

Global Reallocations from the US-China Trade War

Amit Khandelwal

Yale

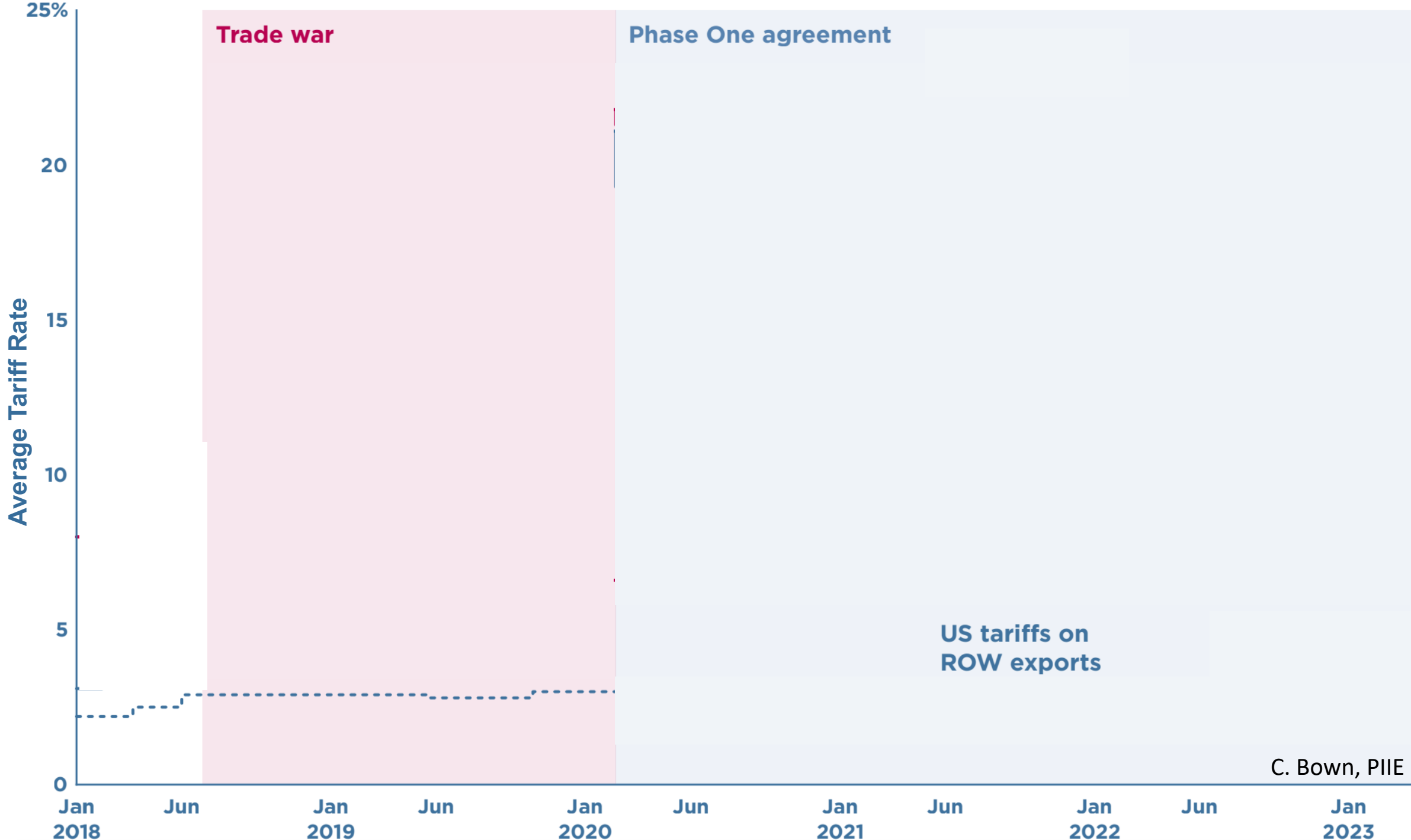
May 2023

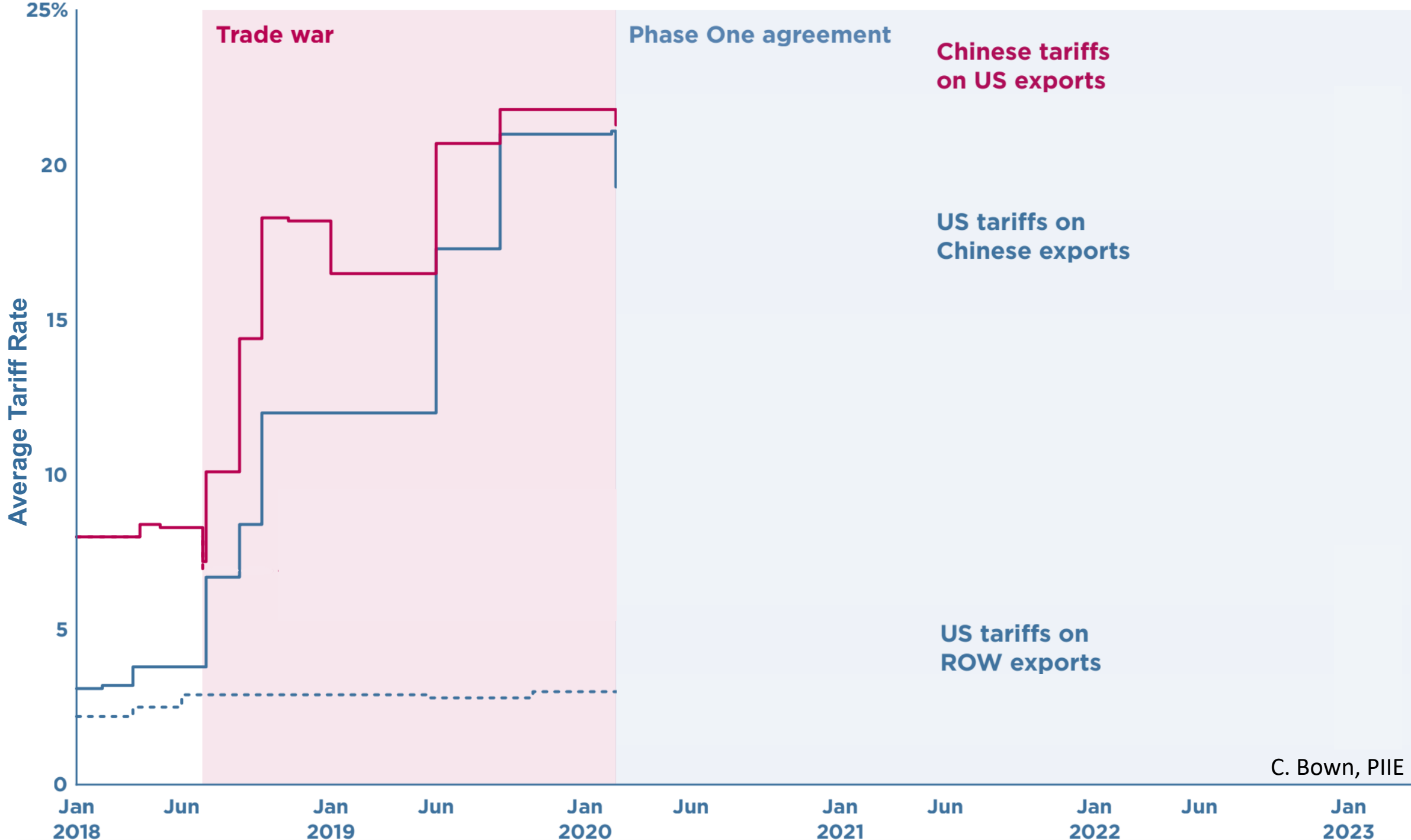
A 21st Century Trade War

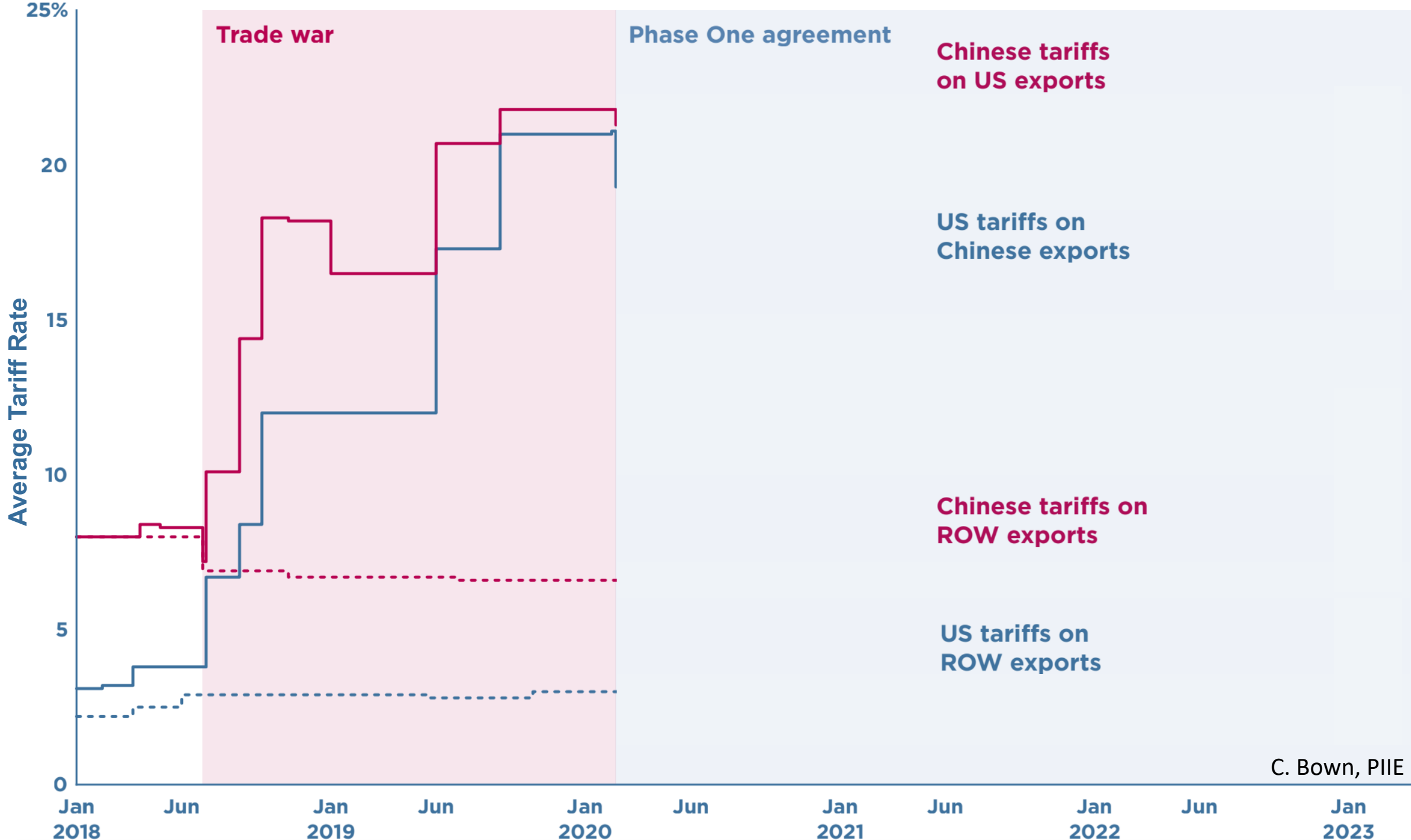
- In 2018-19, US and China collectively raised tariffs on about \$450b trade
 - US targeted 18% of imports (~2.5% of GDP)
 - China targeted 11% of imports (~3.6% of GDP)
 - 1930 Smoot-Hawley raised tariffs on ~1.4% of GDP Irwin
- Despite 2020 agreement, tariffs remain elevated
 - Magnified with US export controls on “national security” products
 - Compounded by a general deterioration in US-China political relationship
- What are the economic impacts? What have we learned so far?
 - ...on US and China?
 - ...on “bystander” countries?

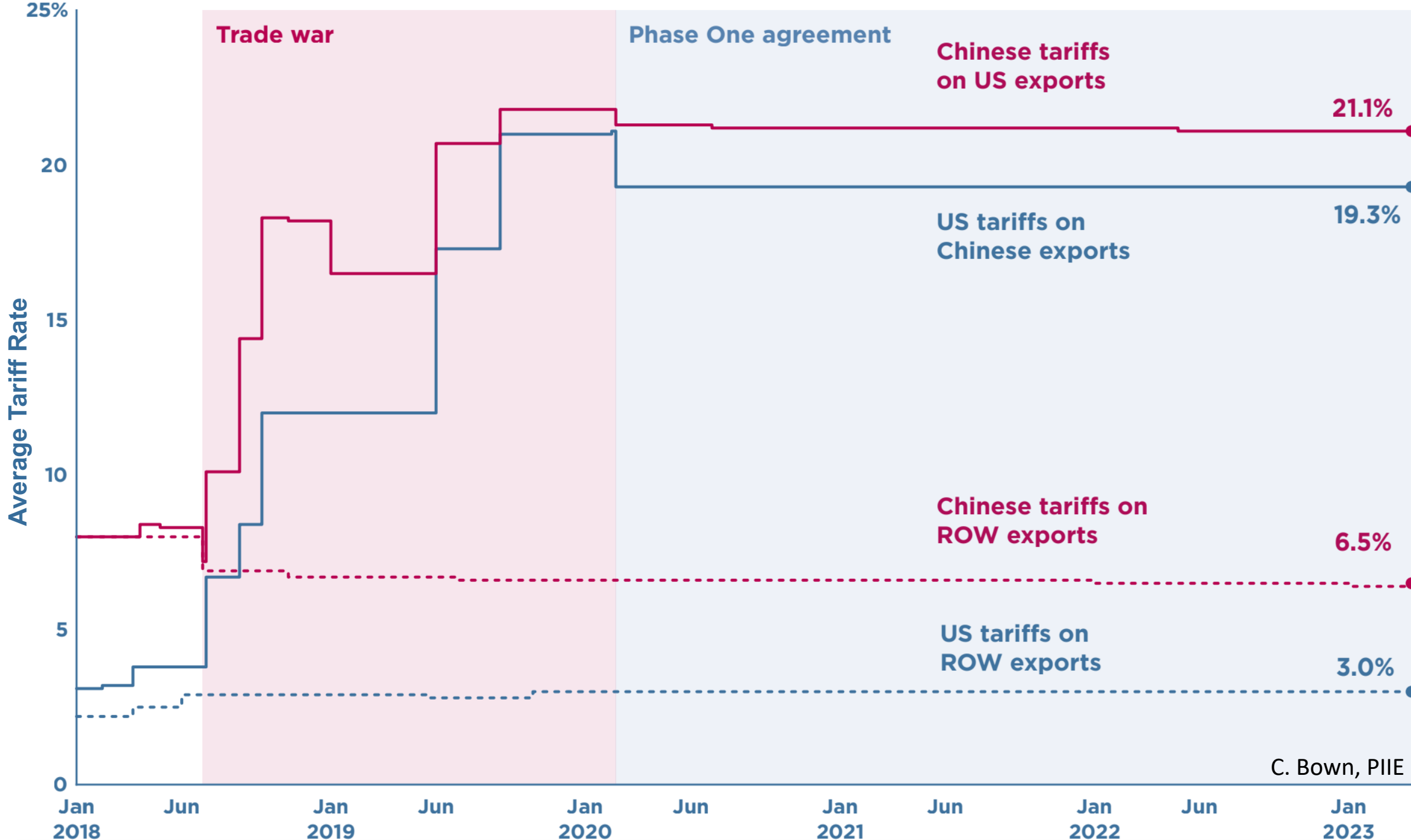
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 - ...on US and China? Fajgelbaum et al 20, Fajgelbaum & Khandelwal 22
 - ...on “bystander” countries? Fajgelbaum et al 22









