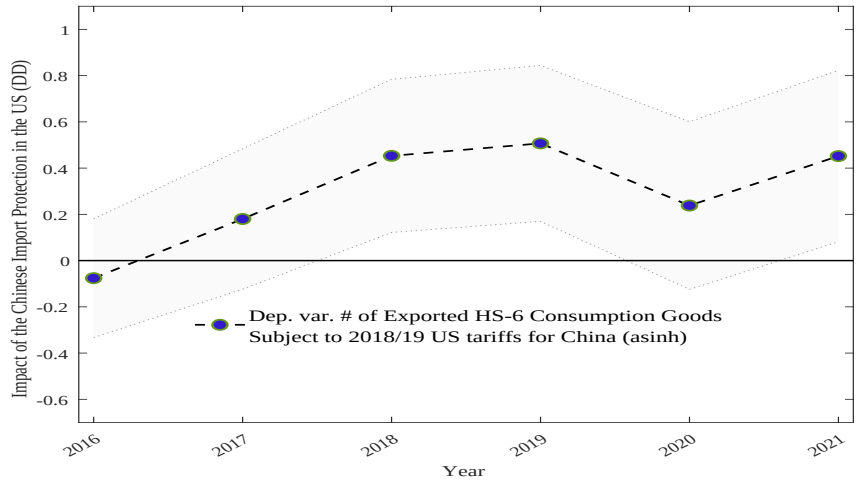
Number of products



No. of targeted intermediate products



Number of targeted products



No. of targeted consumption products

▸ Back

All regressions include firm FEs, size-specific, and sector-specific time FEs as well as China's retaliatory tariffs and the

The US-China Trade War

- Two investigations under the Trade Act of 1962/74 opened in 2017, concluding in 2018
  - **Section 232:** steel and aluminum imports pose a national security threat
  - **Section 301:** the Chinese government is conducting unfair trade practices related to technology transfer, intellectual property, and innovation.
- **March, '18**: Steel and aluminum tariffs (the Section 232 investigation).
- **April, '18**: China retaliates with tariffs on select products in response to the Section 232 tariffs.
- **July, '18- Sept '19**: US-China tariff escalation in five phases, eventually covered $450 billion in trade flows
  - 18% of US imports, 9% of US export
- **February, '20**: Phase I Agreement : Most existing tariffs between the US and China remain in place as of now.
- **US-Mexico**: June '18 - May '19, covered $3 billion trade flow

Identifying the Impact of the US-China Trade War on Mexican Firms

$$Y_{it} = \beta_0 + \sum_{h=2016}^{2021} \alpha_h \mathbb{1}_{h=t} \times \mathbf{TM_i^{US-CH}} + \sum_{h=2016}^{2021} \alpha_h^{IMM} \mathbb{1}_{h=t} \times \mathbf{TM_i^{US-CH}} \times IMM_i$$

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$$+ \sum_{h=2016}^{2021} \beta_h \mathbb{1}_{h=t} \times \mathbf{TX_i^{CH-US}} + \sum_{h=2016}^{2021} \beta_h^{IMM} \mathbb{1}_{t=h} \times \mathbf{TX_i^{CH-US}} \times IMM_i$$

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&+ \sum_{h=2016}^{2021} \beta_h \mathbb{1}_{h=t} \times \mathbf{TX_i^{CH-US}} + \sum_{h=2016}^{2021} \beta_h^{IMM} \mathbb{1}_{t=h} \times \mathbf{TX_i^{CH-US}} \times IMM_i \\
&+ \sum_{h=2016}^{2021} \delta_h \mathbb{1}_{h=t} \times TM_i^{US-MEX} + \sum_{h=2016}^{2021} \delta_h^{IMM} \mathbb{1}_{h=t} \times TM_i^{US-MEX} \times IMM_i
\end{aligned}
$$

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&+ \sum_{h=2016}^{2021} \mu_h \mathbb{1}_{t=h} \times TX_i^{MEX-US} + \sum_{h=2016}^{2021} \mu_h^{IMM} \mathbb{1}_{h=t} \times TX_i^{MEX-US} \times IMM_i
\end{aligned}
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Identifying the Impact of the US-China Trade War on Mexican Firms

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\begin{aligned}
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& + \sum_{h=2016}^{2021} \mathbb{1}_{h=t} \times IMM_i + Z_{it} + \eta_i + \varepsilon_{it}
\end{aligned}
$$

Identifying the Impact of the US-China Trade War on Mexican Firms

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Y_{it} =& \beta_0 + \sum_{h=2016}^{2021} \alpha_h \mathbb{1}_{h=t} \times \mathbf{TM_i^{US-CH}} + \sum_{h=2016}^{2021} \alpha_h^{IMM} \mathbb{1}_{h=t} \times \mathbf{TM_i^{US-CH}} \times IMM_i \\
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&+ \sum_{h=2016}^{2021} \mathbb{1}_{h=t} \times IMM_i + Z_{it} + \eta_i + \varepsilon_{it}
\end{aligned}
$$

- GVC-specific aggregate shocks , Firm FEs
- Z_{it} includes
  - time-trends that can vary by firms in different sizes
  - Exposures via input channels
    - differential time trends for firms importing targeted products (as of 2016) from China ▸ more
    - differential time trends for firms importing targeted products from the US ▸ more ▸ Back

Robustness

- Replacement of NAFTA with USMCA: Results robust when the transportation industry is removed. GO

Robustness

- Replacement of NAFTA with USMCA: Results robust when the transportation industry is removed. ▸ GO
- GVC firms are the main link for trade policy spillover
  - GVC firms are larger, maybe this is simply the difference between larger versus smaller exporters?
    - No! ▸ Go

Chinese Inputs Exposure

- We distinguish firms as of 2016 that import goods from China that will be subject to higher tariffs in the US and construct a firm level measure as follows:

$$\mathbf{CHNIMP_i^{USIT}} = \frac{\sum_{j \in USIT^{CH}} M_{ij}^{2016,CH} \times \Delta\tau_j^{USIT^{CH}}}{\sum_j \sum_k M_{ijk}^{2016}}$$

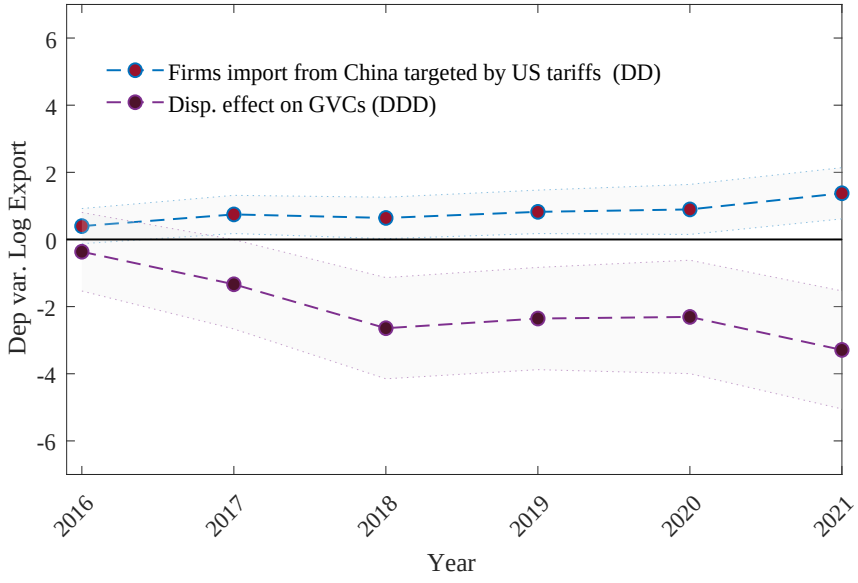
M_{ijk}^{2016}: value of import of Mexican **firm** i in **good** j to **destination** k in year 2016

▸ DDD spec ▸ back

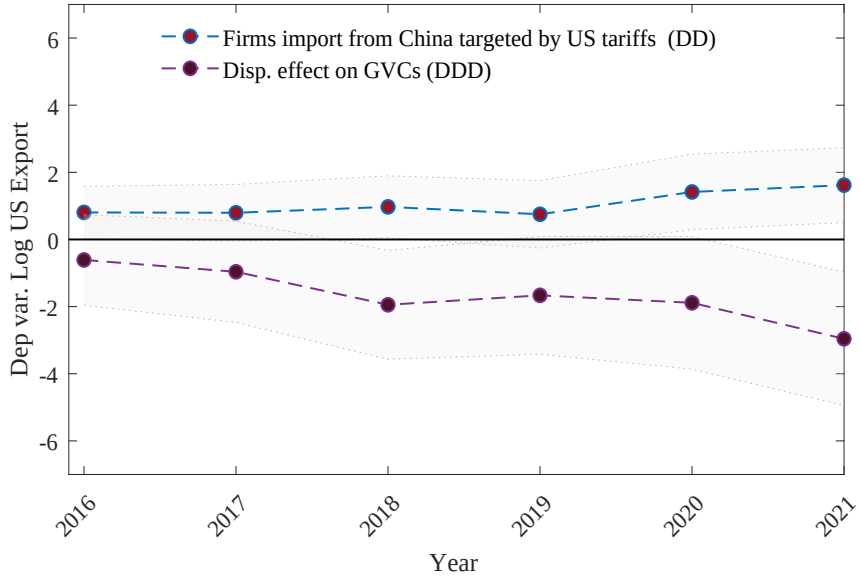
▸ result

Chinese Import Exposure

- Separate analysis–25/75 percentile exposure diff among IMMEX firms: $e^{-1.54*0.028} - 1 = 4\%$
  ↓ in GVC firms' worldwide export in 2019, mostly in skilled manuf (33)



Export



US Export

Notes: N= 159,378 (log export) & N=123,698 (log US export). The shaded area indicate the confidence interval at the 95% level. All regressions include firm, size-specific, and IMMEX-specific time fixed effects and other trade policy controls. The right axis shows the coefficient values of the respective DD or DDD coefficients.

▸ China Import Exposure Measure ▸ IC Measures ▸ Back

Input Channels

- We allow for differential trends for those **firms** whose **US imports depend on**:
  - $USIT^{CH}$ goods (US tariffs on China):

$$\mathbf{IC_i^{USIT}} = \frac{\sum_{j \in USIT^{CH}} M_{ij}^{2016,US} \times \Delta\tau_j^{USIT^{CH}}}{\sum_j \sum_k M_{ijk}^{2016}}$$

$M_{ij}^{2016,US}$: firm i's import of good j from the US

▸ back to DDD spec ▸ back

Input Channels

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$M_{ij}^{2016,US}$: firm i's import of good j from the US

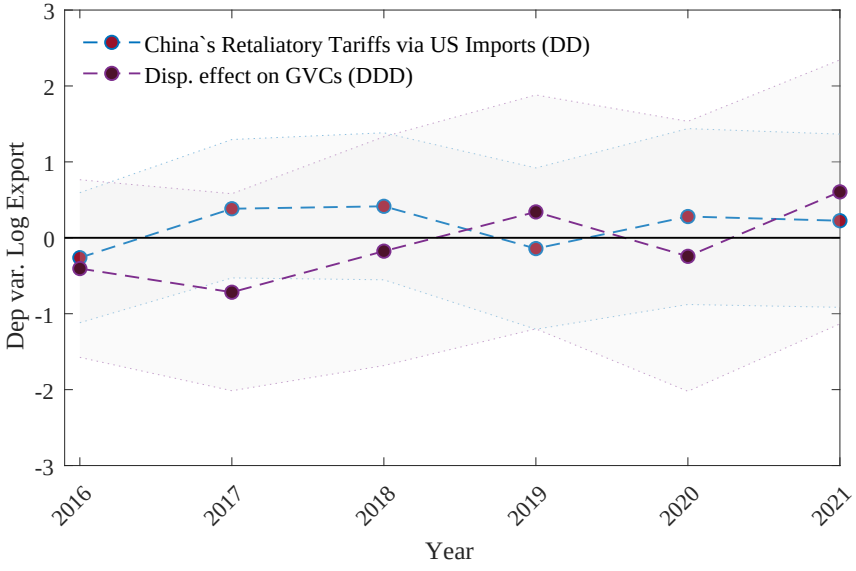
  - $USRT^{CH}$ goods (China's tariffs on US):

$$\mathbf{IC_i^{USRT}} = \frac{\sum_{j \in USRT^{CH}} M_{ij}^{2016,US} \times \Delta\tau_j^{USRT^{CH}}}{\sum_j \sum_k M_{ijk}^{2016}}$$