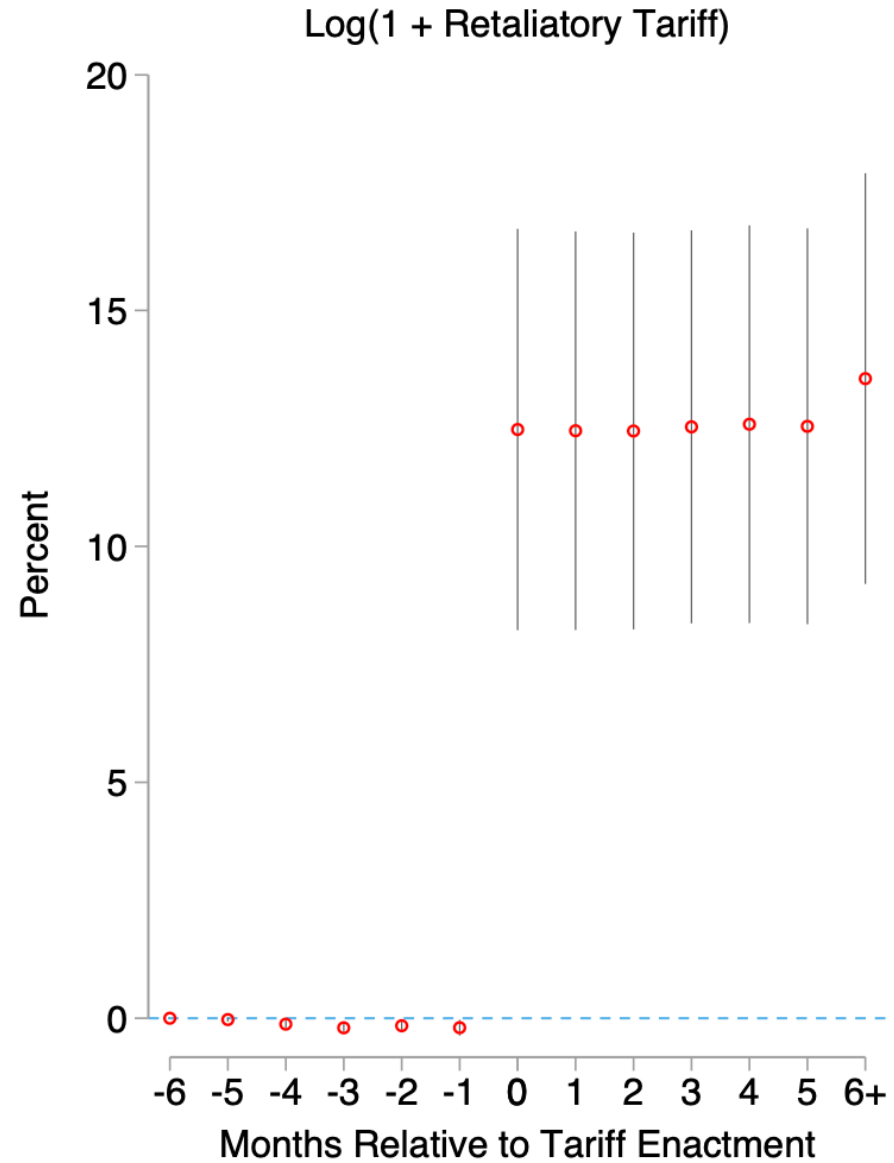
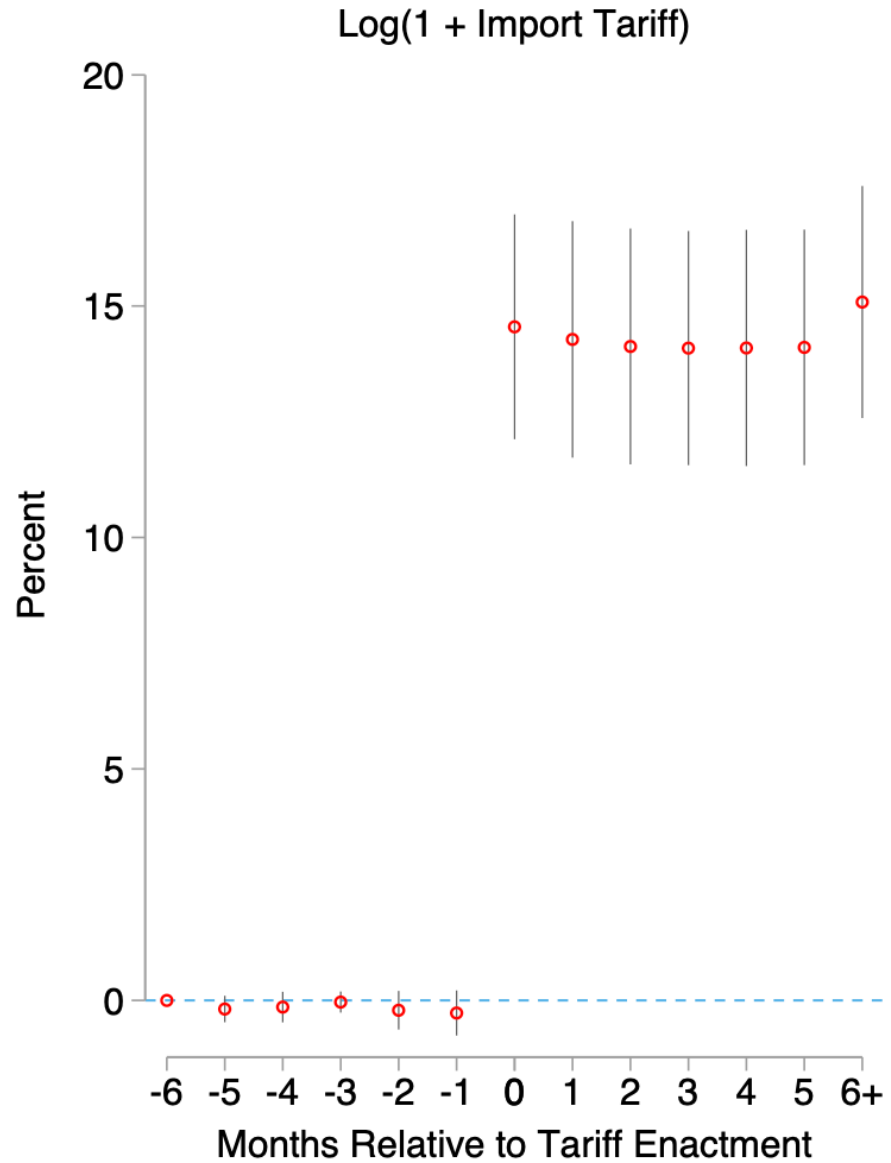
Visualizing Impacts

- What happened to trade?
 - US import and export data, by origin and month
 - Match tariff rates to product codes
 - variety = origin-product pair

- Event study

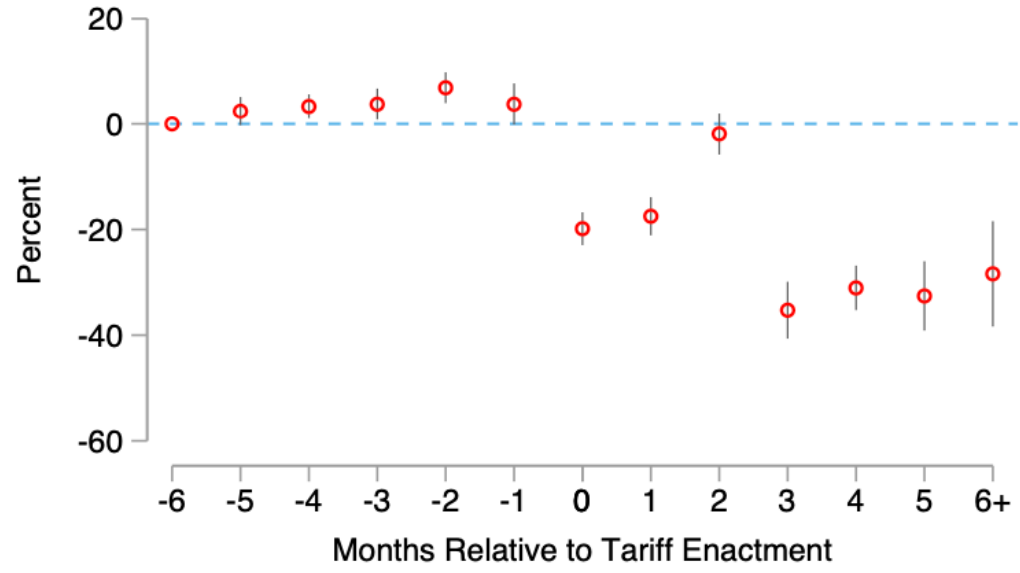
$$\ln y_{igt} = \alpha_{ig} + \alpha_{gt} + \alpha_{it} + \sum_j \beta_{0j} I(event_{igt} = j) + \sum_j \beta_{1j} I(event_{igt} = j) \times target_{ig} + \epsilon_{igt}$$

- **i** origin, **g** product, **t** month
- target: dummy if variety is targeted
- import values, quantities, unit values (before- and after-tariff)

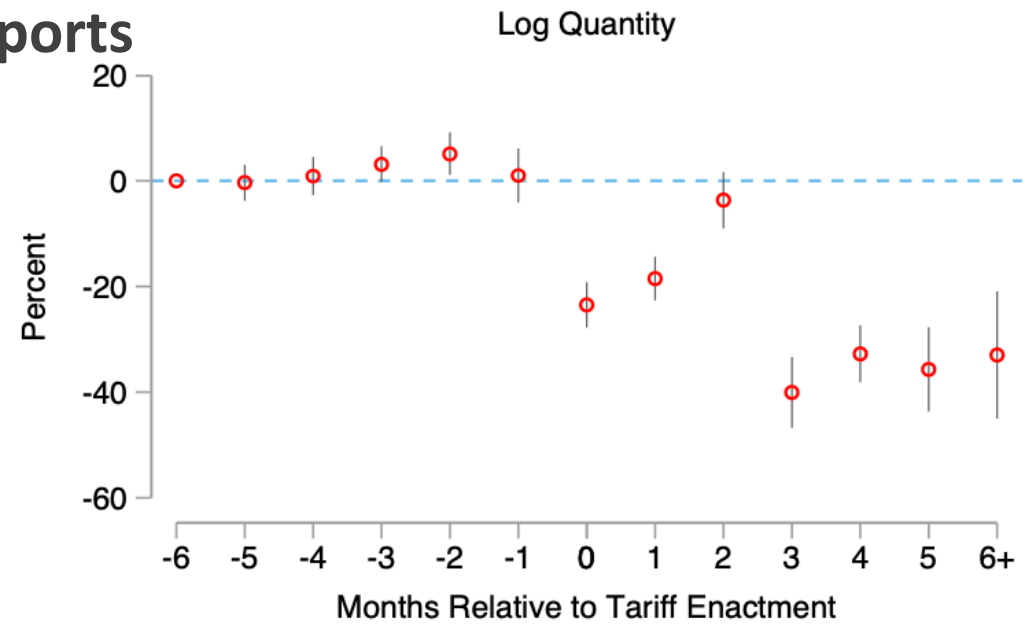
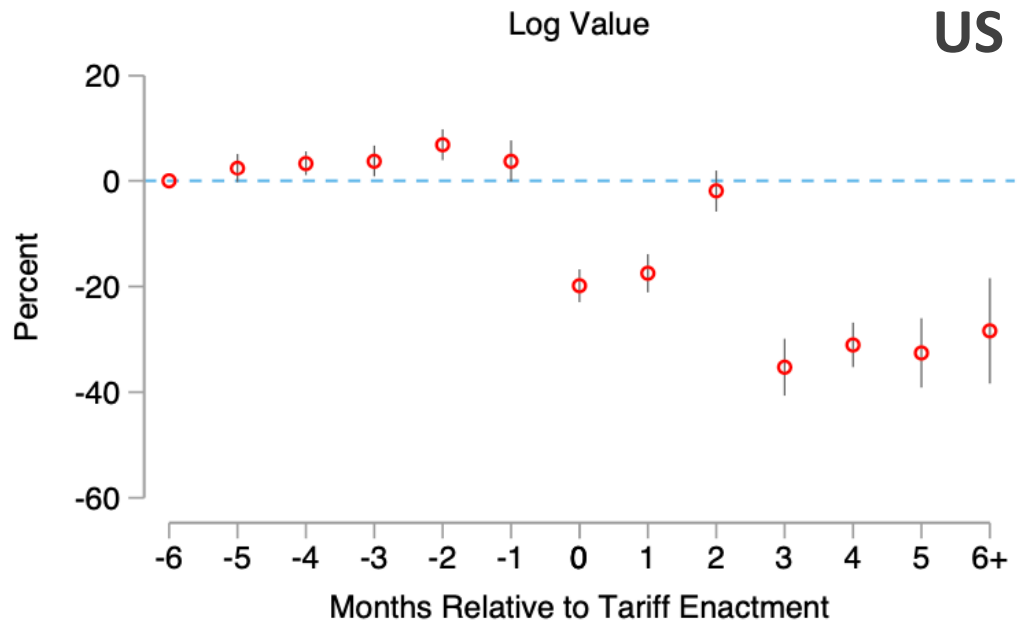


Log Value

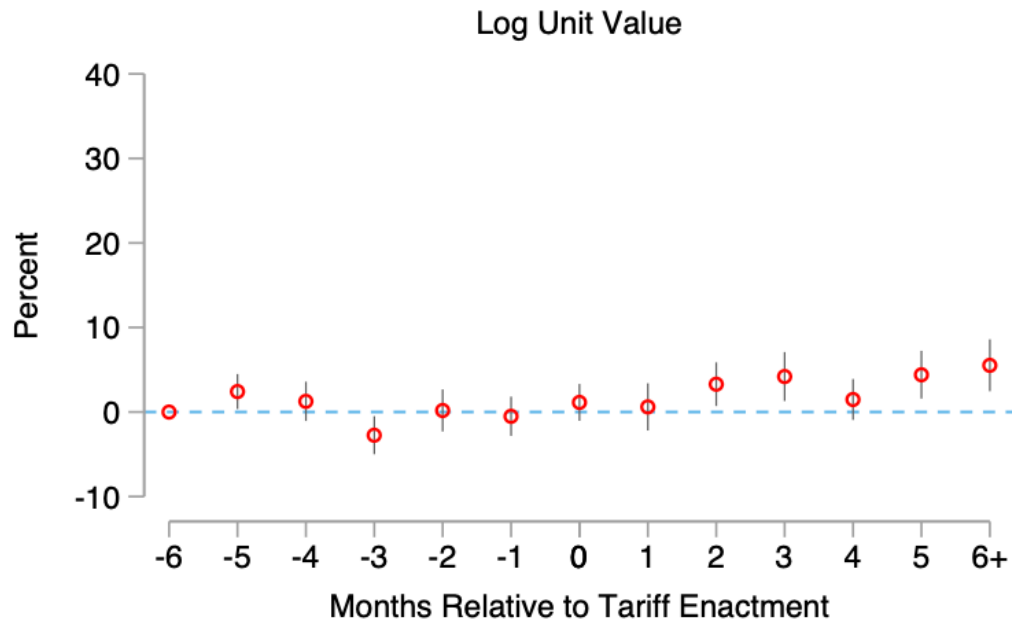
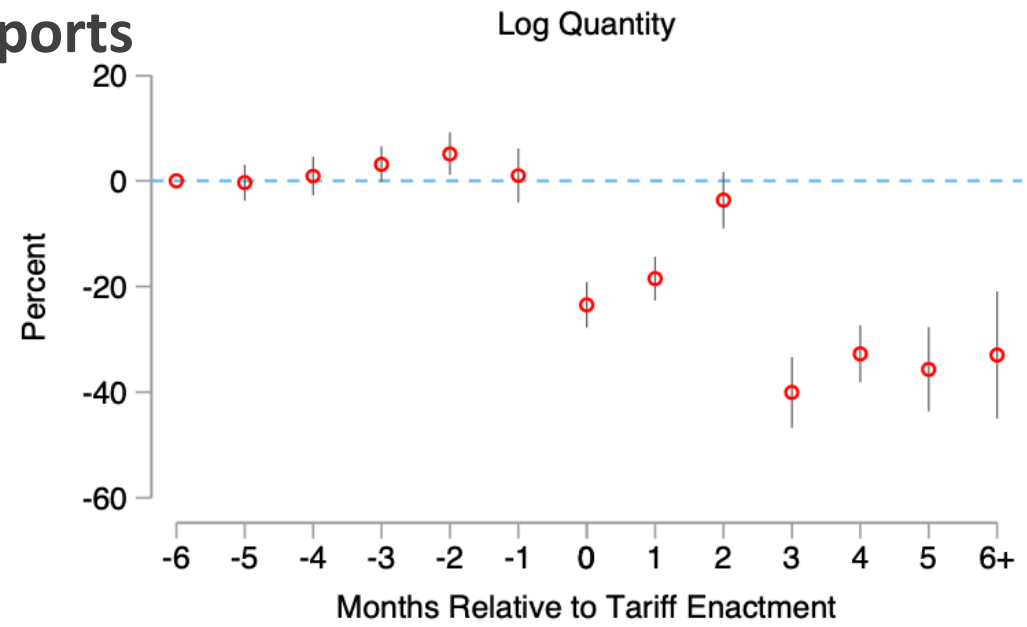
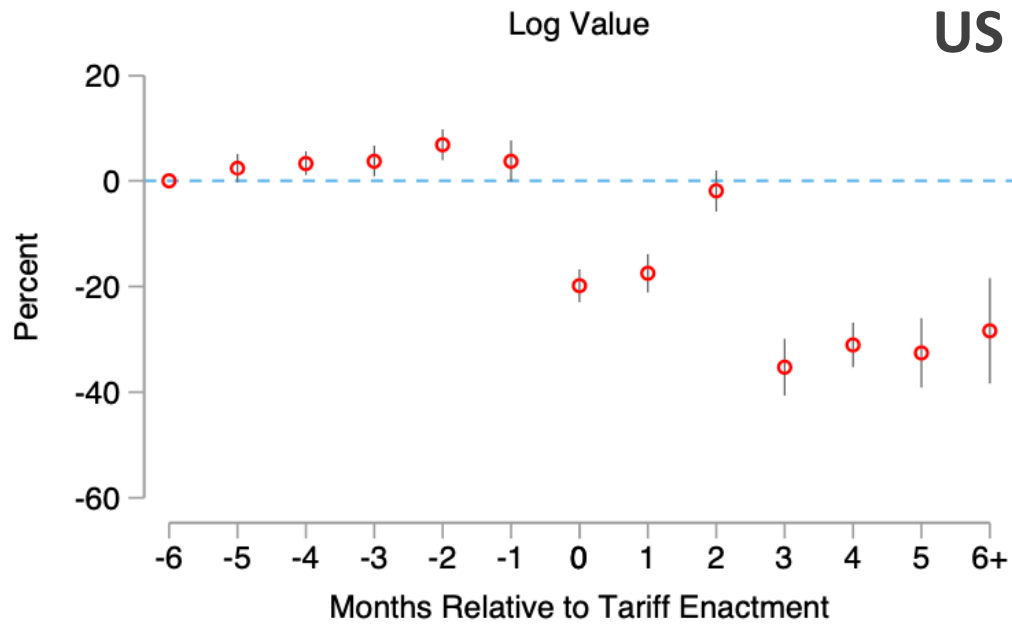
US Imports



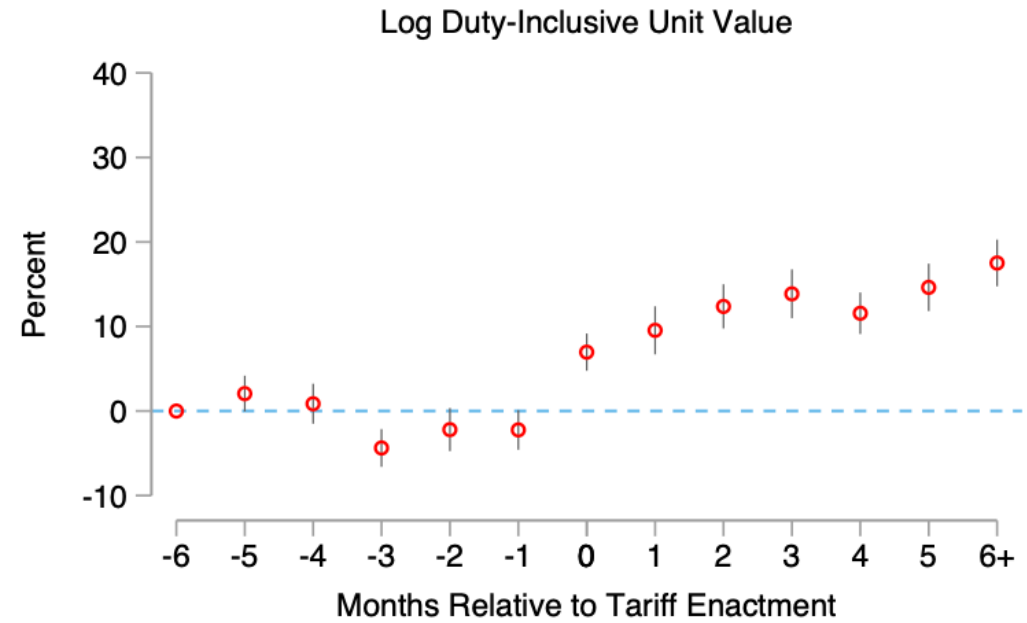
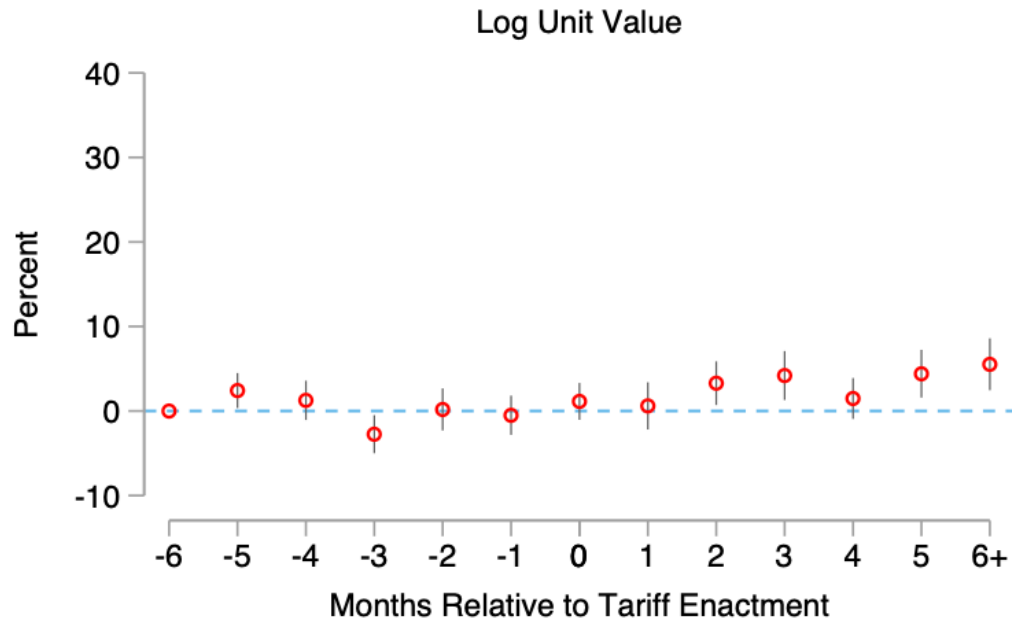
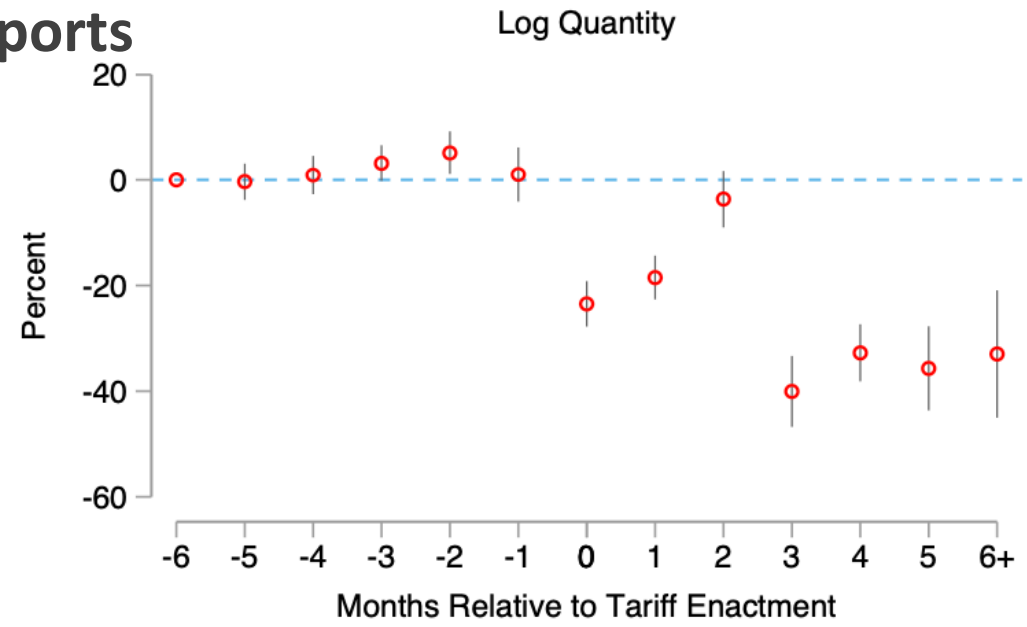
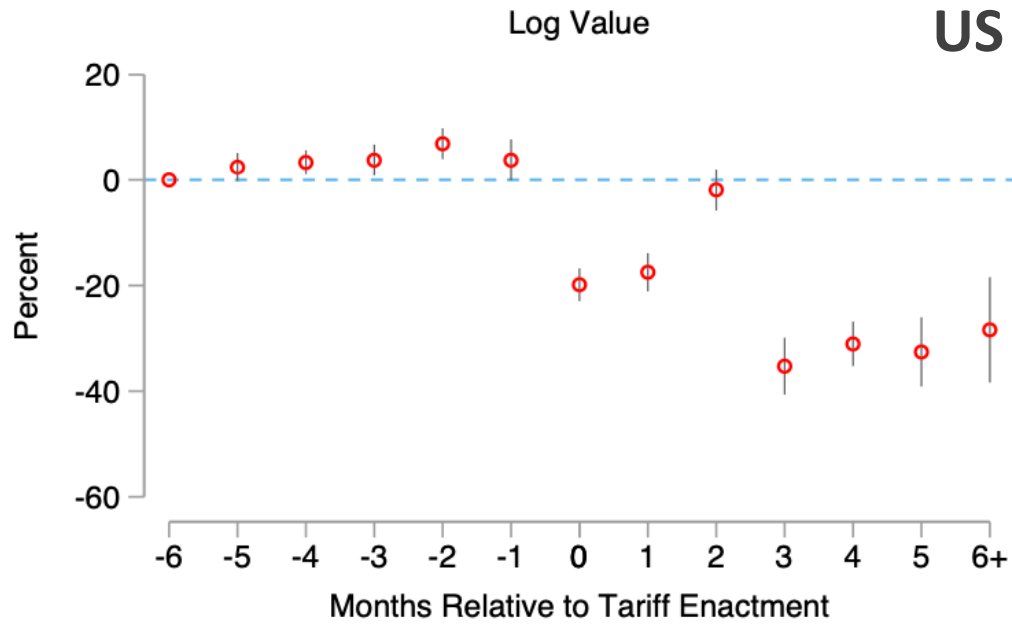
US Imports