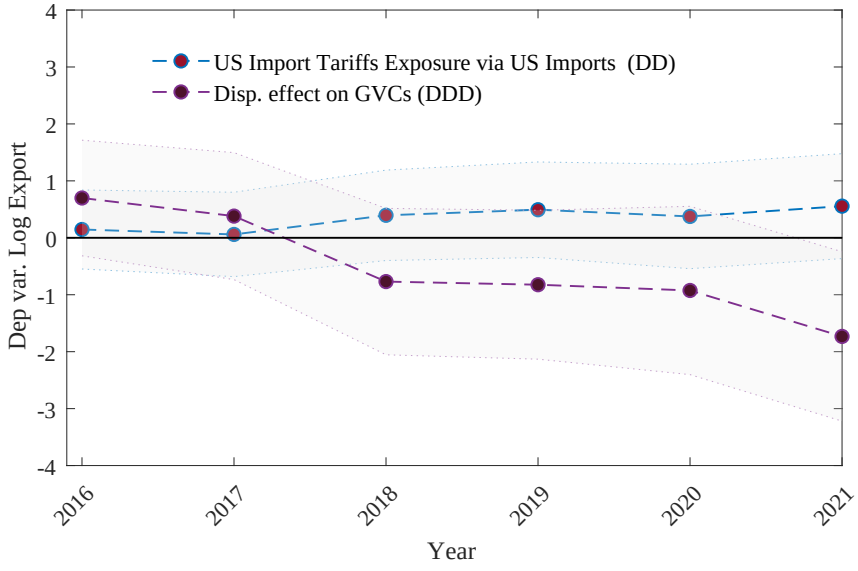
▸ back to DDD spec ▸ back

Input Costs Channels

How firms' export impacted whose US imports concentrated on the affected goods



China's retaliatory tariffs (IC_i^{USRT})



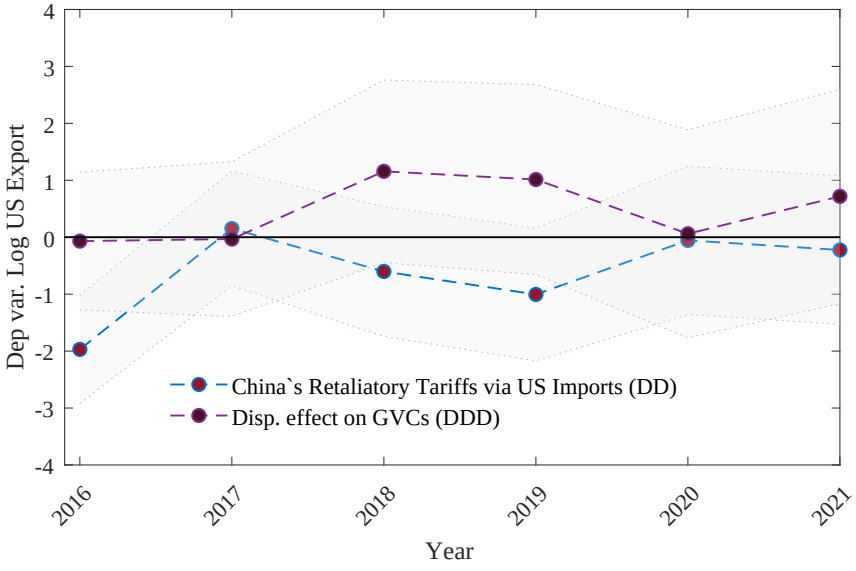
US tariffs on China (IC_i^{USIT})

Notes: The dependent variable is the natural logarithm of firm's annual export value. Figures present the yearly IC_i^{USRT}, and IC_i^{USIT} coefficient estimates. The sample consists of all exporting firms in Mexico as of 2016 over 2015-2021. The shaded area indicates the confidence interval at the 95% level. The number of observations is 159,378. All regressions include firm, size-specific, and IMMEX-specific time fixed effects. The right axis shows the coefficient values of the respective DD or DDD coefficients.

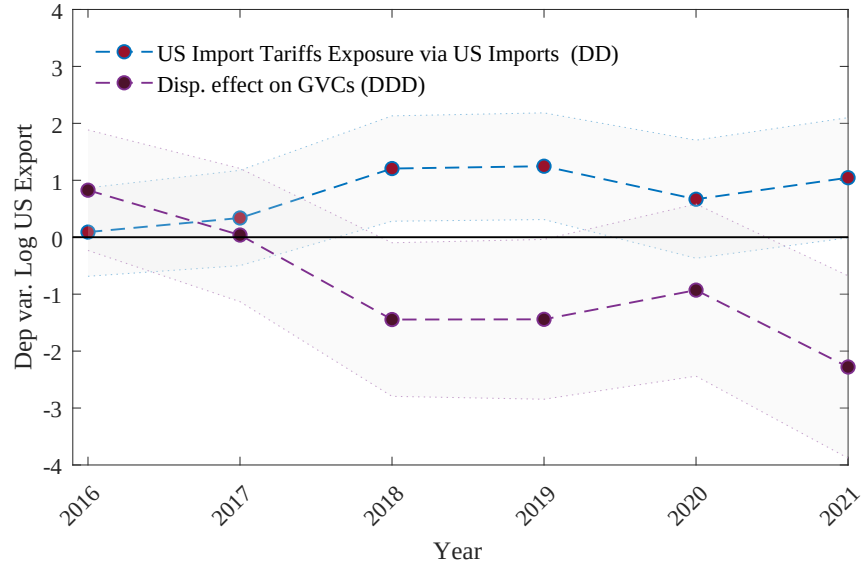
▸ Back

Input Costs Channels

Dep var. US export



China's retaliatory tariffs (IC_i^{USRT})



US tariffs on China (IC_i^{USIT})

Notes: Figures present the yearly IC_i^{USRT}, and IC_i^{USIT} coefficient estimates. The sample consists of all exporting firms in Mexico as of 2016 over 2015-2021. The shaded area indicates the confidence interval at the 95% level. The number of observations is 123,698. All regressions include firm, size-specific, and IMMEX-specific time fixed effects. The right axis shows the coefficient values of the respective DD or DDD coefficients.

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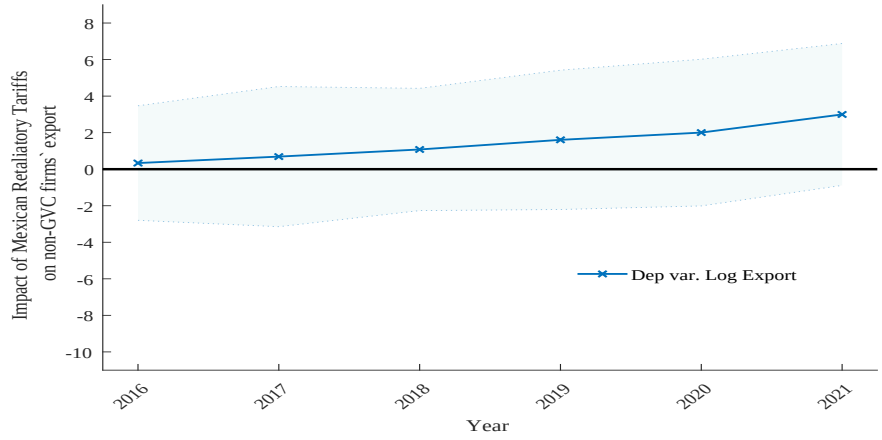
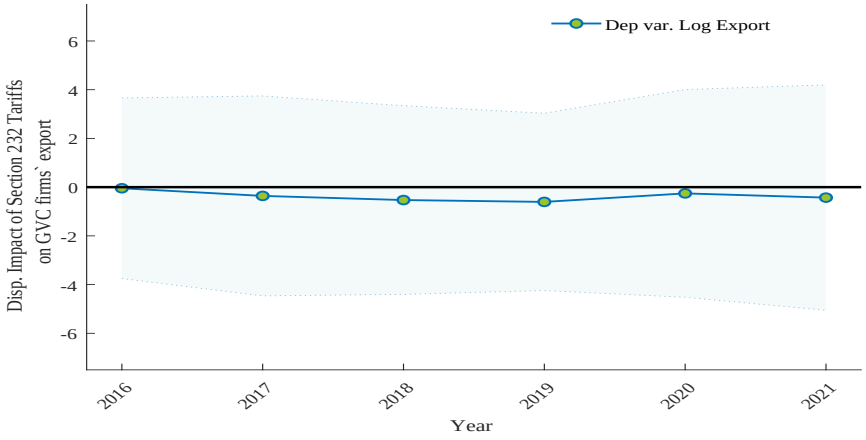
Section 232 Tariffs on Mexico and Mexico's Retaliation

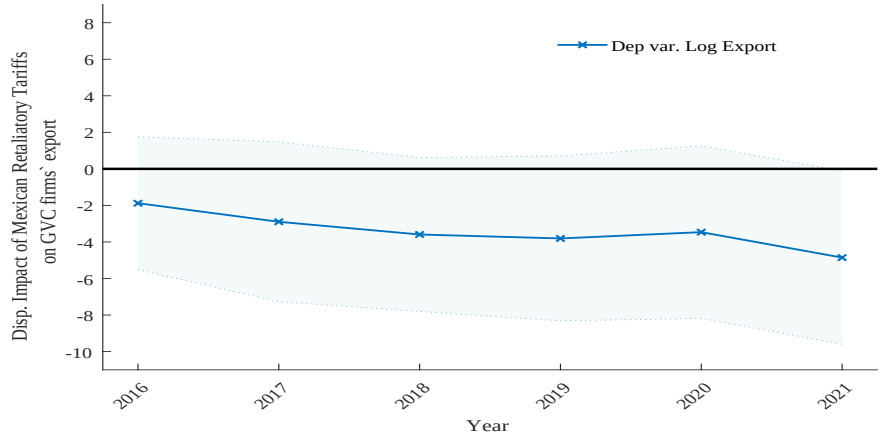
Impact of US tariffs on Mexico



Impact of Mexico's ret. tariffs



Disp. effect on GVC firms (IMMEX)



Disp. effect on GVC firms (IMMEX)

Notes: N= 159,378 (log export) & N=123,698 (log US export). The shaded area indicate the confidence interval at the 95% level. All regressions include firm, size-specific, and IMMEX-specific time fixed effects and other trade policy controls.