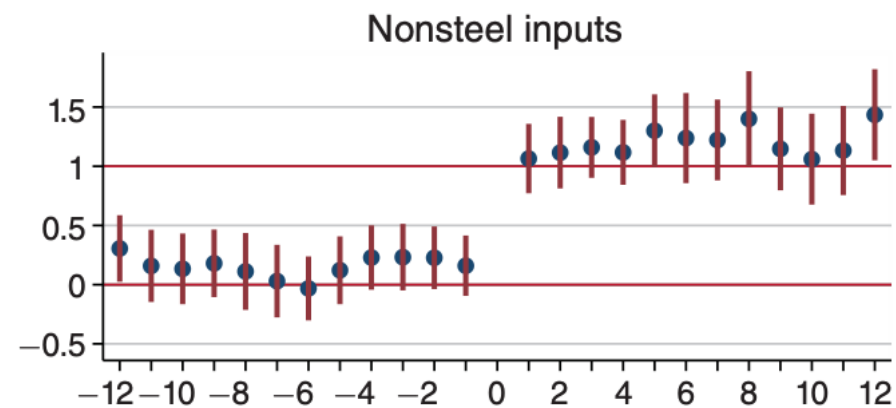
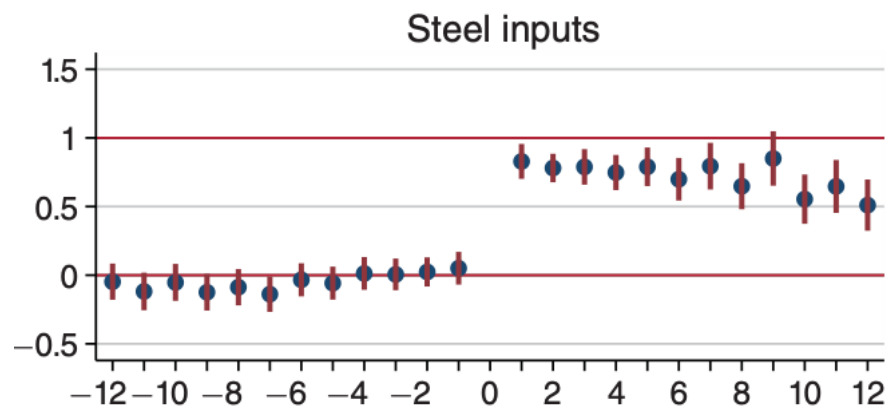
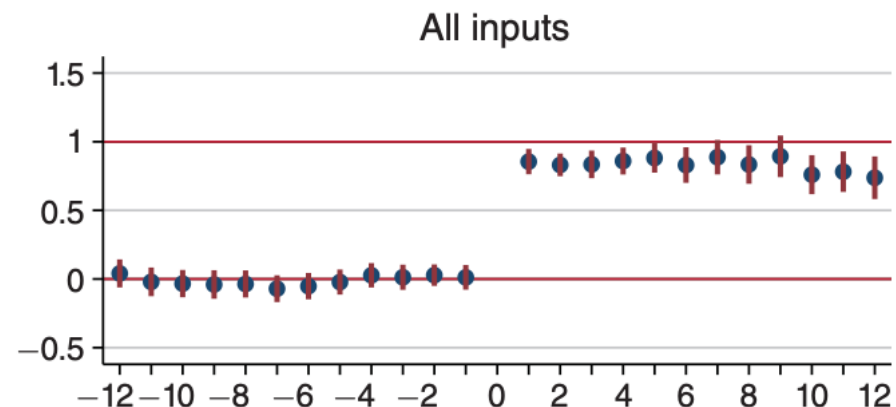
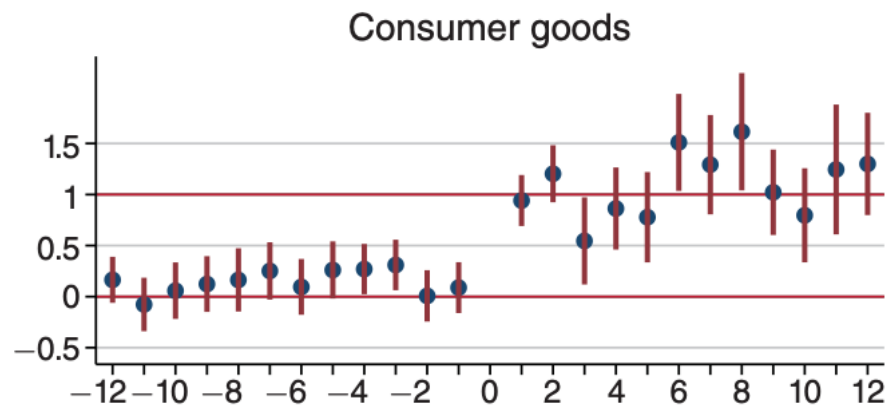
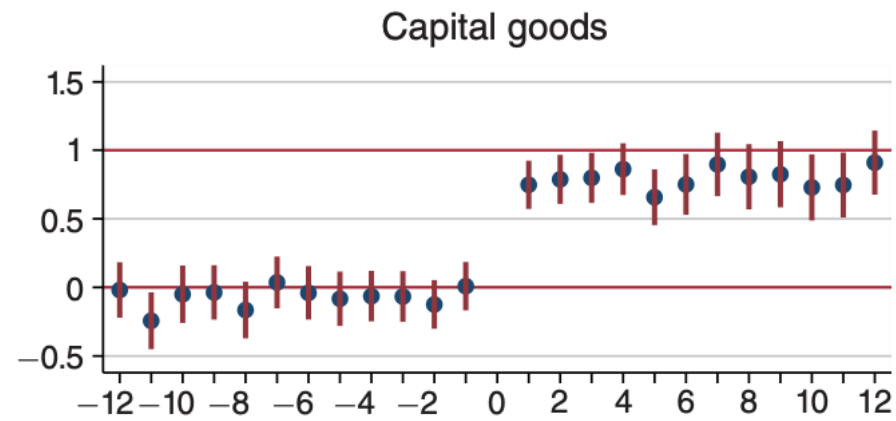
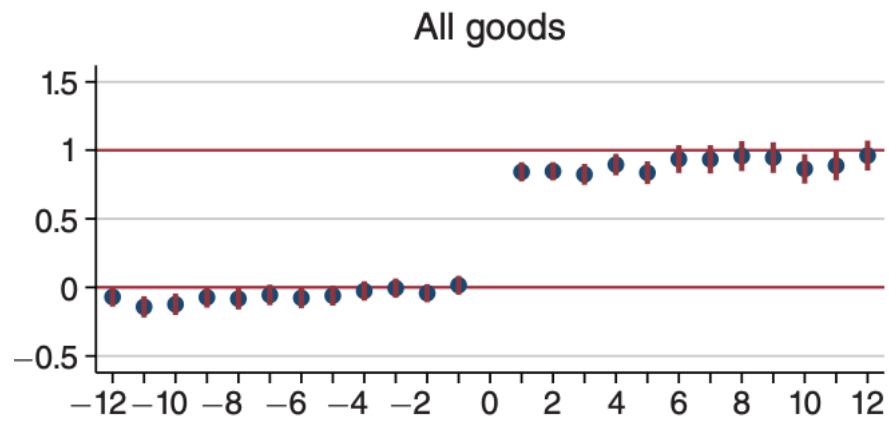


US Imports



US Imports





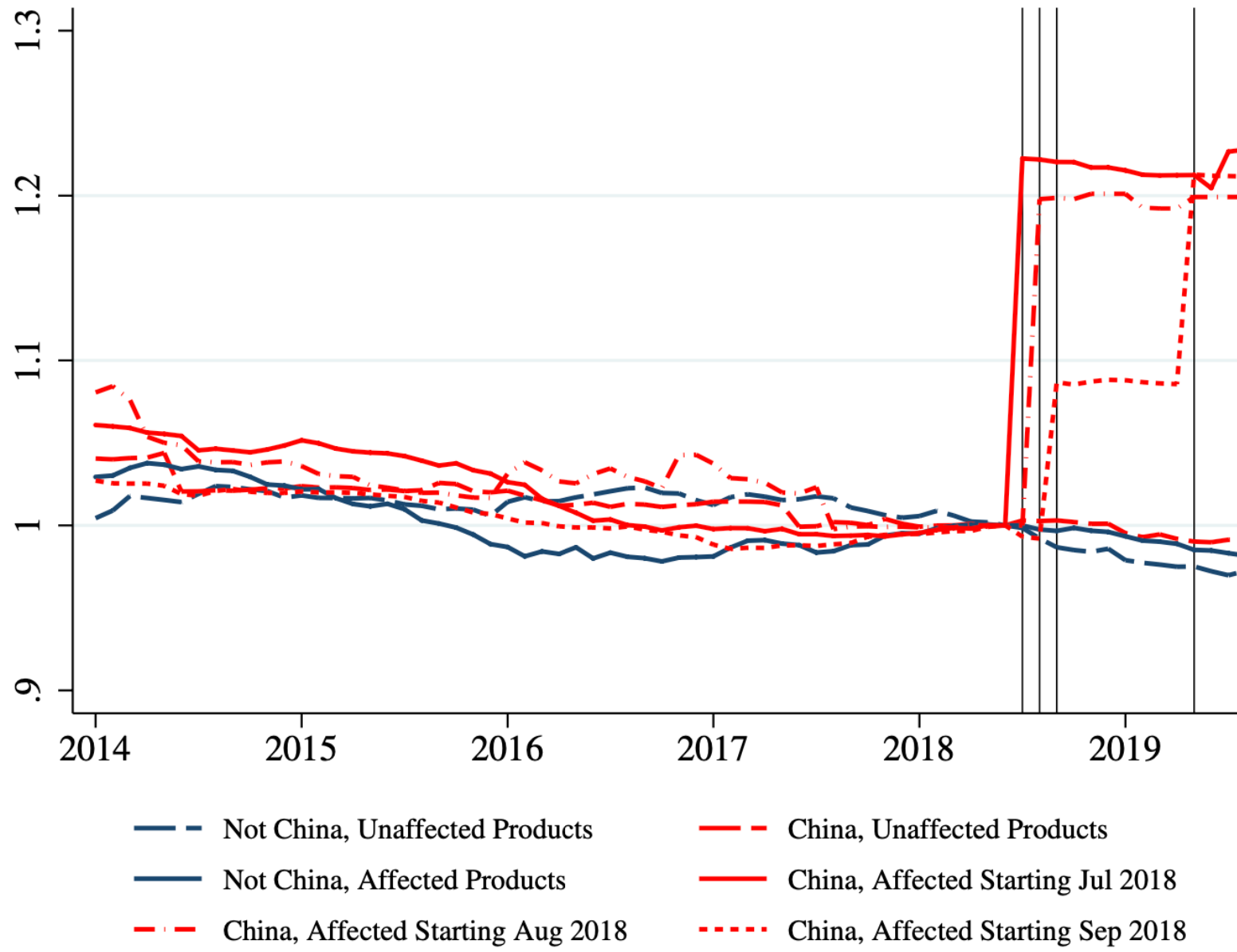
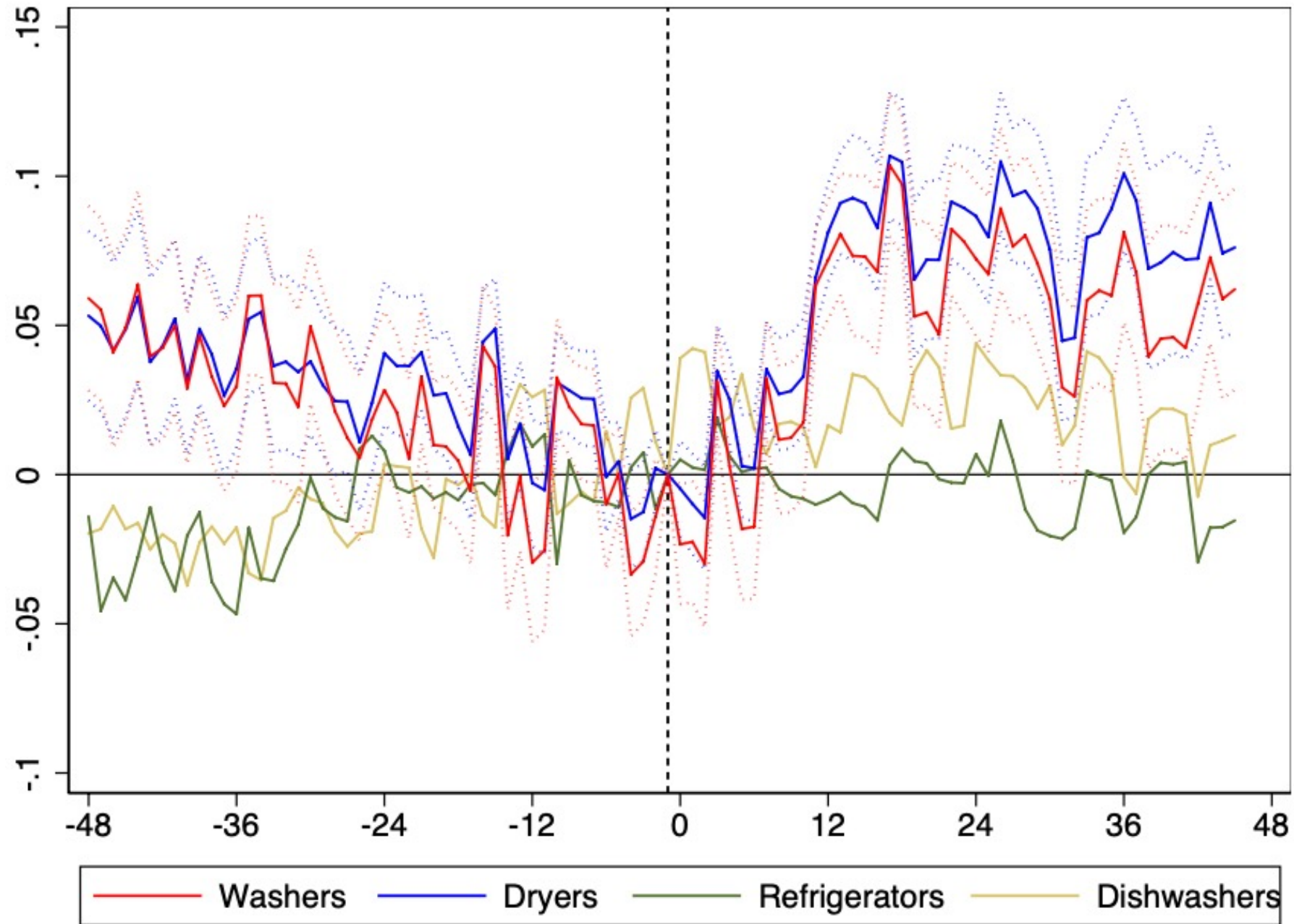
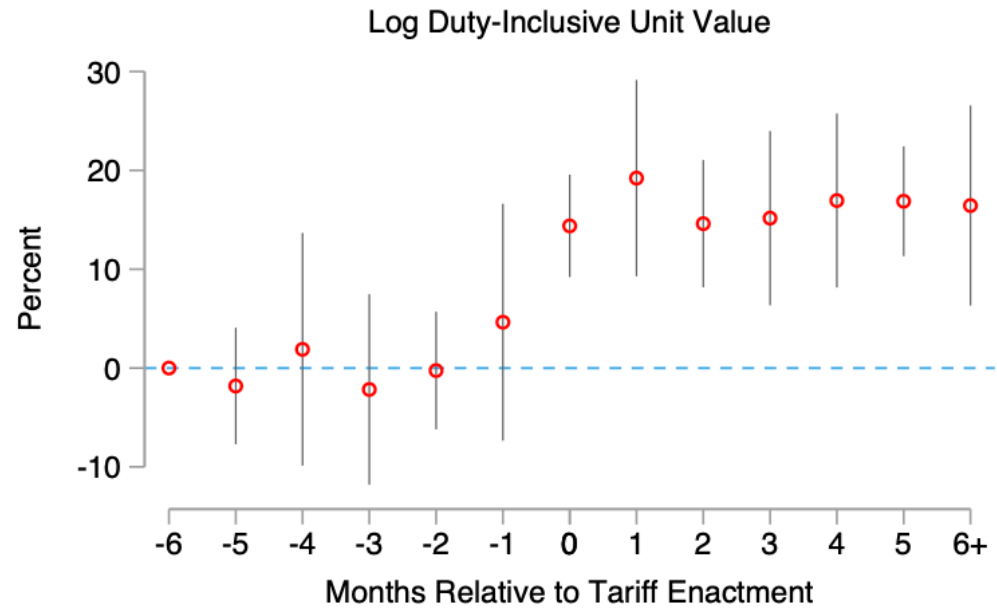
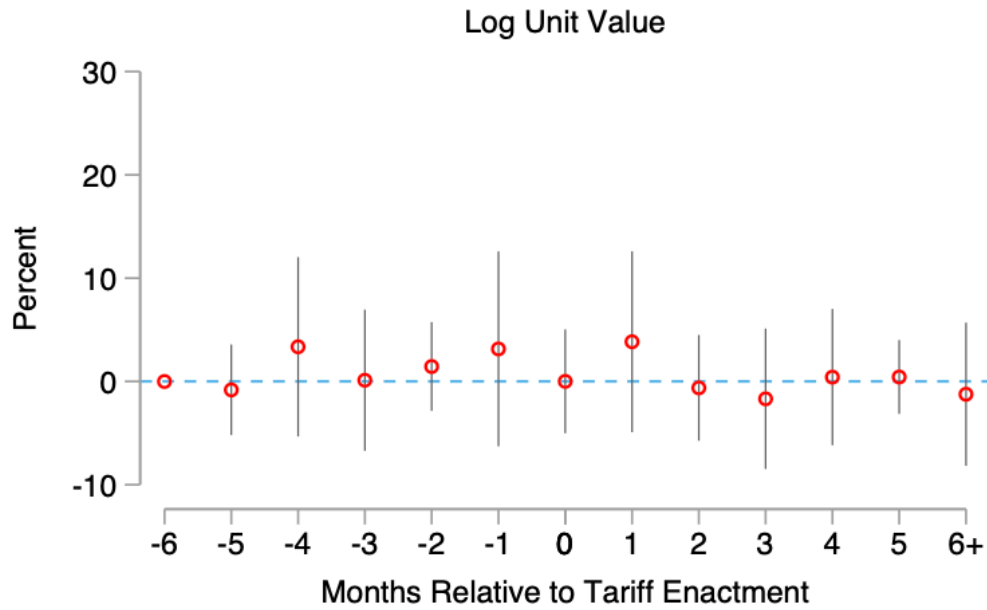
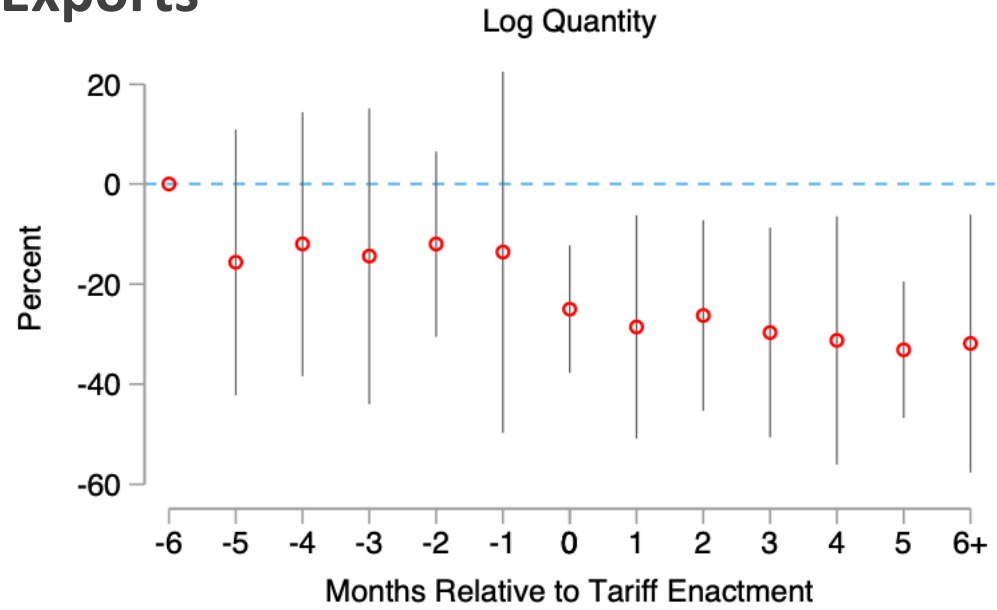
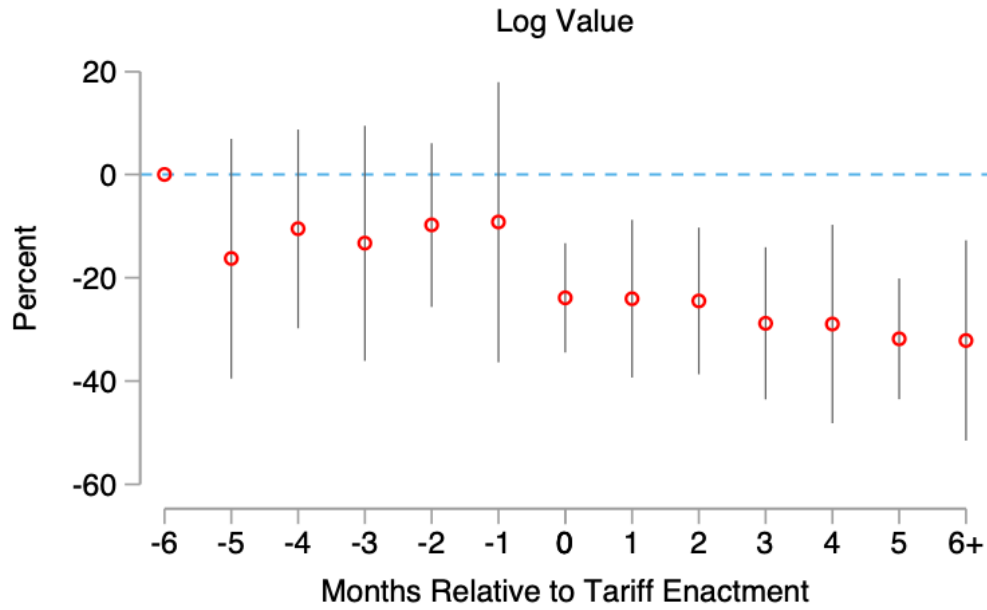


Figure 1: Import Price Indices, by China Tariff Wave

Panel B. Safeguard Tariffs 2018



US Exports



Tariff Propagation

- **Consumers**
 - consumers should be worse off
 - magnitude depends on **tariff pass-through**
- **Producers**
 - producers should be better off
 - Magnitude depends on
 - **Substitutability**: if imports highly substitutable, gains ↑
 - **Input costs**: if producers use a lot of tariffed imports, gains ↓
 - **Retaliations**: dampen global demand, gains ↓
- **Government Revenue**

Calculating Aggregate Impacts

$$EV = -m' \Delta p^M + x' \Delta p^X + \Delta R \quad \text{Dixit \& Norman 80}$$

- With complete pass-through, 1st order impact: $EV = -m' \Delta p^M$
 - Import share of GDP: ~15%
 - Fraction of trade targeted: ~15%
 - Average increase in import prices = average increase in tariffs = ~15%
 - $EV \approx 0.15^3 = 0.34\%$ GDP
- 2nd-order impact: $EV = \frac{1}{2} (\Delta m)' \Delta \tau \approx 0.06\%$ GDP
- Full model:
 - Input-output structure
 - Retaliations
 - Terms-of-trade affects at the sector level (because of a fixed factor)
 - Demand and supply elasticities estimated from tariff changes

Calculating Aggregate Impacts

Table 2: Aggregate Impacts

	EV^M	EV^X	ΔR	EV
	(1)	(2)	(3)	(4)
	2018-19 Trade War			
Change (\$ b)	-114.2	24.3	65.0	-24.8
	[-121.8,-106.5]	[15.4,35.2]	[59.0,70.2]	[-39.4,-8.8]
Change (% GDP)	-0.61	0.13	0.35	-0.13
	[-0.65,-0.57]	[0.08,0.19]	[0.32,0.38]	[-0.21,-0.05]

Calculating Aggregate Impacts

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	[-0.65,-0.57]	[0.08,0.19]	[0.32,0.38]	[-0.21,-0.05]
2018-19 U.S. Tariffs and No Retaliation				
Change (\$ b)	-114.1	31.8	65.9	-16.4
	[-119.8,-108.4]	[24.8,40.1]	[59.9,71.1]	[-28.5,-3.0]
Change (% GDP)	-0.61	0.17	0.35	-0.09
	[-0.64,-0.58]	[0.13,0.22]	[0.32,0.38]	[-0.15,-0.02]