▸ USExport ▸ ChineseImports

Results w/ Municipality Time Trends

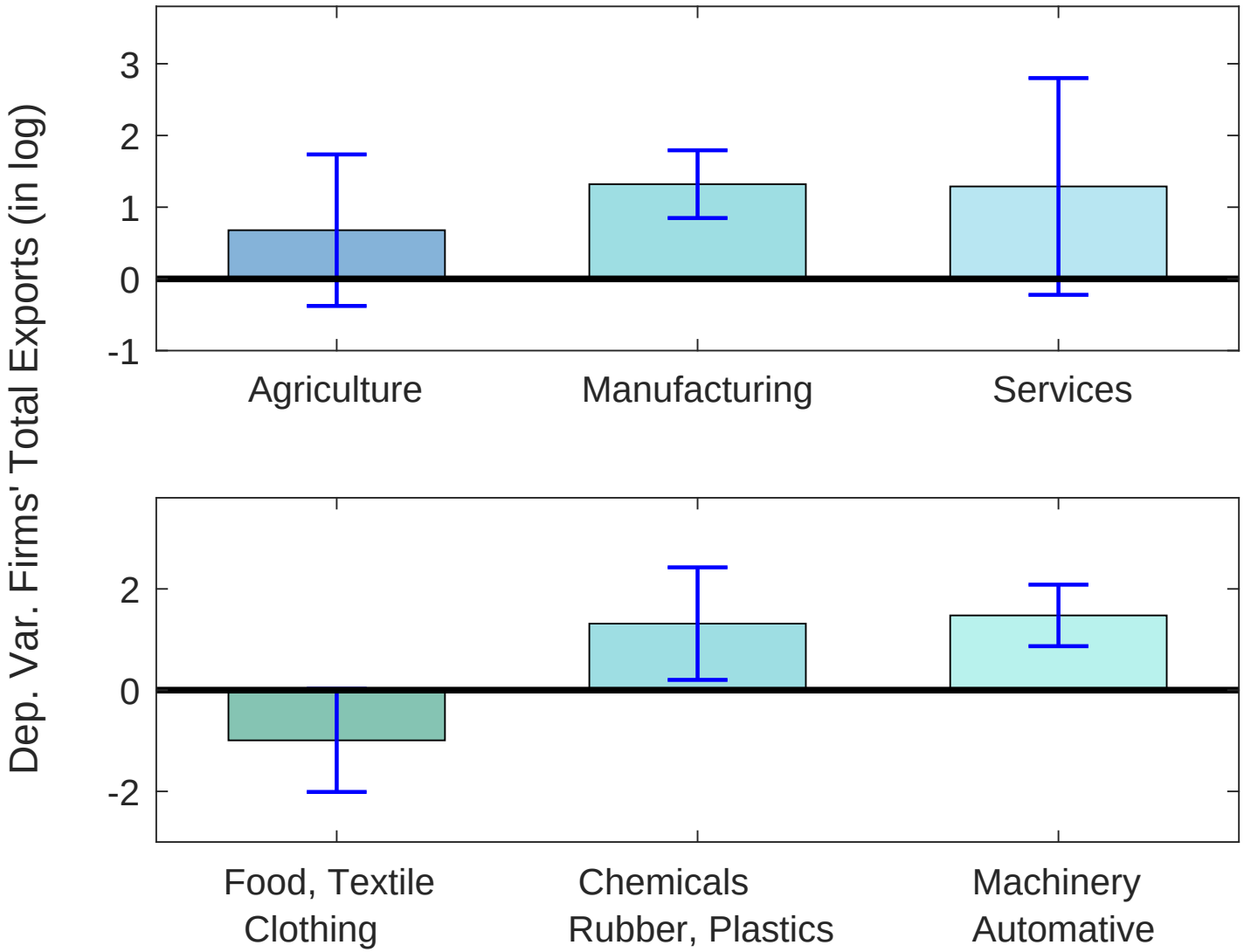
▸ Back

VARIABLES	(1) Exports (Log)	(2) US Exports (Log)	(3) US Imports (Log)	(4) China Imports (Log)	(5) OTHAS Imports (Log)	(6) Net Exports (IHS)
$TM_i^{US-CHN} \times$ 2016	-0.334	-0.204	0.050	0.468	0.257	1.047
	(0.264)	(0.280)	(0.263)	(0.431)	(0.422)	(1.968)
$TM_i^{US-CHN} \times$ 2017	0.001	0.006	-0.035	0.482	0.506	-0.247
	(0.305)	(0.323)	(0.306)	(0.471)	(0.464)	(2.078)
$TM_i^{US-CHN} \times$ 2018	0.854**	0.827**	0.257	0.810	1.143**	4.151*
	(0.340)	(0.341)	(0.334)	(0.493)	(0.514)	(2.231)
$TM_i^{US-CHN} \times$ 2019	1.125***	1.396***	0.23	1.047*	1.074**	7.779***
	(0.348)	(0.373)	(0.361)	(0.539)	(0.537)	(2.417)
$TM_i^{US-CHN} \times$ 2020	1.108***	1.082***	0.409	1.389**	1.475***	6.703***
	(0.378)	(0.402)	(0.423)	(0.568)	(0.554)	(2.473)
$TM_i^{US-CHN} \times$ 2021	1.184***	1.370***	0.396	1.425**	1.781***	5.590**
China's Retaliatory Tariffs × YEAR FEs	✓	✓	✓	✓	✓	✓
Section 232 Tariff Exposure × YEAR FEs	✓	✓	✓	✓	✓	✓
Mex. Retaliatory Tariff Exp. × YEAR FEs	✓	✓	✓	✓	✓	✓
Size × YEAR FEs	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Industry × YEAR FEs	✓	✓	✓	✓	✓	✓
Municipality × YEAR FEs	✓	✓	✓	✓	✓	✓
Observations	36,370	34,604	33,492	29,396	27,922	37,523
R-squared	0.894	0.895	0.904	0.864	0.875	0.803

Notes: Sample: IMMEX firms as of 2016 over 2015-2021. The dependent variables are given in column headings. OTHAS refers to Other Asia, which includes the following set of countries: Taiwan, Thailand, Vietnam, Japan, Korea, and India. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Sectoral Heterogeneity–US Tariffs on Chinese Imports

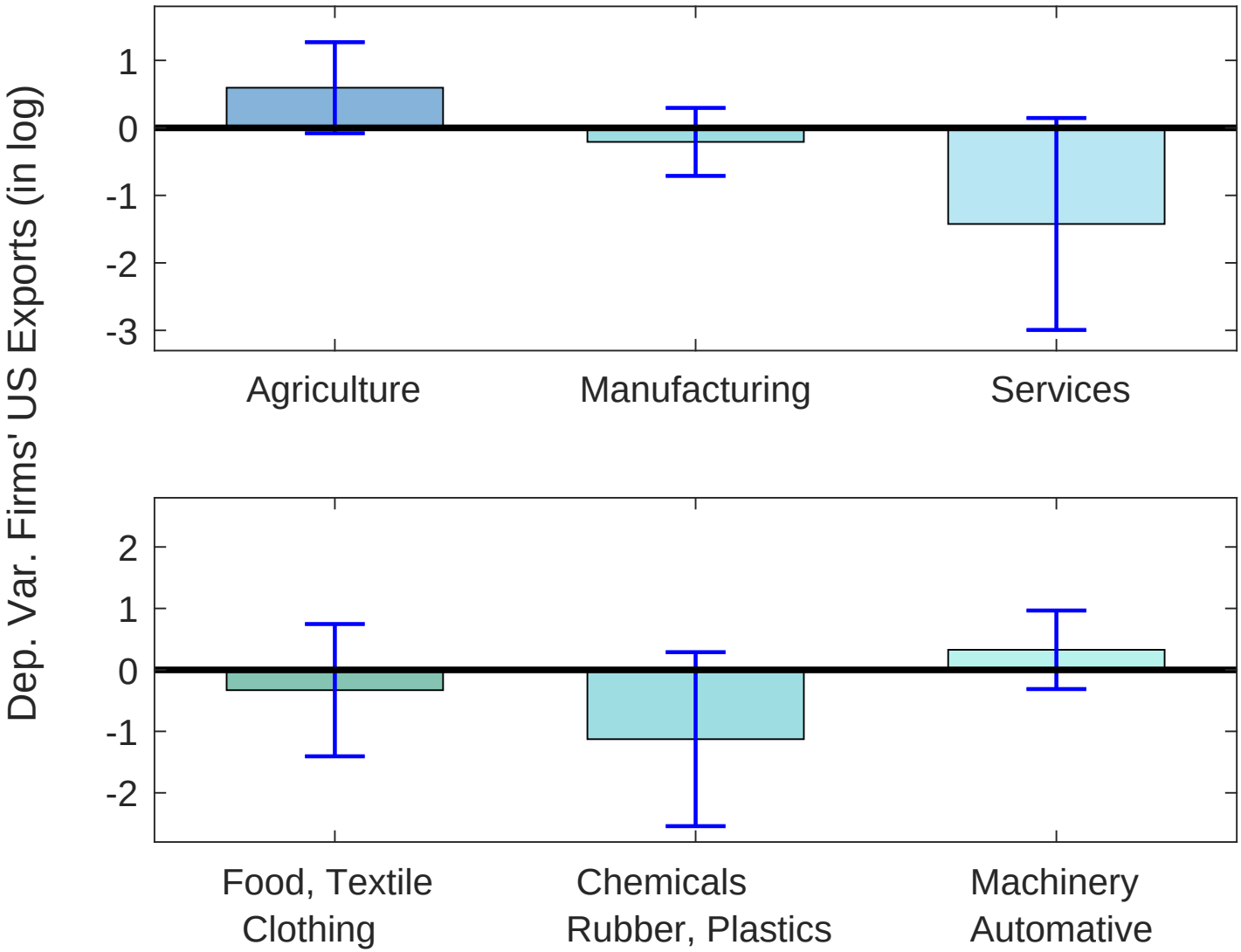
▸ Go to US Exports



Estimation separately across IMMEX companies based on their industry of operations. All regressions include firm FEs, initial-firm-size by year FEs, and the other trade exposure variables. Error bars indicate 95% confidence intervals.

Sectoral Heterogeneity–China's Retaliatory Tariffs

Back



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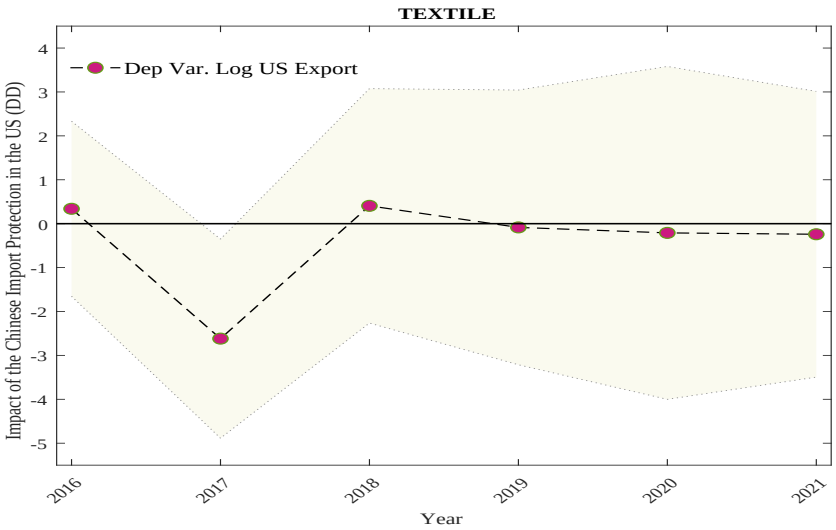
Variation across Manufacturing Industries– Firms' Export to the US



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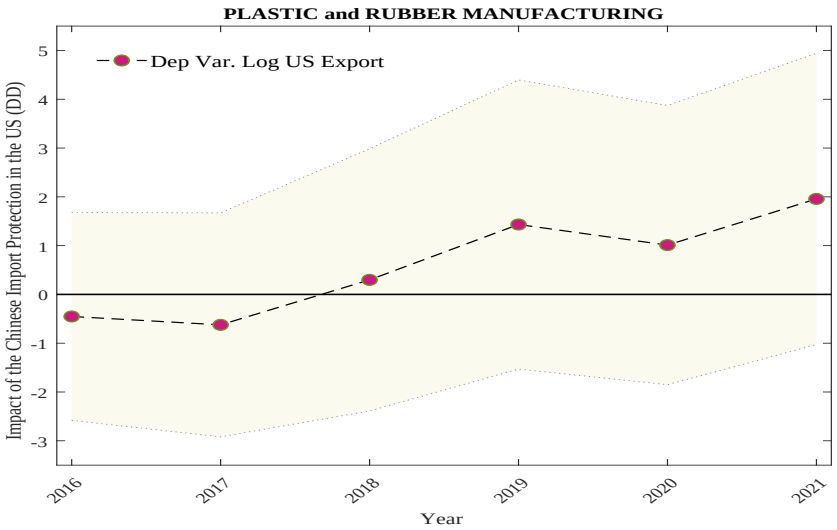
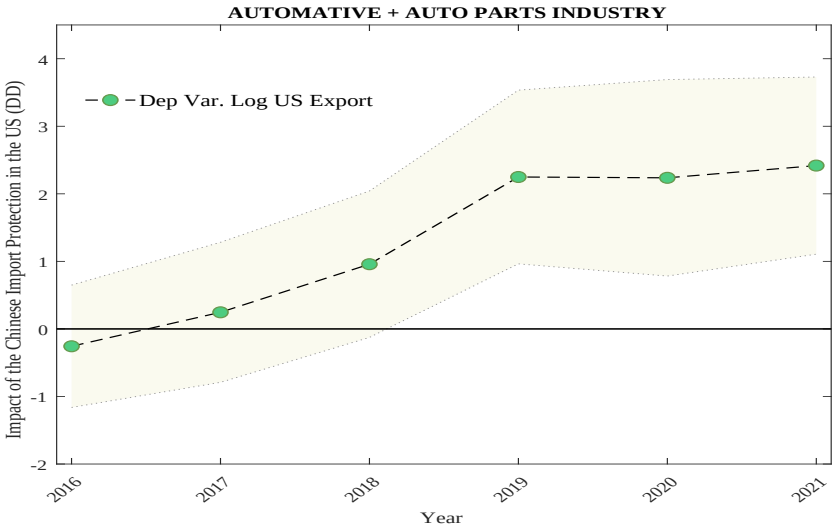
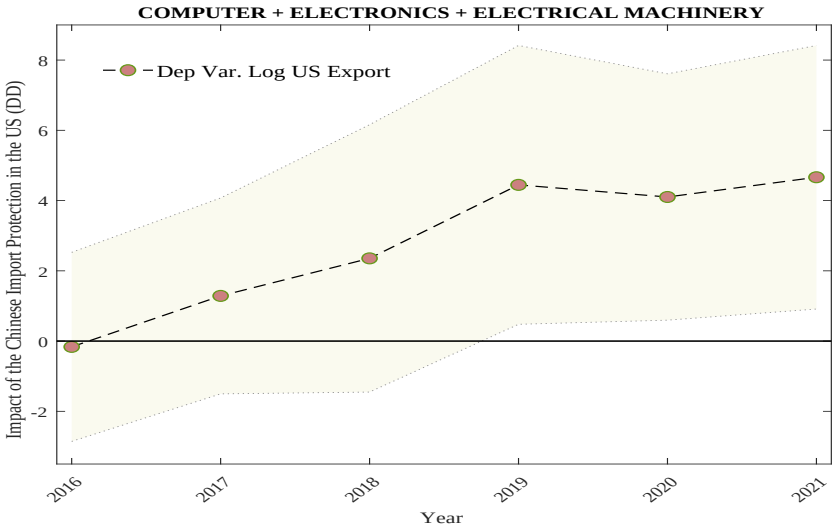


PLASTIC and RUBBER MANUF

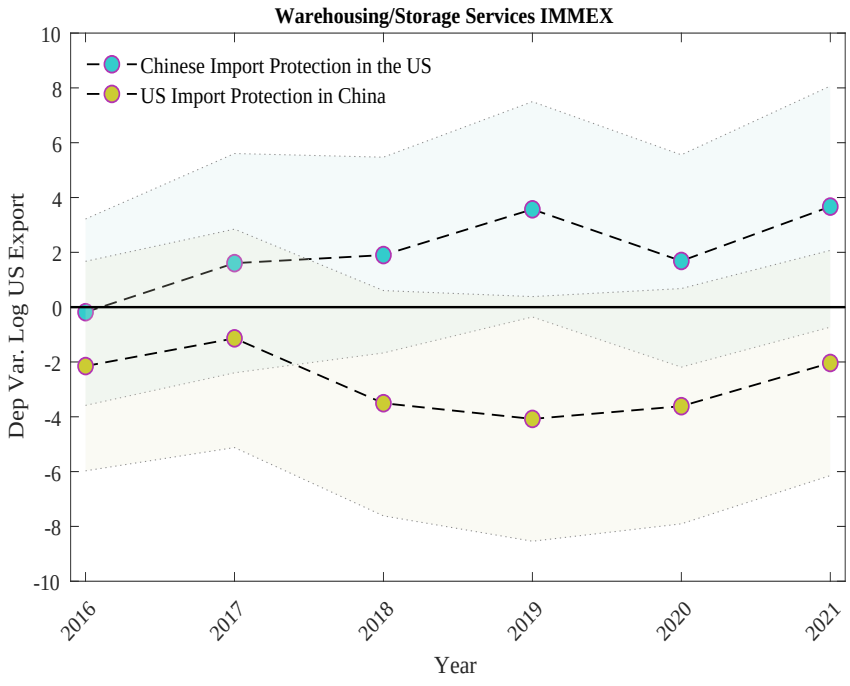


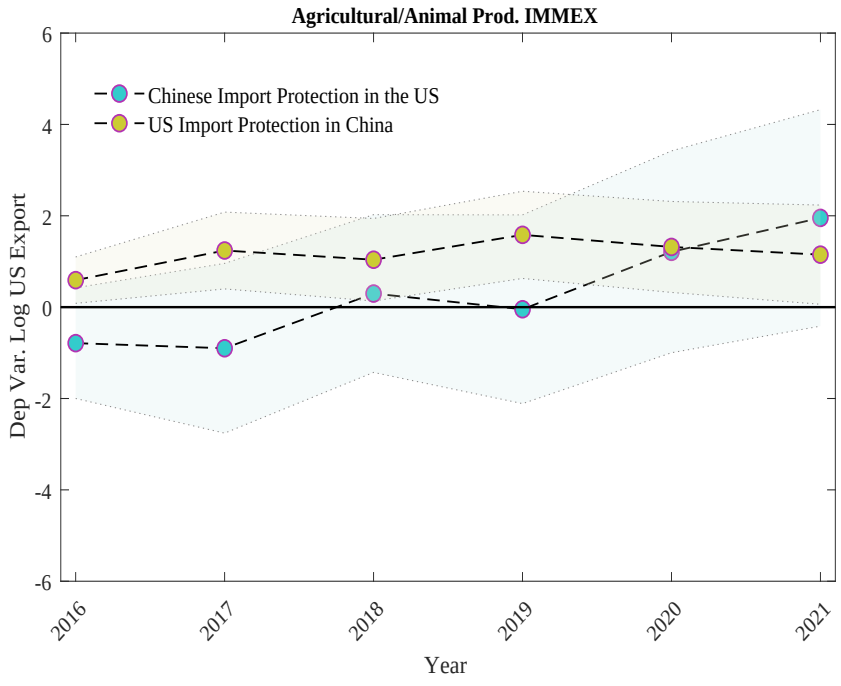
AUTOMATIVE



COMPUTER and ELECTRICAL MACH

Export to the US across Various Industries





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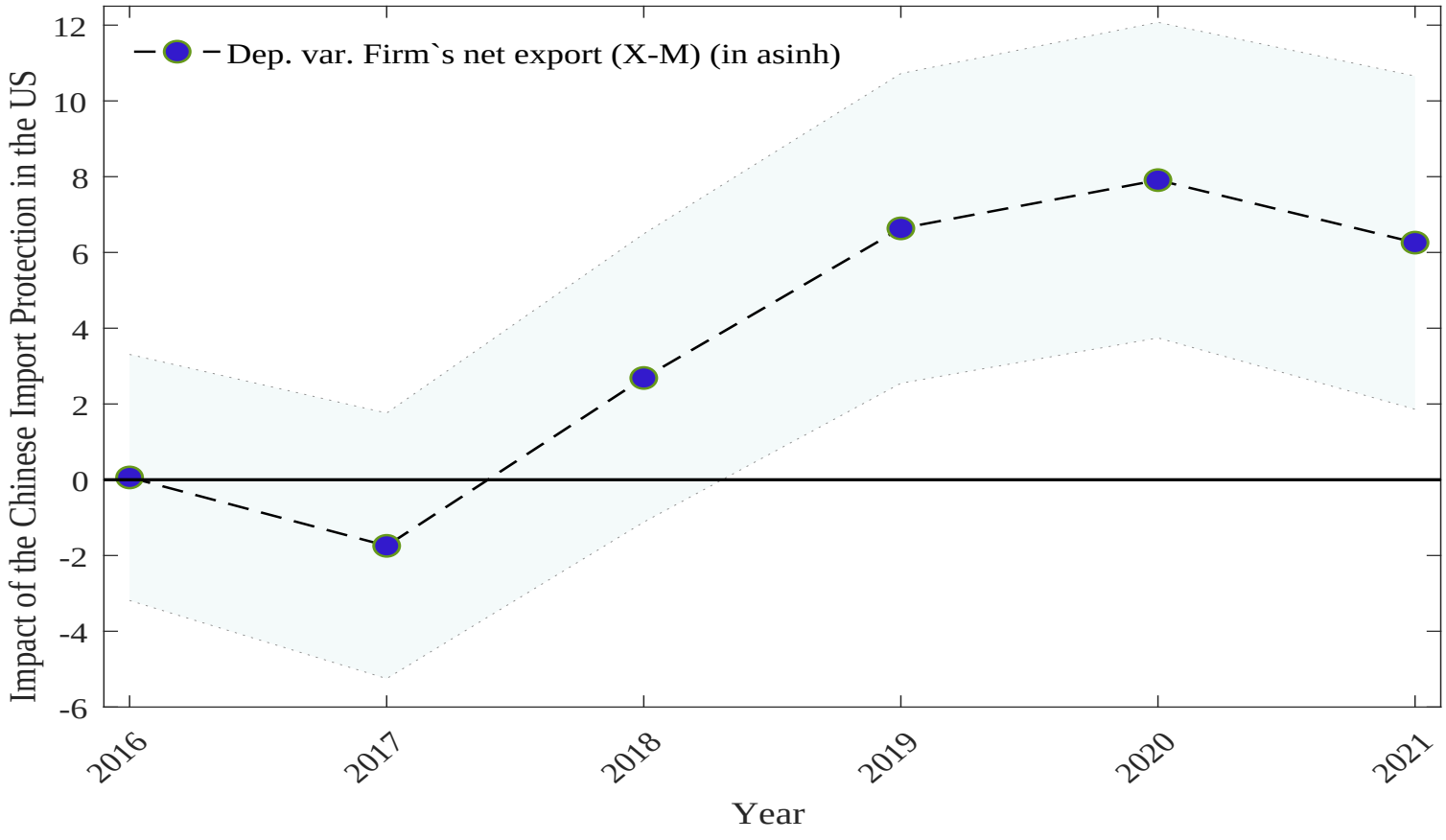
GVC firms' worldwide net export (X-M) in response to the US tariffs on China



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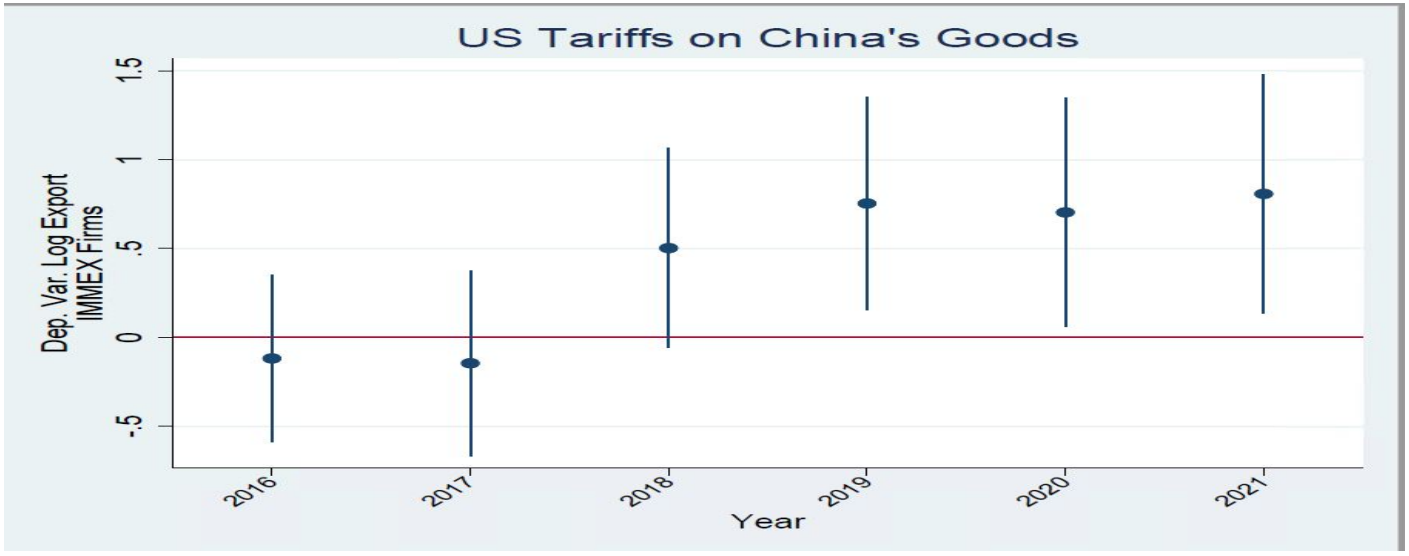
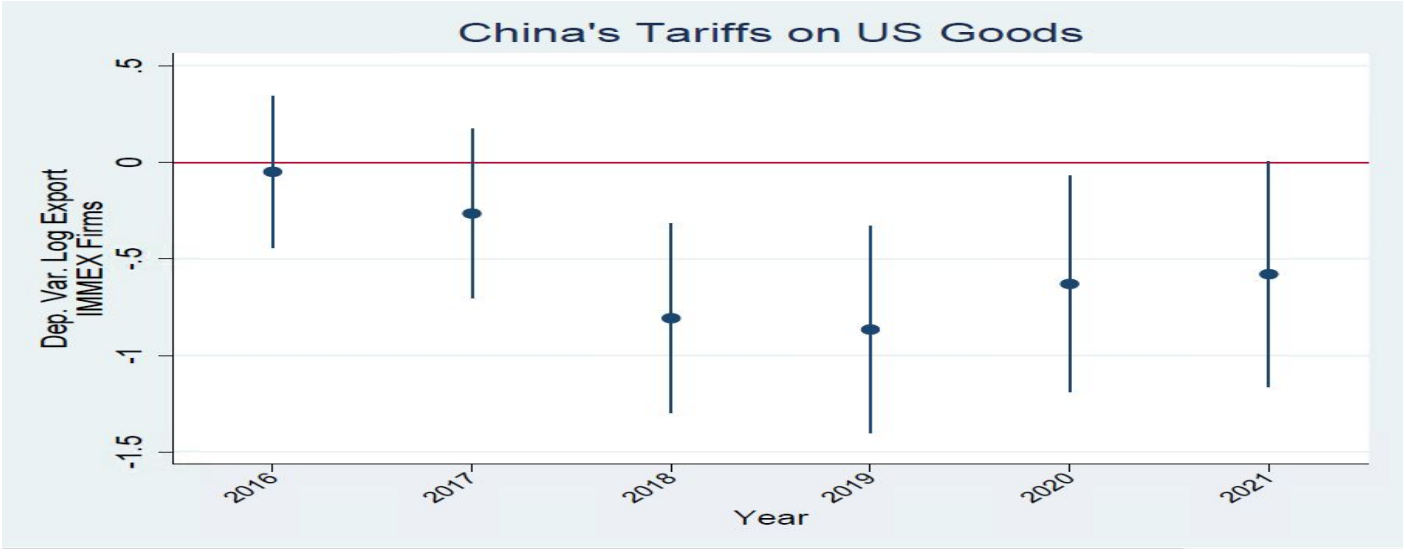
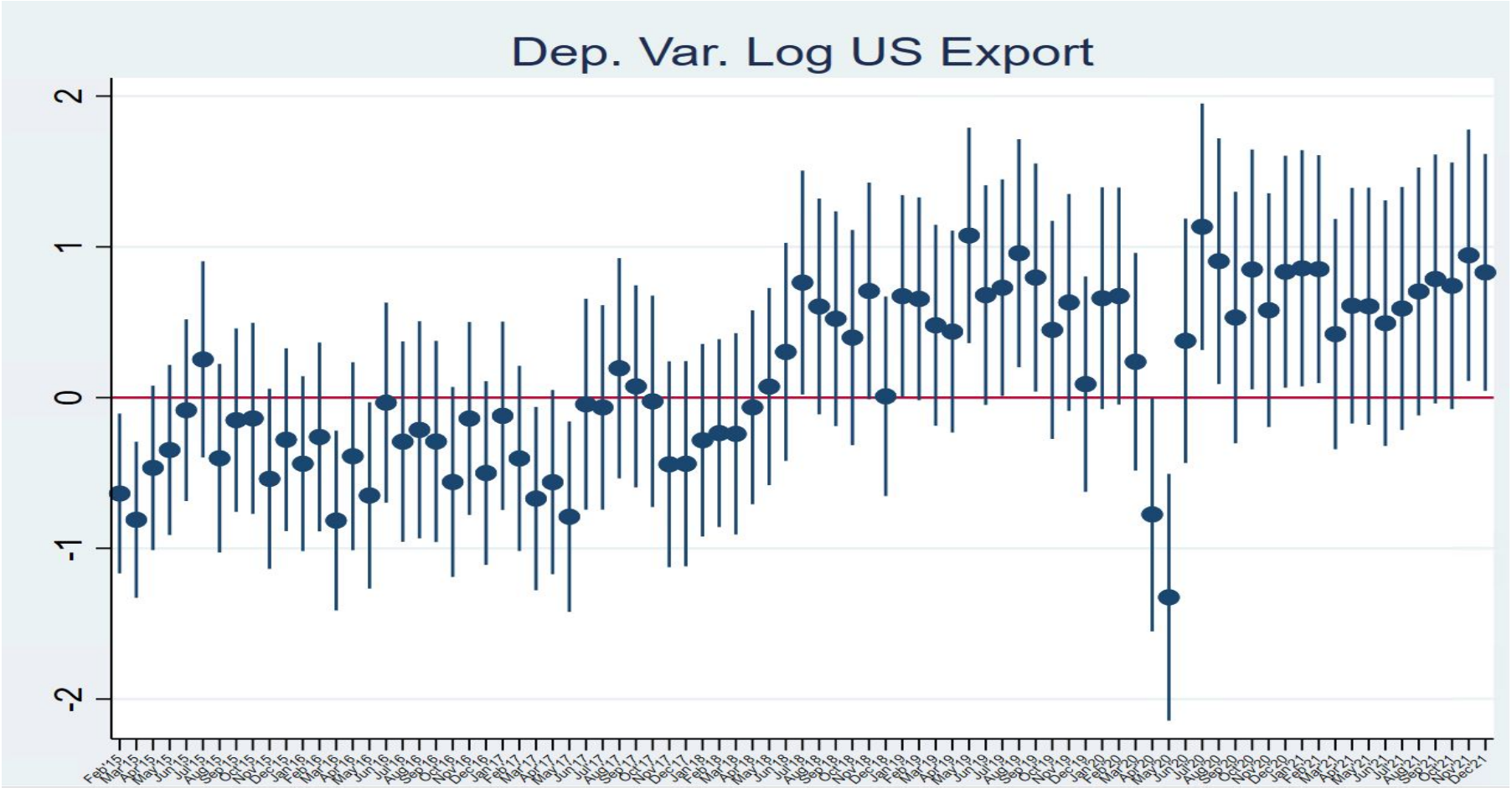
Exposures based on the US Export