Calculating Aggregate Impacts, China

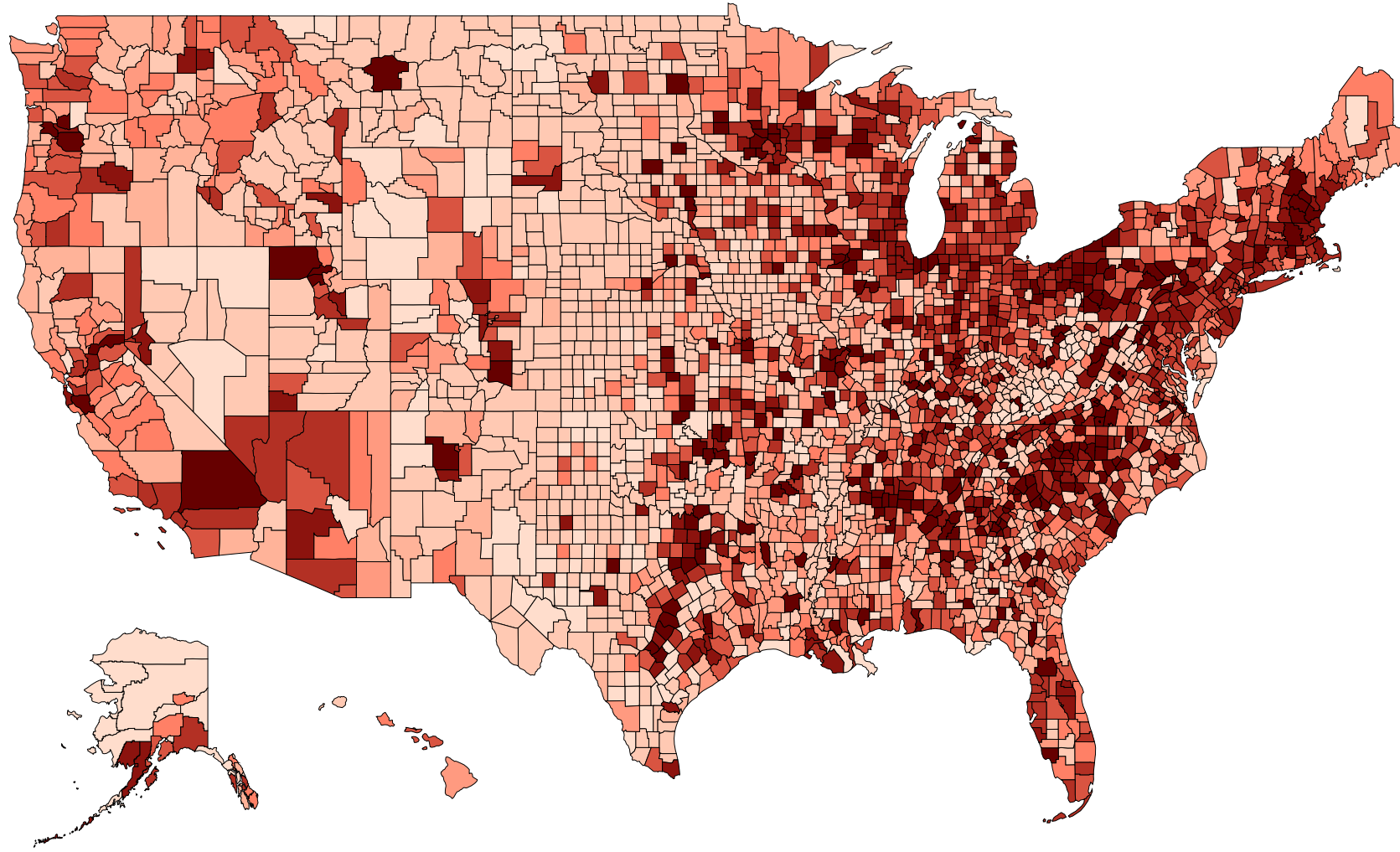
Table 8: Aggregate Impacts

	EV^X	EV^M	ΔR	EV
	(1)	(2)	(3)	(4)
2018–2019 trade war				
change (\$ b)	-32.968	-6.906	1.976	-37.898
	[-45.159, 0.786]	[-15.524, 0.874]	[1.360, 3.708]	[-52.282, -3.153]
change (% GDP)	-0.272	-0.057	0.016	-0.312
	[-0.372, 0.006]	[-0.128, 0.007]	[0.011, 0.031]	[-0.431, -0.026]

Import Tariffs

Tariff Increase on US Imports, 2017-2018

Weighted by Variety-Level US Import Share and County-Level 2016 Tradeable Sector Employee Wage Bill



Mean = 1.11 p.p., std = 0.91

2.37 – 11.78
0.59 – 0.86

1.97 – 2.37
0.44 – 0.59

1.66 – 1.97
0.35 – 0.44

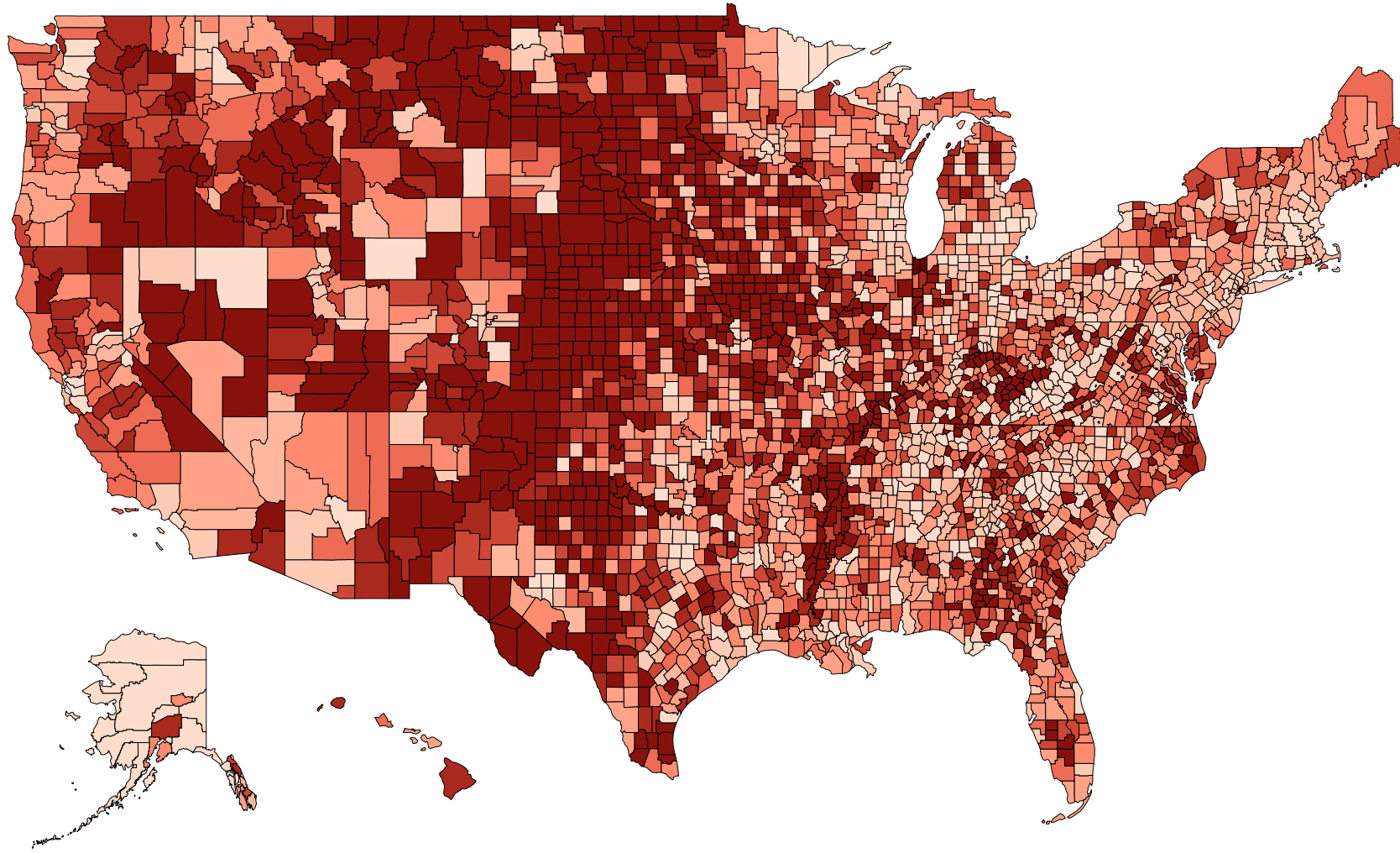
1.25 – 1.66
0.00 – 0.35

0.86 – 1.25

Retaliatory Tariffs

Tariff Increase on US Exports, 2017-2018

Weighted by Variety-Level US Export Share and County-Level 2016 Tradeable Sector Employee Wage Bill



Mean = 4.17 p.p., std = 2.67

7.60 – 12.37
2.30 – 3.06

7.37 – 7.60
1.71 – 2.30

5.68 – 7.37
1.30 – 1.71

4.29 – 5.68
0.98 – 1.30

3.06 – 4.29
0.00 – 0.98

What about Bystander Countries?

- How did the trade war affect global trade of “bystander” countries?
- Opportunity to explore potential forces driving global trade:
 - Specialization
 - Substitutability/complementarity
 - Scale
- Findings:
 - Bystanders increased exports to USA, no change to CHN, **increased** to RW
 - Large heterogeneity in growth of tariffed products (related to untaxed)
 - Heterogeneous responses driven by a country component, not sector or size
 - Different forces at work: Eg, MEX, TWN, COL, UKR all operate on downward-sloping supply
 - MEX, TWN benefit: substitute USA/CHN
 - COL, UKR don't benefit: complement USA/CHN

What about Bystander Countries?

- For top 50 exporters, examine product-level exports to USA, CHN, RW
 - 2018-19 exports in HS6 products
 - Four sets of trade war tariffs
 - USA tariffs on CHN
 - CHN tariff on USA
 - USA tariffs on RW
 - CHN tariffs on RW
- Basic idea:
 - For each country, compare export growth in taxed relative to untaxed products
 - Model guides interpreting of responses:
 - Exports patterns to USA/CHN isolates substitute/complementarity
 - Exports patterns to RW isolates upward/downward supply patterns

Framework

- Bystanders export products that either substitute or complement USA and CHN
- Bystanders' supply curves could be (standard) upward sloping or downward sloping (eg, scale)
- Each bystander country will respond to the trade war tariffs **differently**
 - how substitutable (or complementary) its exports are with USA/CHN?
 - Are its supply curves upward or downward sloping

Framework

- When the USA imposes a tariff on CHN, four possible outcomes for MYS's exports

	Decrease to USA	Increase to USA
Increase to RW		
Decrease to RW		substitutes with CHN upward-sloping supply

Framework

- When the USA imposes a tariff on CHN, four possible outcomes for MYS's exports

	Decrease to USA	Increase to USA
Increase to RW		substitutes with CHN downward-sloping supply
Decrease to RW		substitutes with CHN upward-sloping supply

Framework

- When the USA imposes a tariff on CHN, four possible outcomes for MYS's exports

	Decrease to USA	Increase to USA
Increase to RW	complements with CHN upward-sloping supply	substitutes with CHN downward-sloping supply
Decrease to RW		substitutes with CHN upward-sloping supply

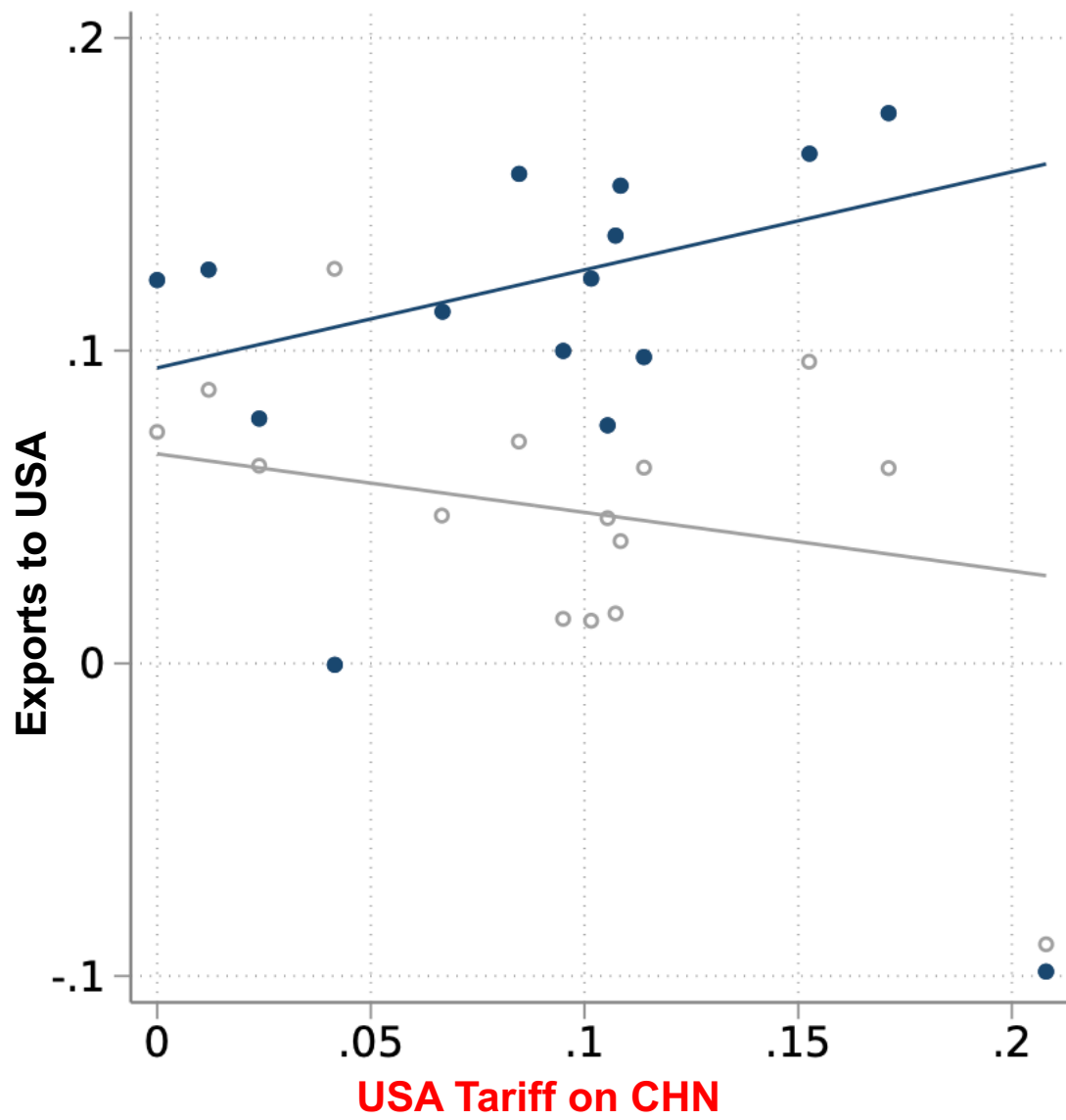
Framework

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Increase to RW	complements with CHN upward-sloping supply	substitutes with CHN downward-sloping supply
Decrease to RW	complements with CHN downward-sloping supply	substitutes with CHN upward-sloping supply