IMMEX firms



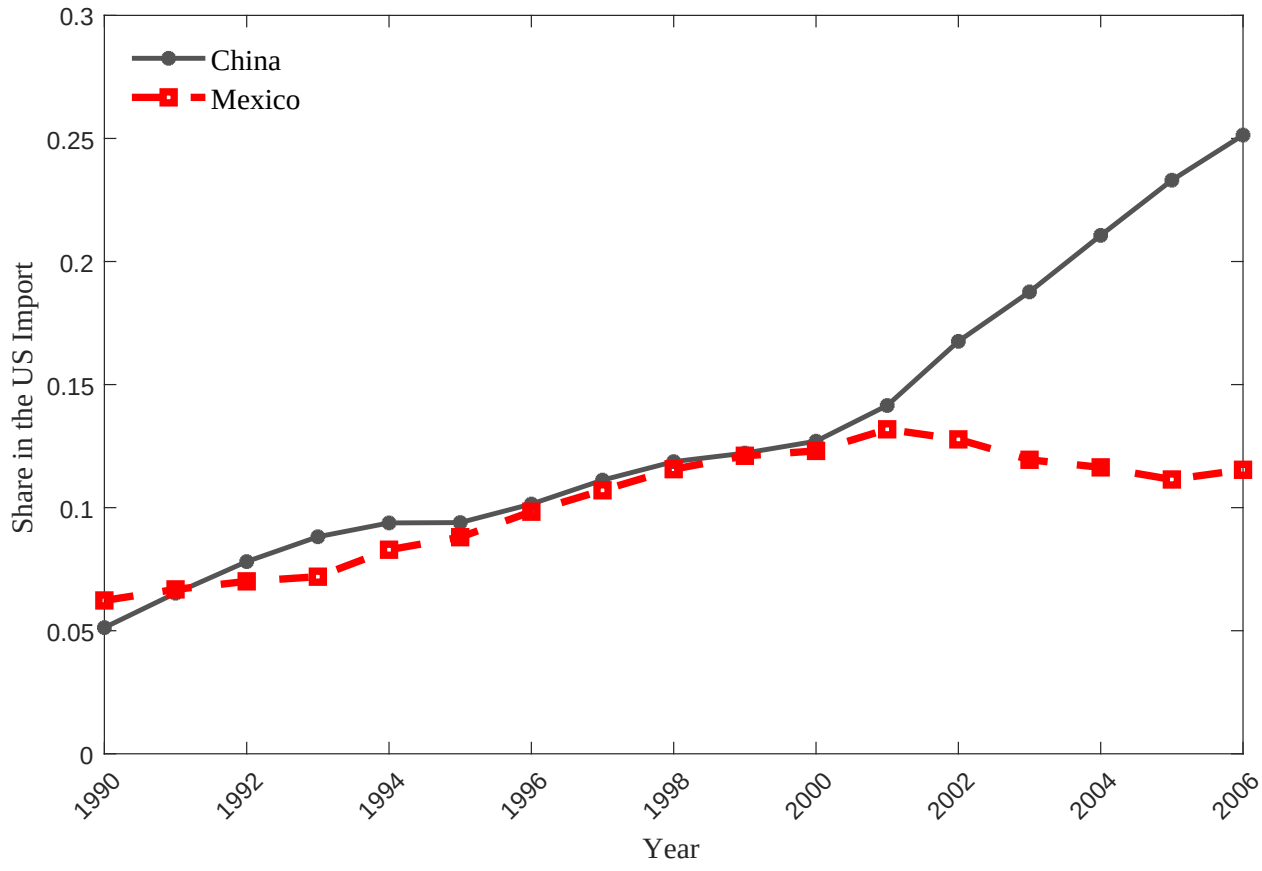


Monthly Analysis, US Import Tariffs on China



US imports of manufactured goods: China vs Mexico

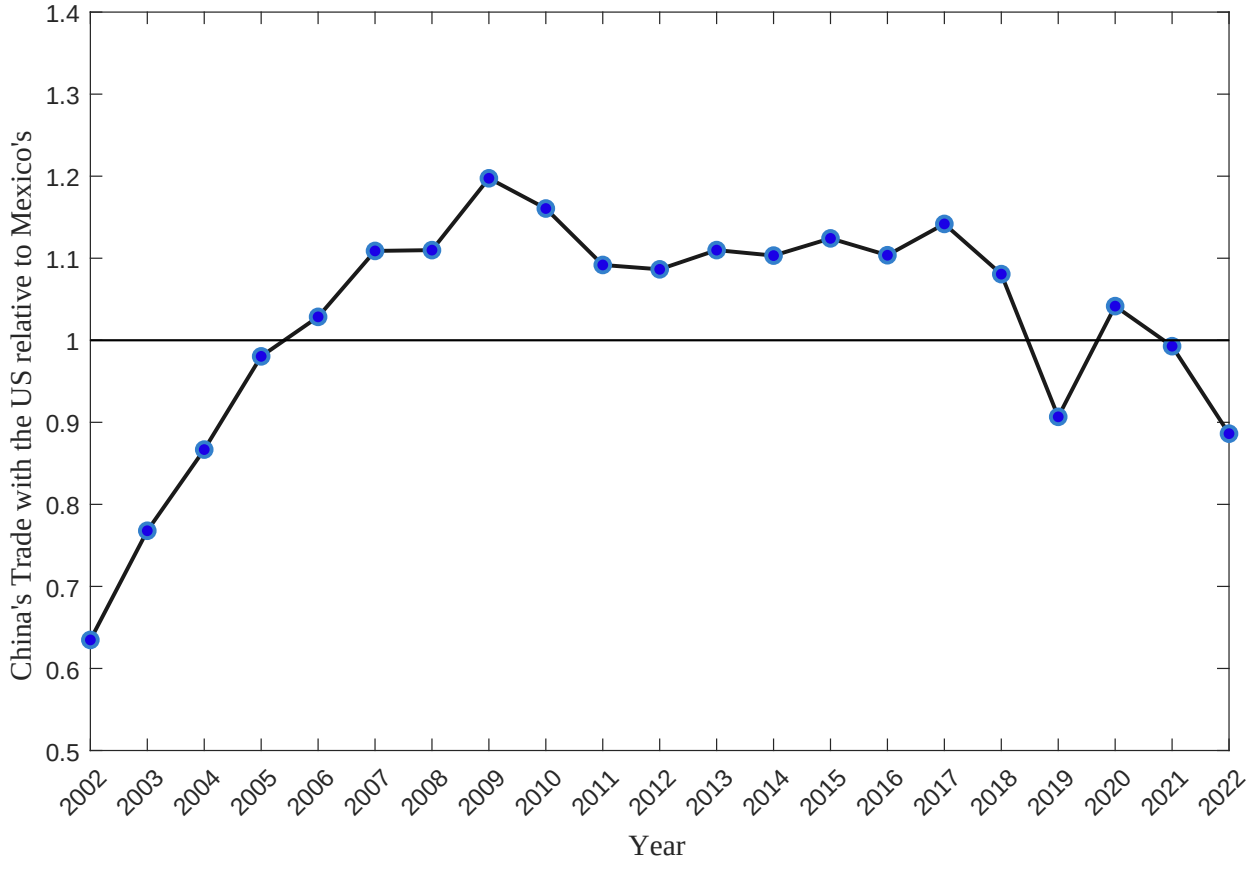
China's rise was a big negative shock for Mexico in the US



Source: Utar and Torres-Ruiz, '13

Are the tides turning in favor of Mexico?

Mexico became the #1 trade partner of the US in 2019 outpacing China



Source: USA Trade Census

Summary Statistics on Exporters in 2016

Variable	(1) Mean	(2) Median	(3) SD	(4) Min	(5) Max	(6) Obs
Panel A. All Exporters in 2016						
IMMEX Firms	0.167	0	0.373	0	1	34,911
Firms w/ Preferential Duty License	0.064	0	0.245	0	1	34,911
Export	1	1	0	1	1	34,911
Import	0.521	1	0.500	0	1	34,911
Number of Goods (HS6) Exported	2.129	1	4.422	0	114	34,911
Number of Goods (HS6) Imported	5.383	0	9.951	0	209	34,911
Log Value of Export	11.383	11.146	3.073	-2.996	23.473	34,911
Log Value of Import	13.542	13.632	2.776	-0.020	23.687	18,183
Panel B. IMMEX (GVC) Firms in 2016						
IMMEX Firms	1	1	0	1	1	5,830
Firms w/ Preferential Duty License	0.247	0	0.432	0	1	5,830
Export	1	1	0	1	1	5,830
Import	0.934	1	0.249	0	1	5,830
Number of Goods (HS6) Exported	4.894	2	8.109	0	114	5,830
Number of Goods (HS6) Imported	14.723	10	14.443	0	135	5,830
Log Value of Export	14.863	15.148	2.894	-0.020	23.344	5,830
Log Value of Import	15.004	15.274	2.685	-0.020	23.072	5,443

Notes: Values are expressed in USD.

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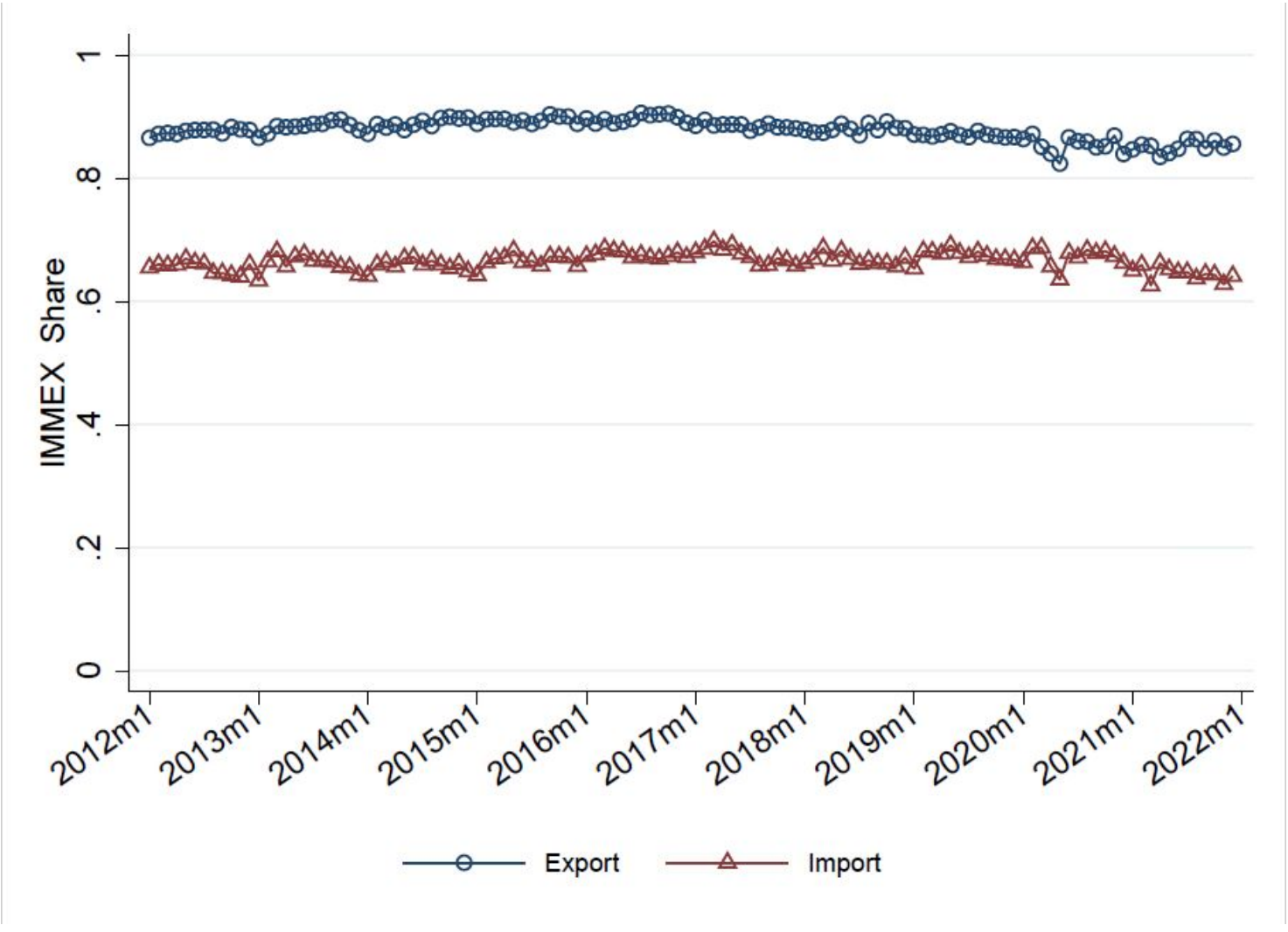
GVC Firms in Mexico



Source: Comext Database of Banco de Mexico & the Ministry of Economy

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Firm-Level Exposures to the US-China Trade War

- Exposures via US imports

  M_{ijk}^{2016}: value of import of Mexican **firm** i in **good** j to **destination** k in year 2016

Firm-Level Exposures to the US-China Trade War

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  $USIT^{CH}$: set of HS-6 products subject to the 2018/19 US import tariffs towards China

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Firm-Level Exposures to the US-China Trade War

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  $\Delta\tau_j^{USIT^{CH}}$: change in the US tariff rate for good j imported from China in percentage points (latest announced tariff)

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- $$\mathbf{TIM_i^{US-CH}} = \frac{\sum_{j \in USIT^{CH}} \sum_k M_{ij}^{2016,US} \times \Delta\tau_j^{USIT^{CH}}}{\sum_j \sum_k M_{ijk}^{2016}}$$

Firm-Level Exposures to the US-China Trade War

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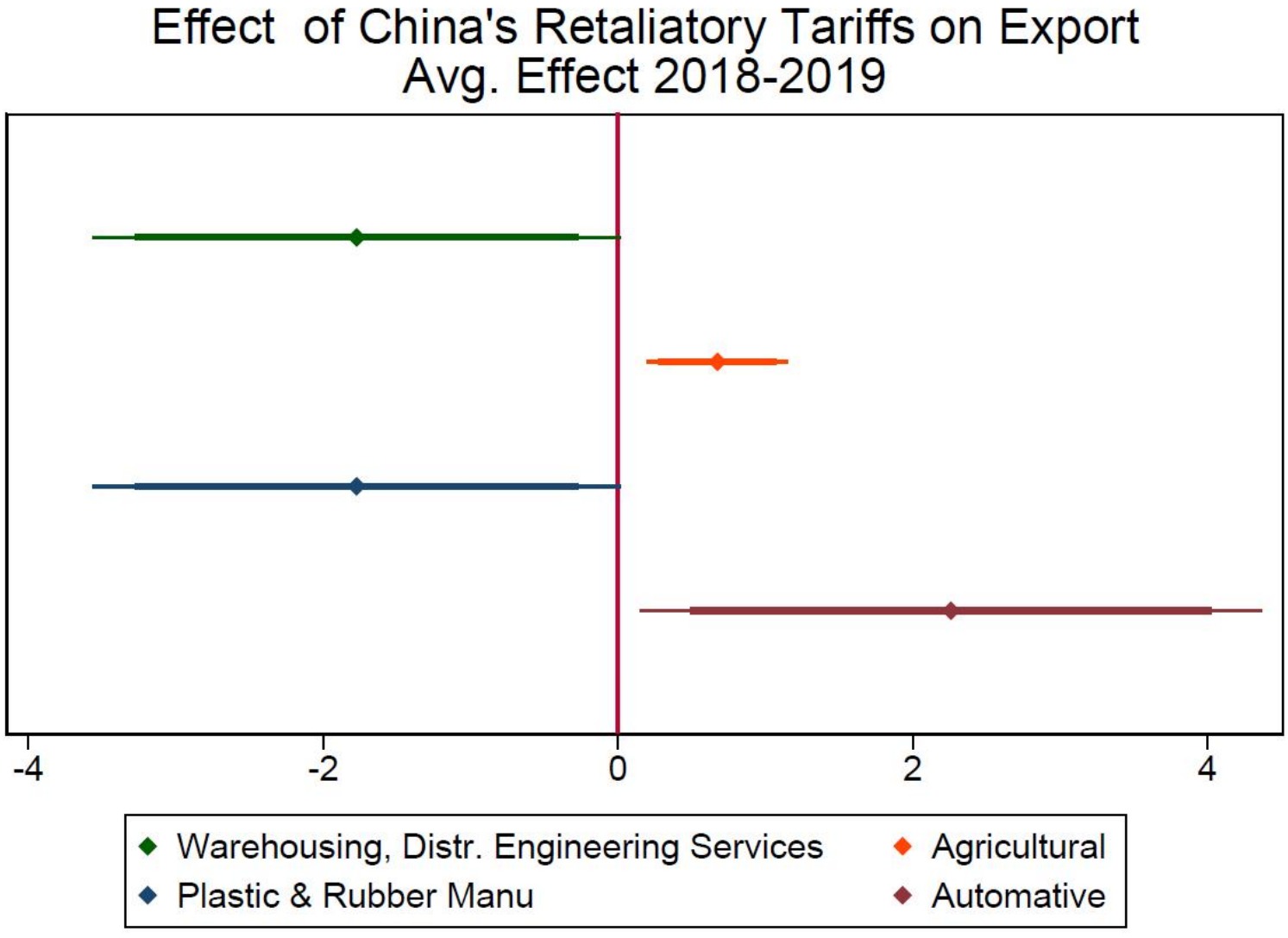
- $$\mathbf{TIX_i^{CH-US}} = \frac{\sum_{i \in USRT^{CH}} \sum_k M_{ij}^{2016,US} \times \Delta\tau_j^{USRT^{CH}}}{\sum_i \sum_k M_{ijk}^{2016}}$$

▸ more

Heterogeneity in Responding China's Retaliatory Tariffs

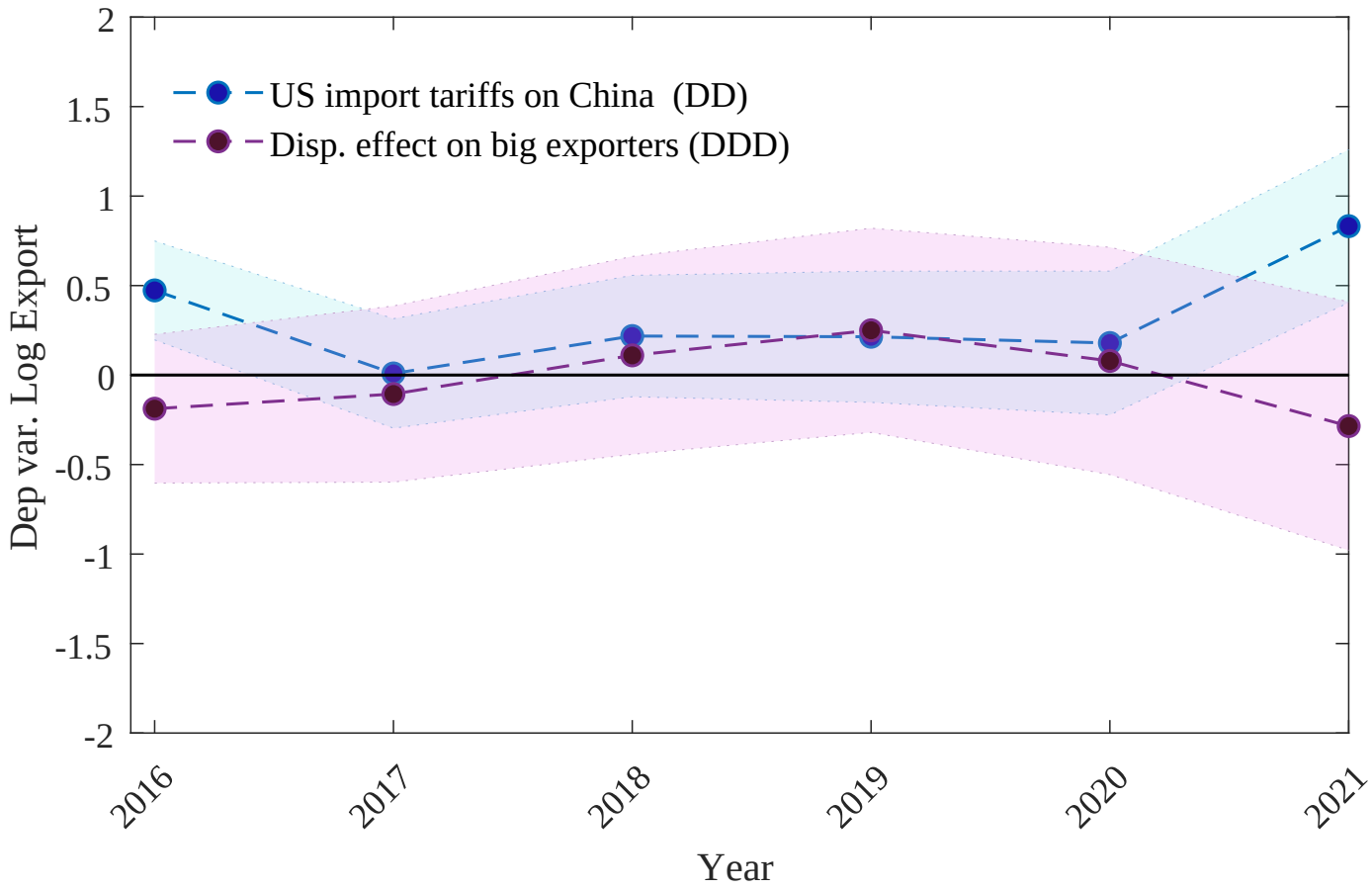


Back

IMMEX Firms versus Big Exporters (>=p75)