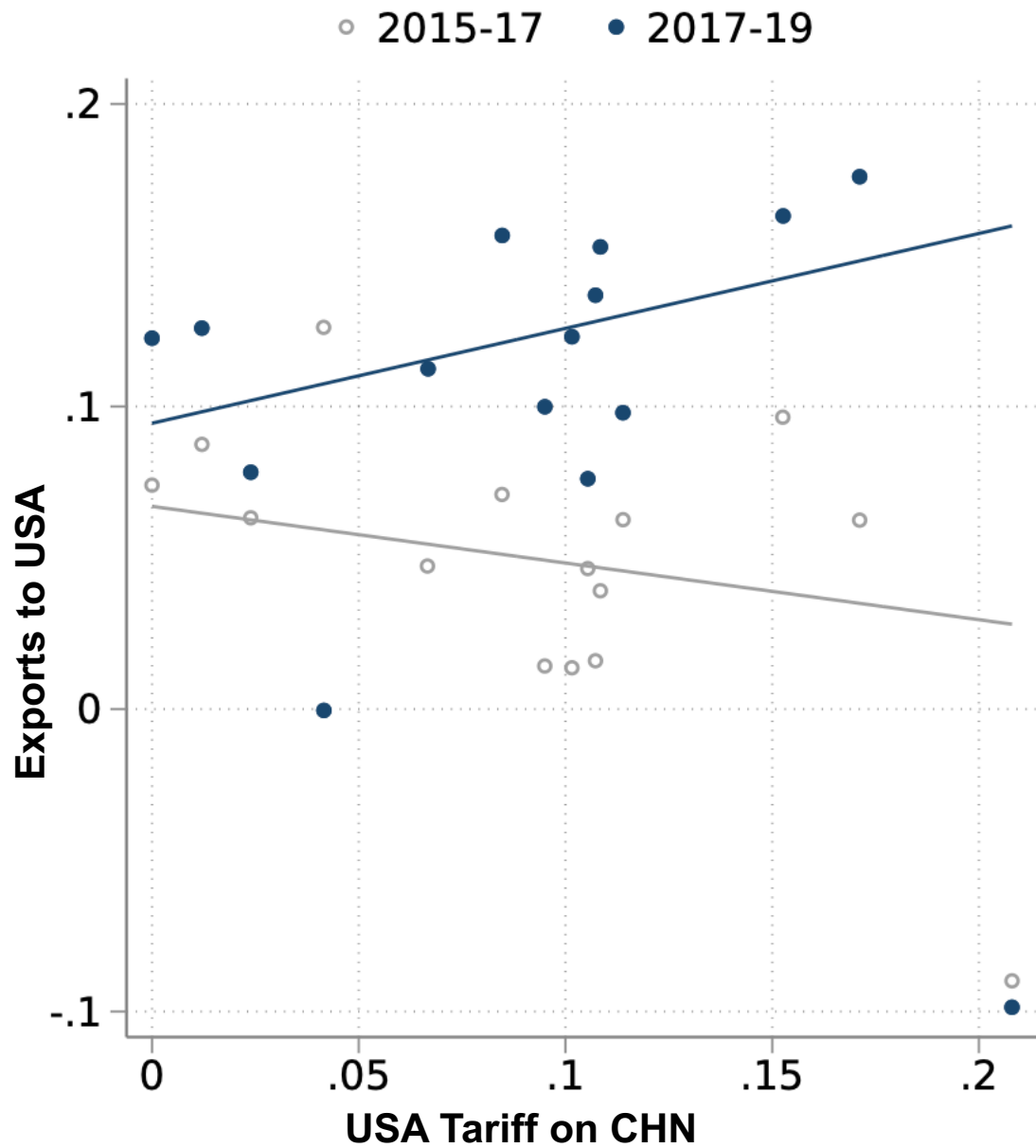
Bystanders' Export Value to US

○ 2015-17 ● 2017-19



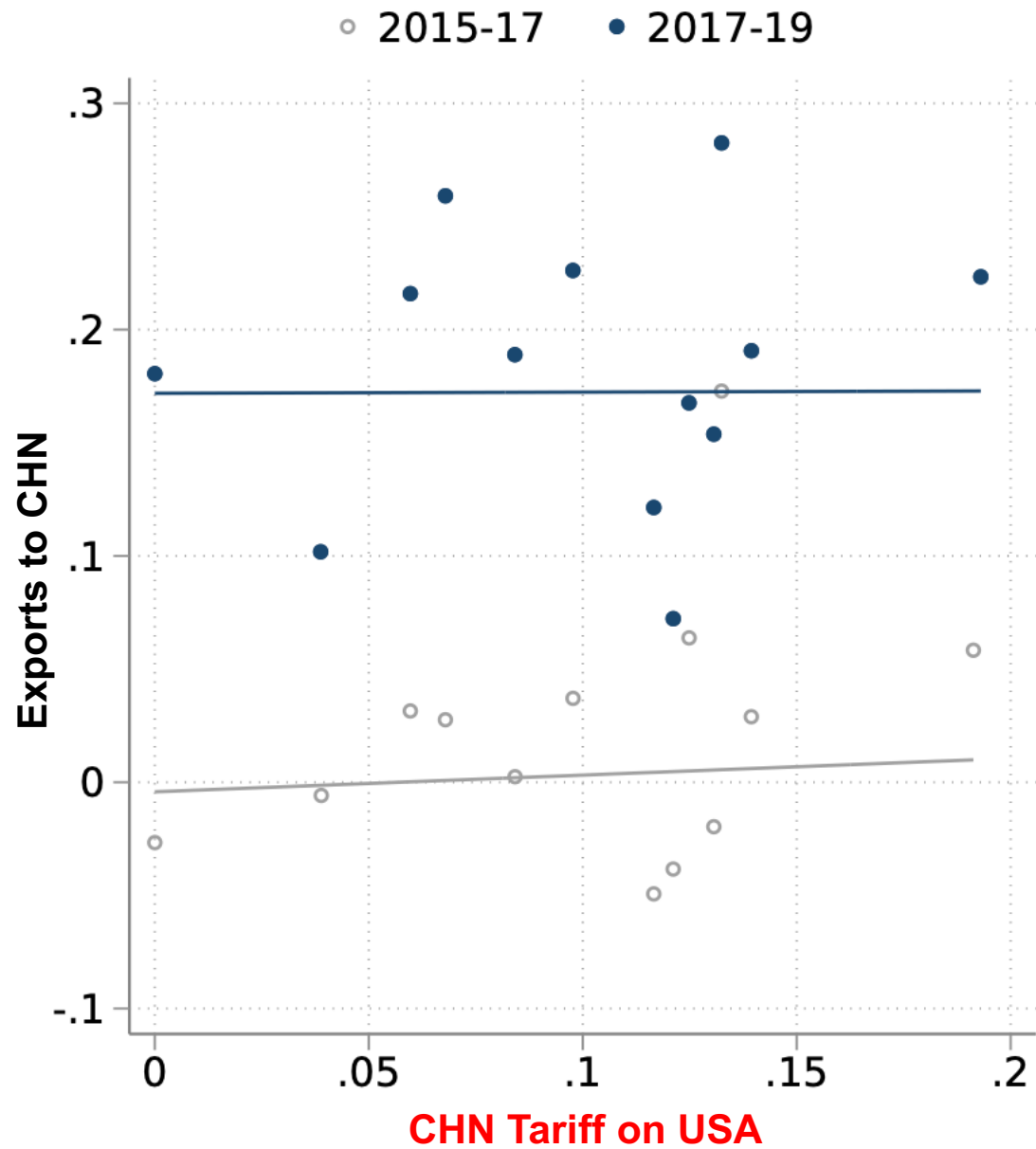
Pre-period: $\beta=-0.19$ (0.10). Post-period: $\beta=0.31$ (0.10).

Bystanders' Export Value to US



Pre-period: $\beta = -0.19$ (0.10). Post-period: $\beta = 0.31$ (0.10).

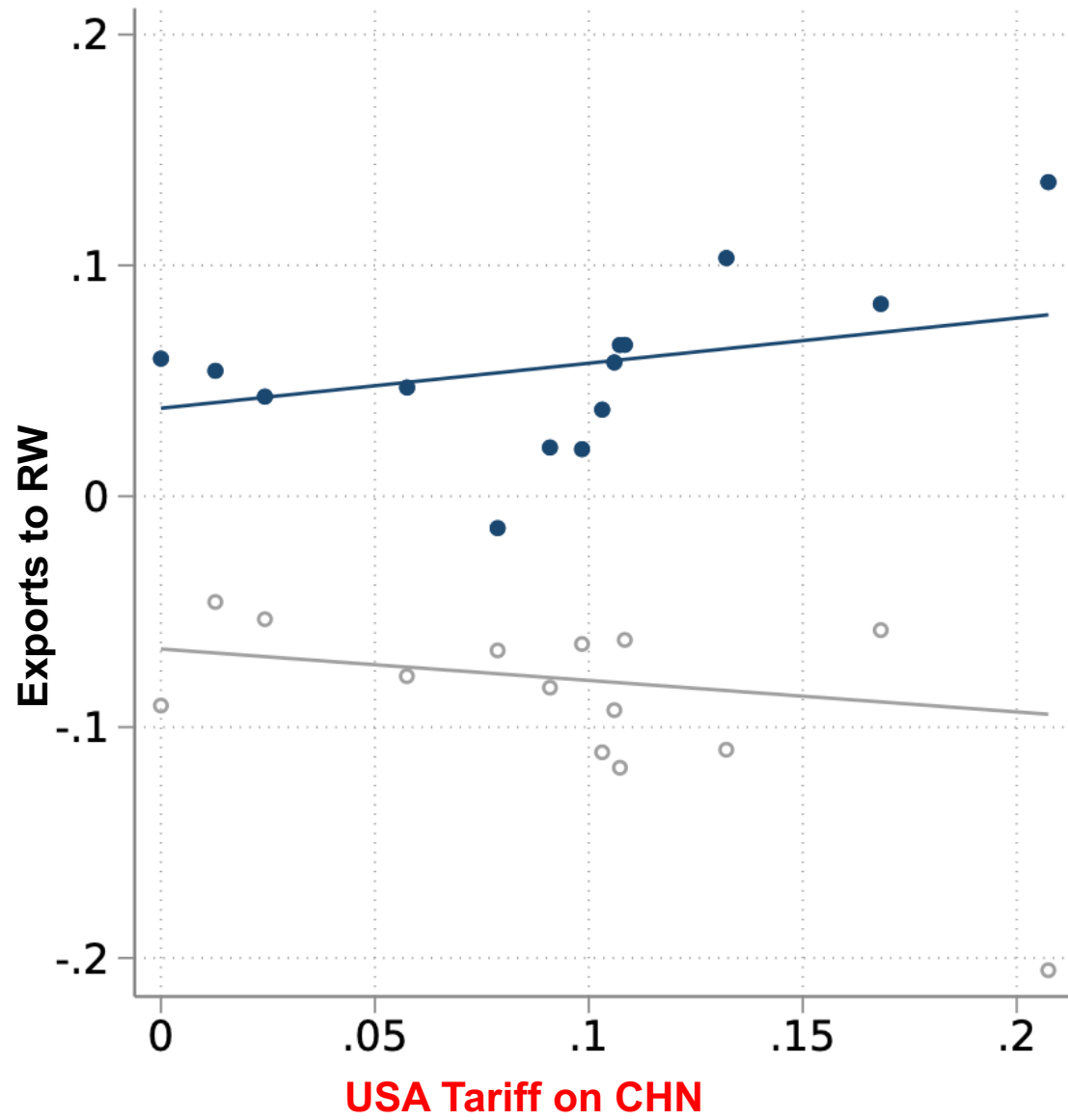
Bystanders' Export Value to China



Pre-period: $\beta = 0.07$ (0.18). Post-period: $\beta = 0.01$ (0.19).

Bystanders' Export Value to RW

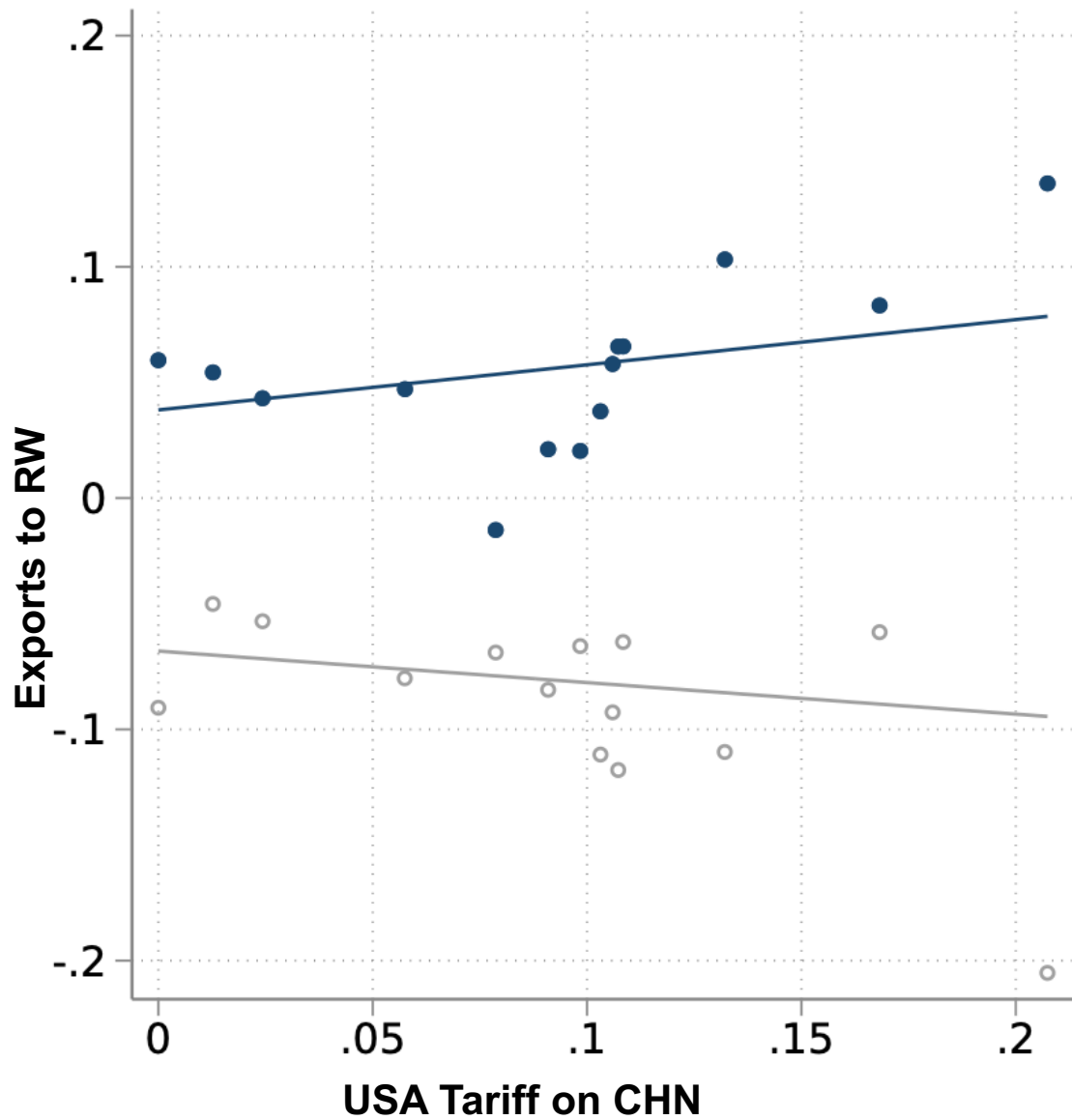
○ 2015-17 ● 2017-19



Pre-period: $\beta = -0.14$ (0.08). Post-period: $\beta = 0.20$ (0.08).