Back

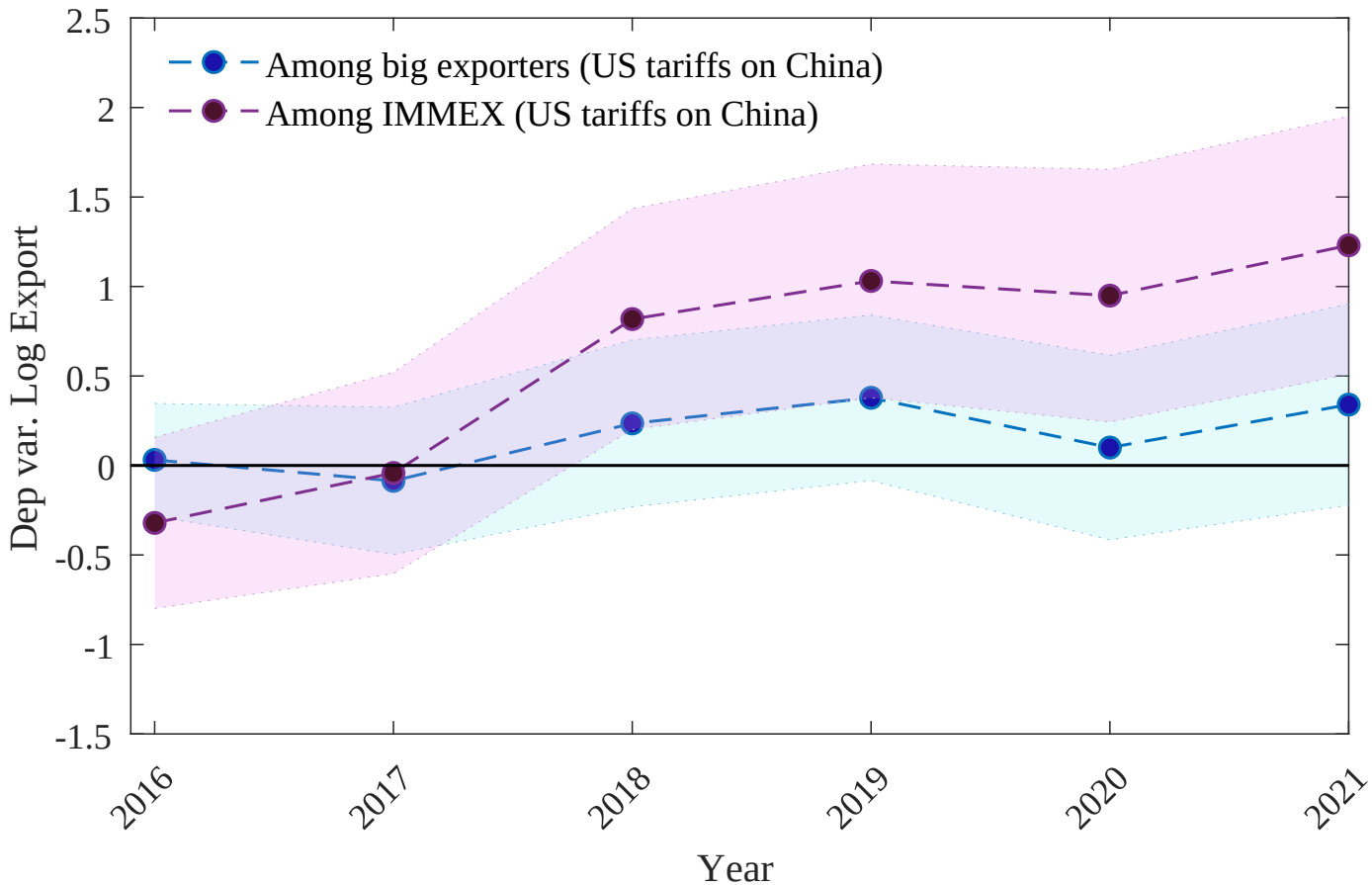
- Bigger exporters (top quartile) are not significantly differ from others in responding US tariffs



All regressions include firm FEs, size-specific, and sector-specific time FEs as well as China's retaliatory tariffs and the US-MEX tariff escalation exposures. N= 37,313. The shaded area indicate the confidence interval at the 95% level. The

IMMEX Firms versus Big Exporters (>=p75)

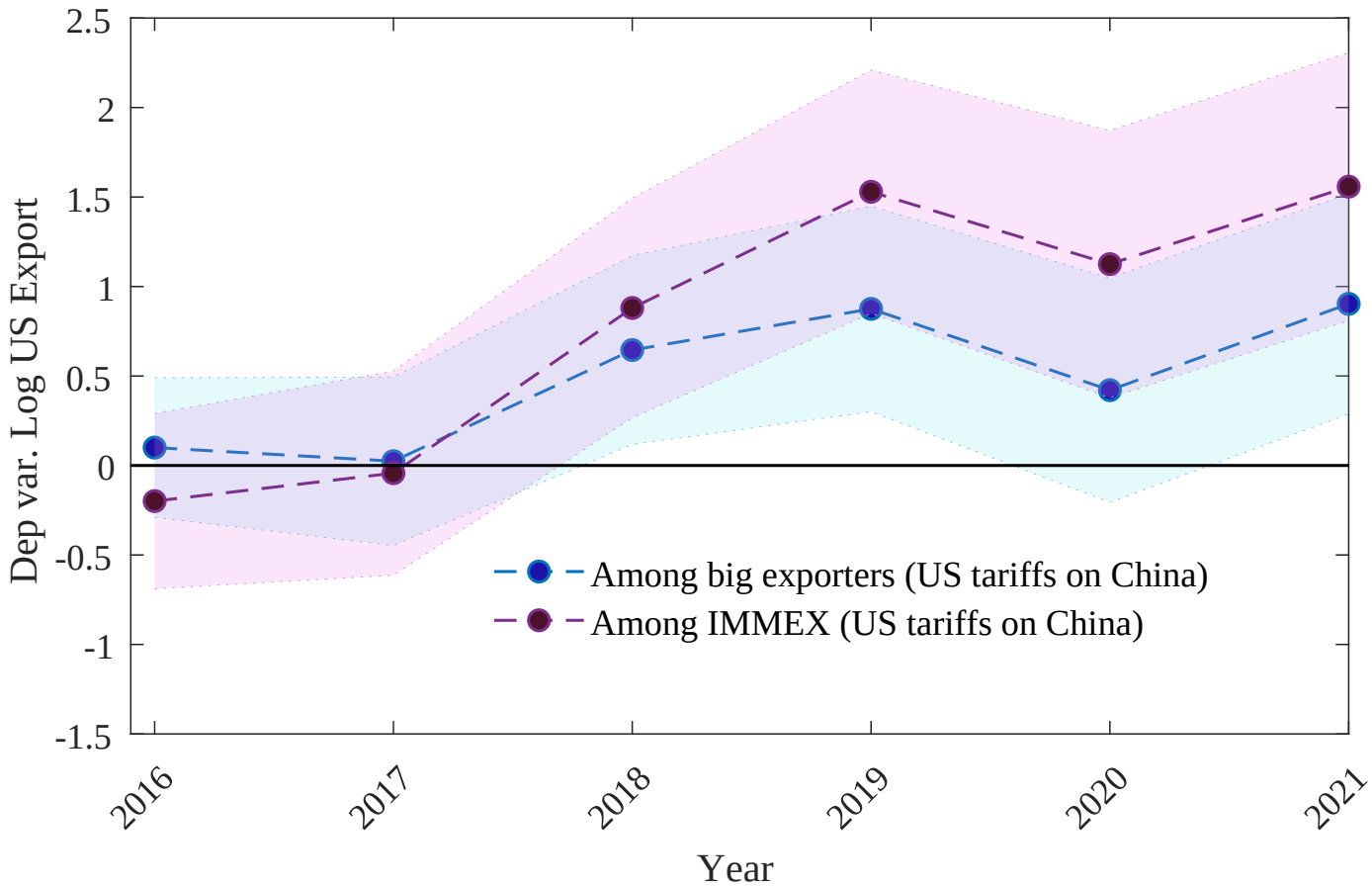
- $\sim$ 6,000 the biggest exporters versus $\sim$ 6,000 IMMEX firms
- Dep var. Total Exports Back



All regressions include firm FEs, size-specific, and sector-specific time FEs as well as other trade policy exposures. N= 37,313 (immex) and 39,285 (big). The shaded area indicate the confidence interval at the 95% level. The right axis shows

IMMEX Firms versus Big Exporters (>=p75)

- $\sim$ 6,000 the biggest exporters versus $\sim$ 6,000 IMMEX firms
- Dep var. US Exports Back

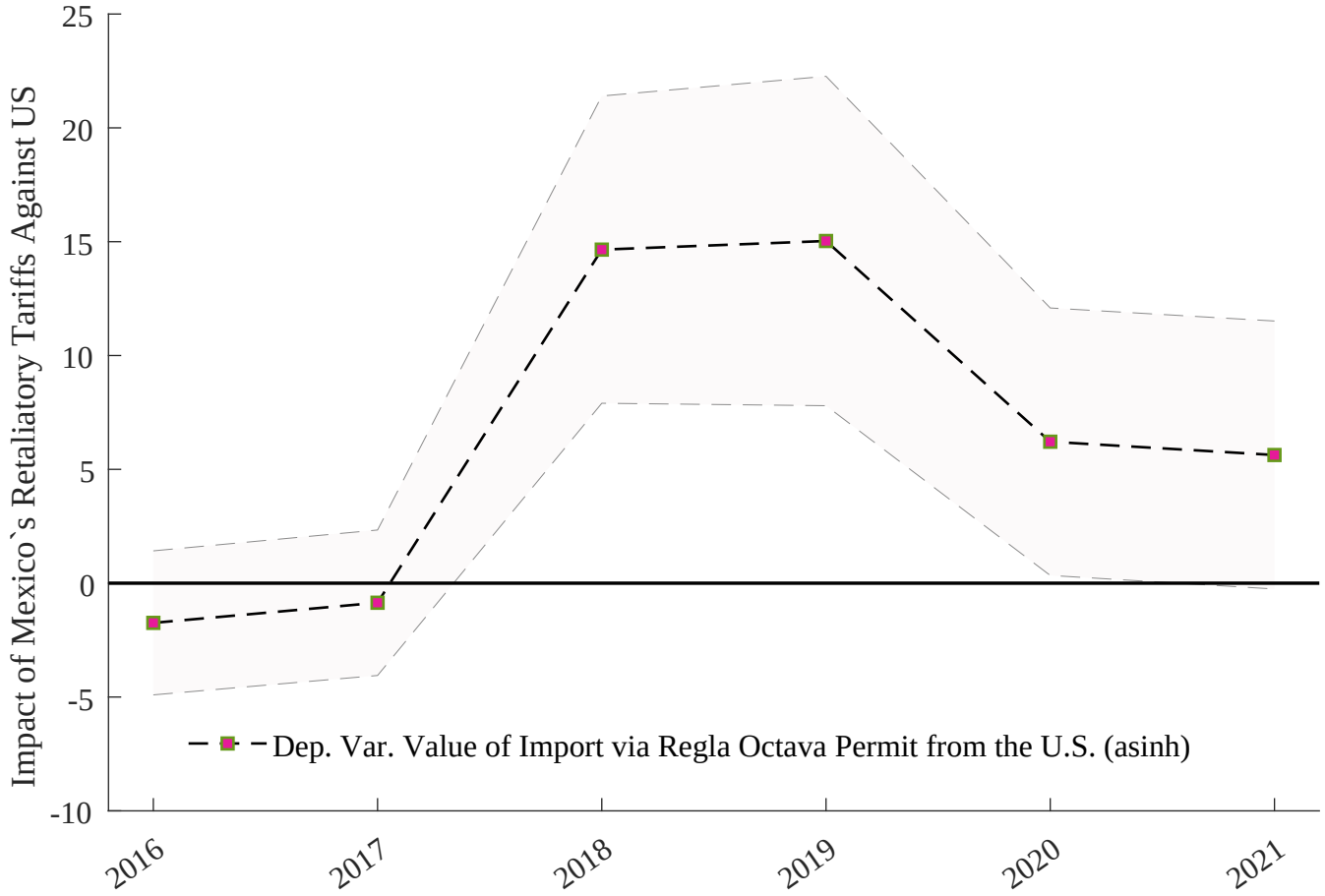


All regressions include firm FEs, size-specific, and sector-specific time FEs as well as other trade policy exposures. N= 37,313 (immex) and 39,285 (big). The shaded area indicate the confidence interval at the 95% level. The right axis shows

Impact of Mexico's Retaliatory Tariffs on GVC Firms' Preferential Import from the US

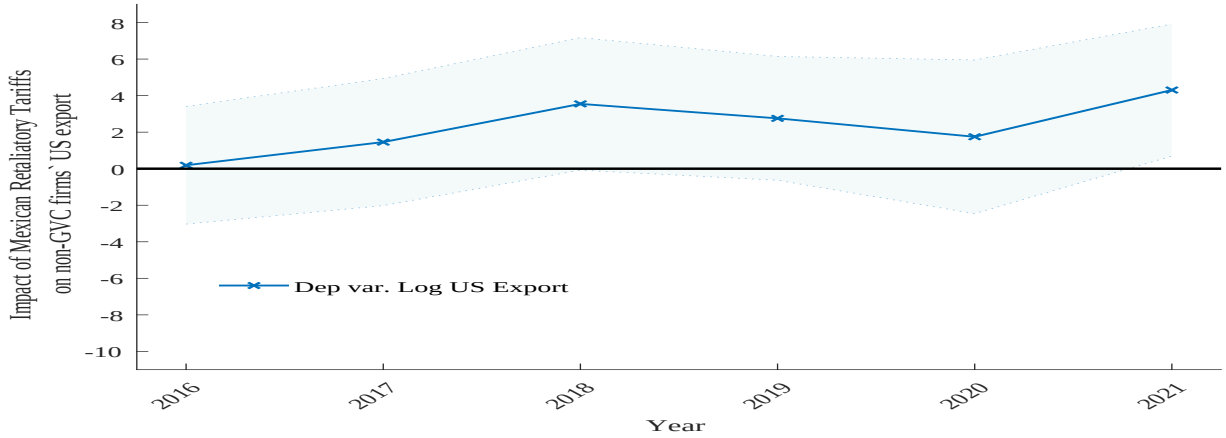
GVC firms continue to import targeted US goods (by Mex government) using firm-specific permits.