Bystanders' Export Value to RW

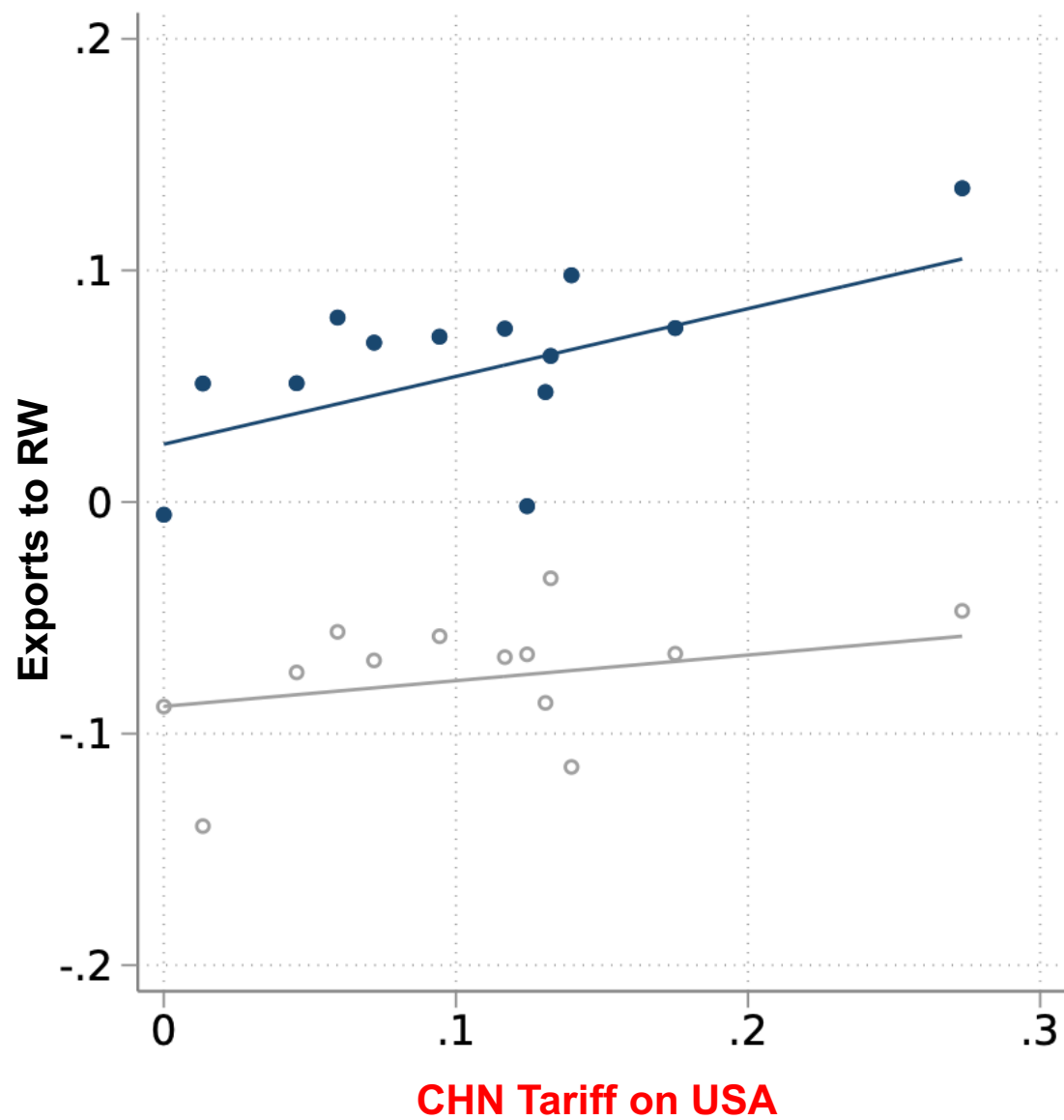
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Pre-period: $\beta=0.11$ (0.08). Post-period: $\beta=0.29$ (0.08).

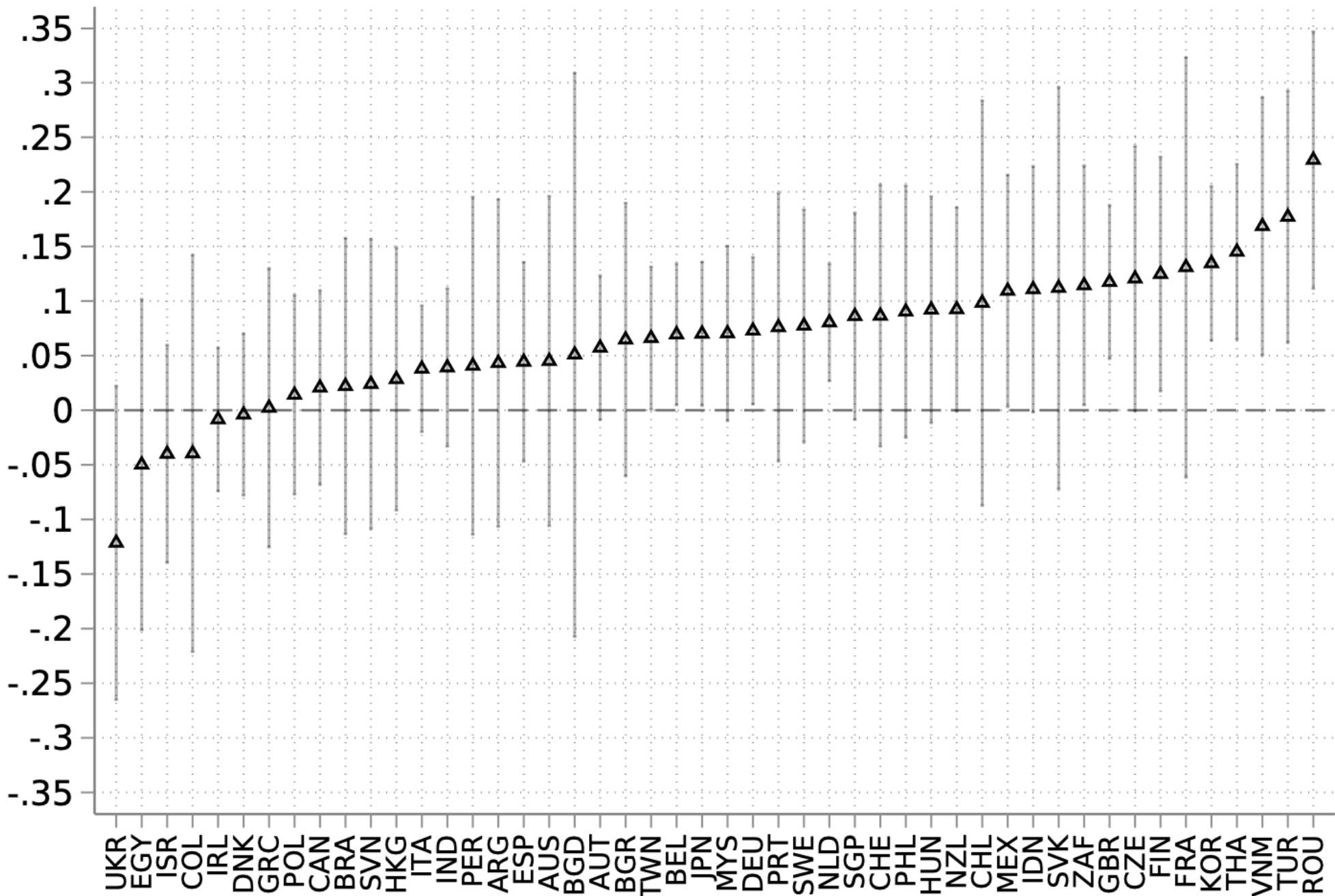
Heterogenous Tariff Responses

$$\Delta \ln X_{ig}^n = \beta_{1ig}^n \Delta \ln T_{CH}^{US} + \beta_{2ig}^n \Delta \ln T_{US}^{CH} + \beta_{3ig}^n \Delta \ln T_i^{US} + \beta_{4ig}^n \Delta \ln T_i^{CH} + \text{controls} + \epsilon_{ig}$$

- X_{ig}^n exports of product **g** from **i** to **n**
- Estimate this regression separately to USA, CHN, RW
- Four tariffs:
 - $\Delta \ln T_{CH}^{US}$: USA tariff on CHN
 - $\Delta \ln T_{US}^{CH}$: CHN tariff on USA
 - $\Delta \ln T_i^{US}$: USA tariff on **i**
 - $\Delta \ln T_i^{CH}$: CHN tariff on **i**
- Aggregate predicted responses to world exports

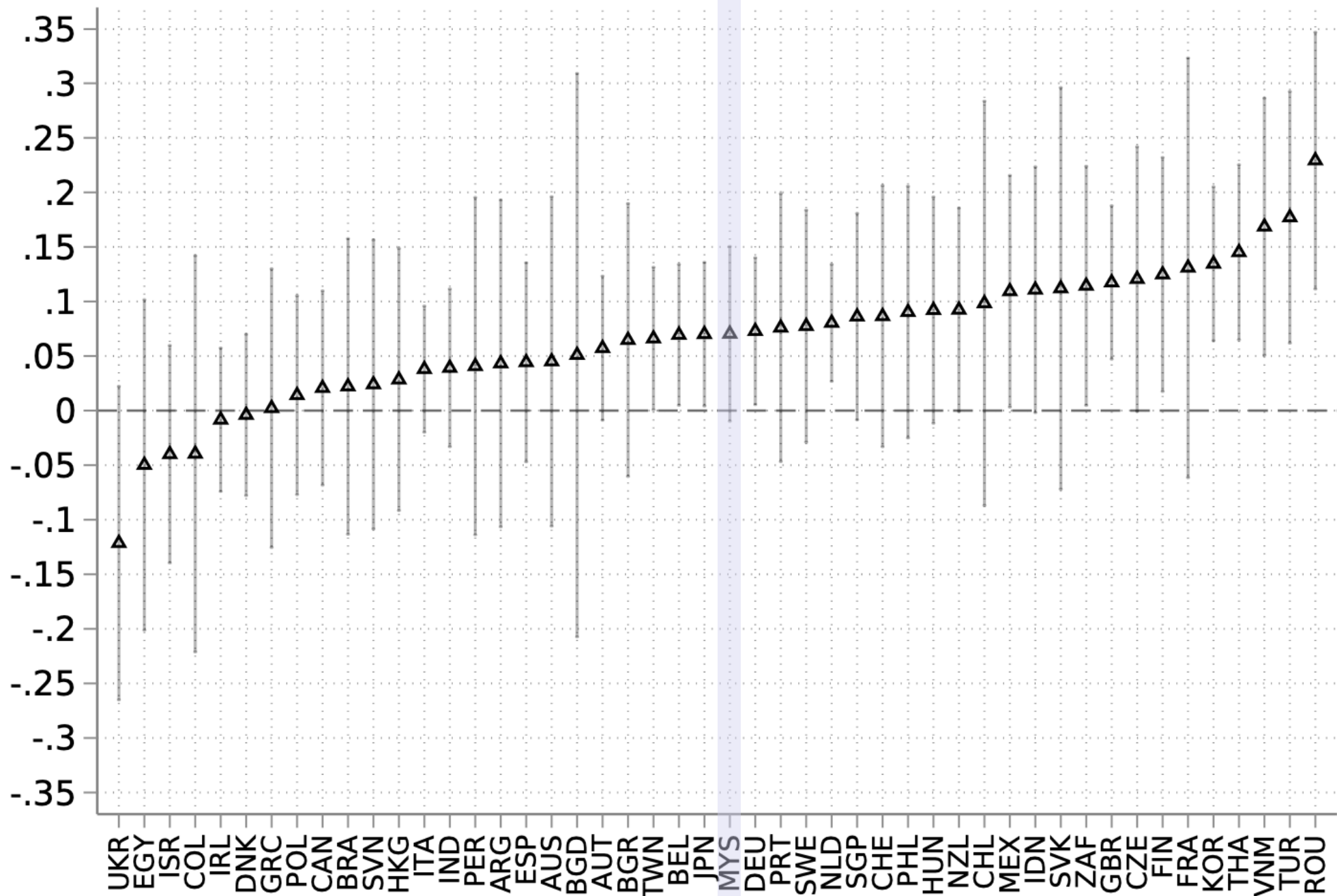
$$\Delta \ln \widehat{X}_i^{WD} = \sum_g \sum_n \lambda_{ig}^n \left(\widehat{\beta}_{1ig} \Delta \ln T_{CH}^{US} + \widehat{\beta}_{2ig} \Delta \ln T_{US}^{CH} + \widehat{\beta}_{3ig} \Delta \ln T_i^{US} + \widehat{\beta}_{4ig} \Delta \ln T_i^{CH} \right)$$
- Tariff responses ($\beta_1, \beta_2, \beta_3, \beta_4$) depend on:
 - country fixed effect
 - sector fixed effect
 - variety size

Log Change



90/10 bootstrapped error bars

Log Change



90/10 bootstrapped error bars

Takeaways

- New era for globalization
 - Elevated trade tensions between the two largest economies
 - Next phase has moved beyond tariffs to export bans and more systematic “decoupling”
- Evidence suggests that war has harmed consumers because of complete pass-through
- Global trade has reallocated, but at least in trade data, no sign that globalization has ended
 - Tariffs have **created** net trade opportunities for bystander countries
- A lot more work is needed!
 - country factors driving reallocations?
 - Micro-level data
 - Sector-specific analyses