▸ Back

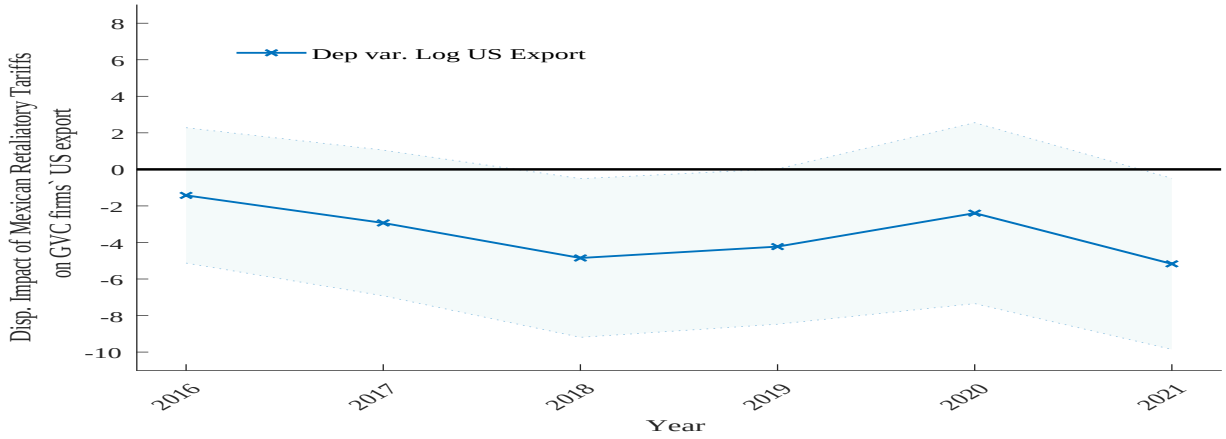


Notes: All regressions include firm FEs, size-specific, and sector-specific time FEs as well as other trade policy exposures.

Mexico's Retaliatory Tariffs and Firms US Exports



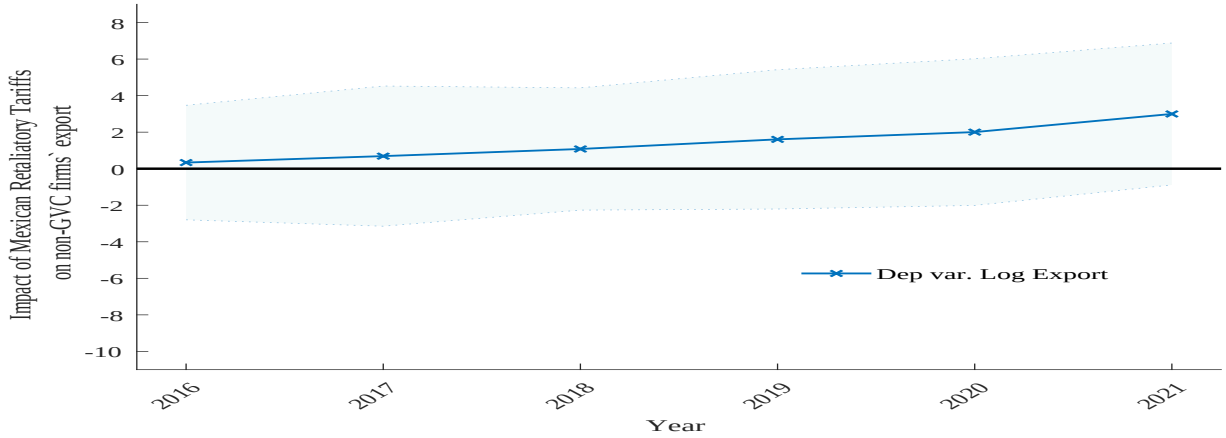
Impact of US tariffs on Mexico



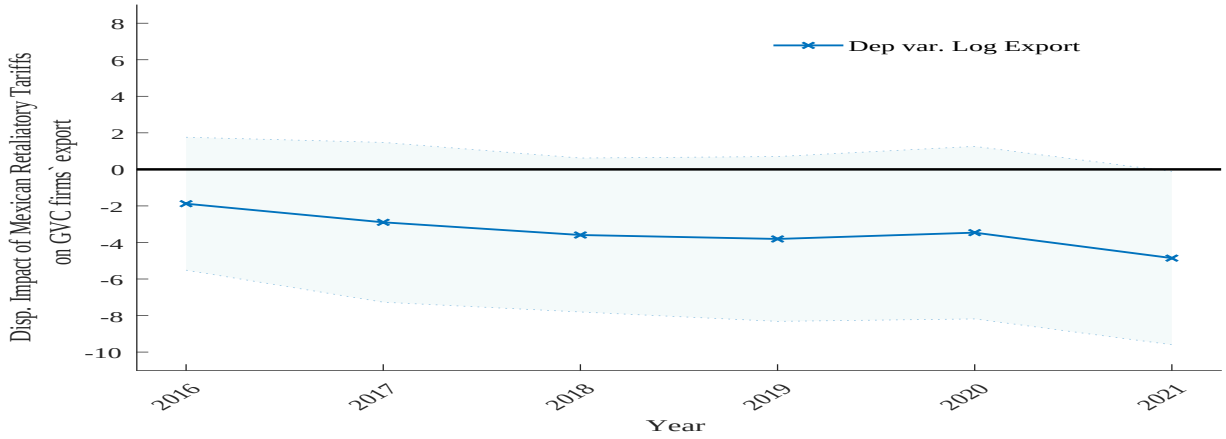
Disp. effect on GVC firms (IMMEX)

Notes: N=123,698 (log US export). The shaded area indicate the confidence interval at the 95% level. All regressions include firm, size-specific, and IMMEX-specific time fixed effects and other trade policy controls. The right axis shows the coefficient values of the respective DD or DDD coefficients.

Mexico's Retaliatory Tariffs and Firms Total Exports



Impact of US tariffs on Mexico



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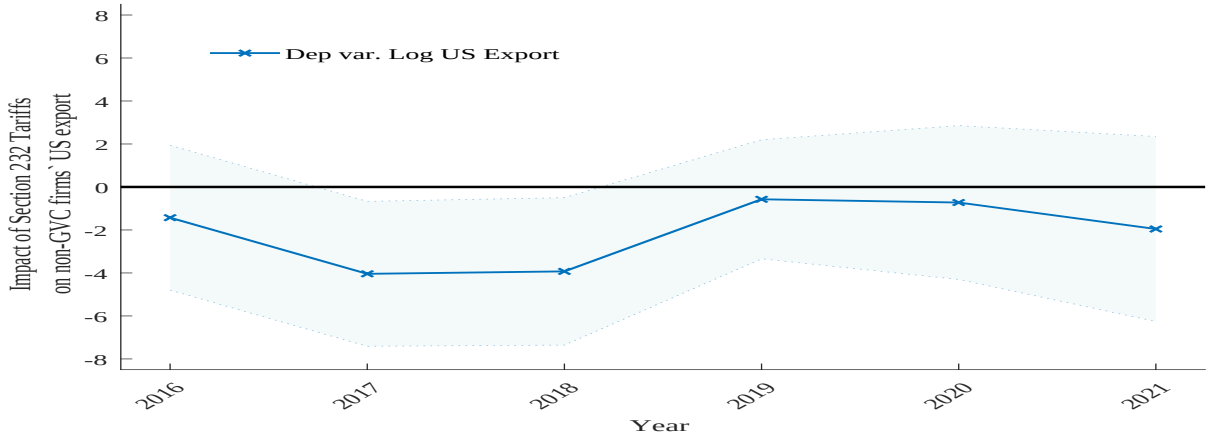
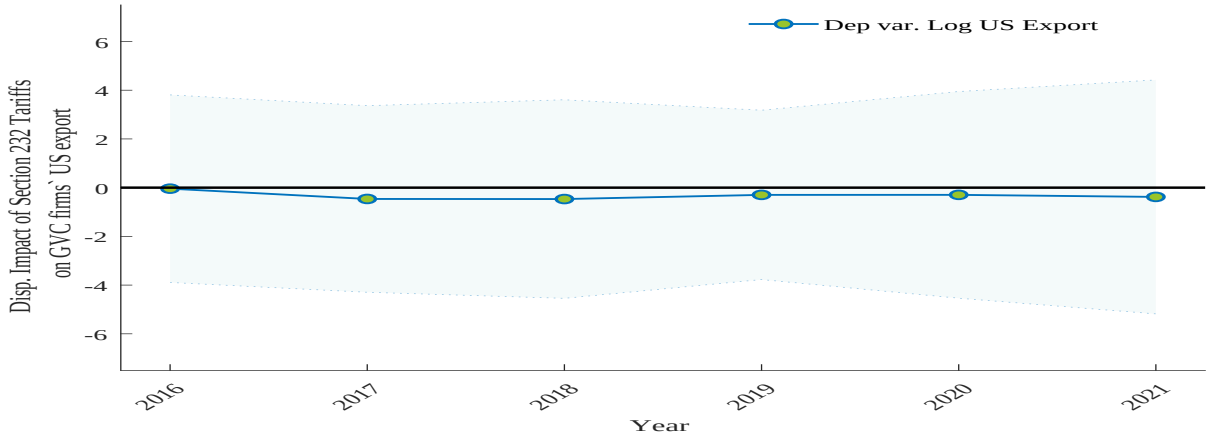
Section 232 Tariffs on Mexico and Firms' US Exports



Impact of US tariffs on Mexico



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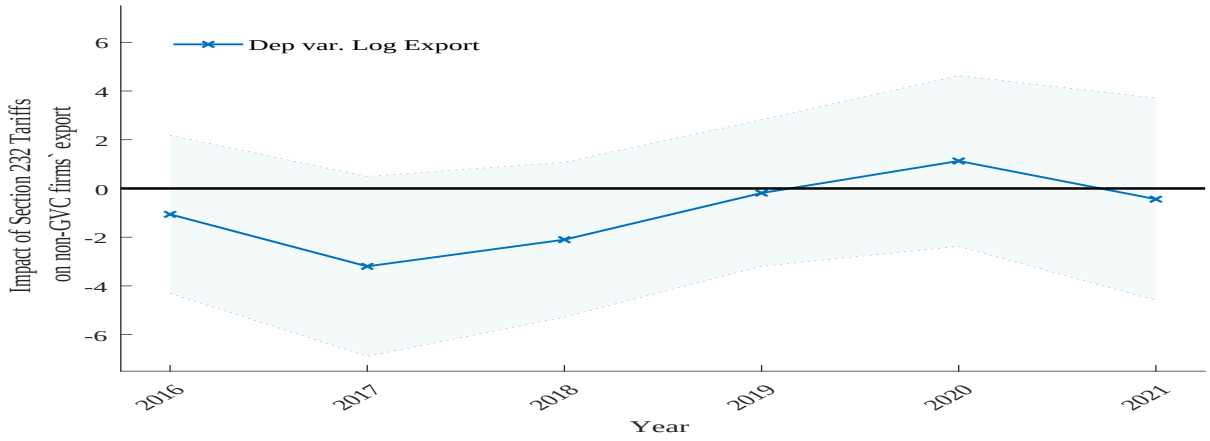
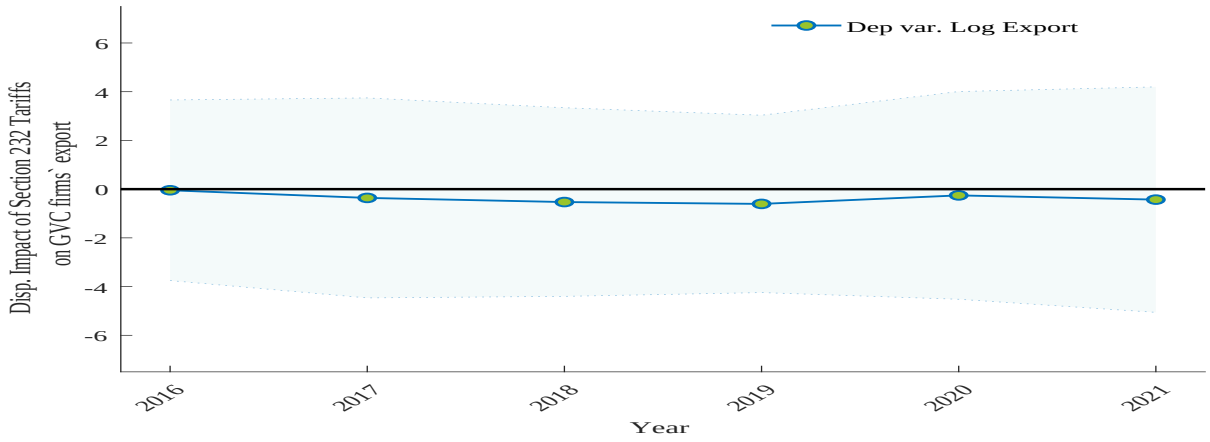
▸ Export

Section 232 Tariffs on Mexico and Firms' Total Exports



Impact of US tariffs on Mexico



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Export