

The Return to Protectionism

Pablo D. Fajgelbaum Penny K. Goldberg
Patrick J. Kennedy Amit K. Khandelwal

UCLA, Yale (on leave WB), Berkeley, Columbia GSB

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Introduction

- In 2018, the U.S. raised tariffs on 12.7% of its imports
 - ▶ Avg tariff ↑ from 2.6% to 16.6%
- Trade partners retaliated by raising tariffs on 8.2% of U.S. exports
 - ▶ Avg tariff ↑ from 7.3% to 20.4%
- Largest return to protectionism since '30 Smoot-Hawley
- We study short-run impacts on U.S. economy

This Paper

- **What were the effects on trade volumes and prices?**
 - ▶ Use tariffs to identify import demand and export supply elasticities
- **What were the aggregate and regional impacts on the U.S. economy?**
 - ▶ Embed elasticities in G.E. model and compute impacts of trade war
- **Time span:**
 - ▶ Short-run analysis
 - ▶ From 2017m1 to 2019m4

This Paper

- **What were the effects on trade volumes and prices?**
 - ▶ Use tariffs to identify import demand and export supply elasticities
- **What were the aggregate and regional impacts on the U.S. economy?**
 - ▶ Embed elasticities in G.E. model and compute impacts of trade war
- **Main results:**
 - ① Imports of targeted varieties: -31.7%
 - ② Tariffs completely passed to tariff-inclusive import price
 - ③ Consumer loss: -.27% GDP
 - ★ Aggregate effect -.04% GDP
 - ④ Data: Higher import protection in electorally competitive counties
 - ★ Republican counties most negatively affected due to retaliation

Road Map

- **Data and Event Study**
- Trade Elasticities
- Aggregate and Regional Impacts

Summary Statistics: US Tariffs

Panel A: Tariffs on U.S. Imports Enacted by U.S. in 2018

Tariff Wave	Date Enacted	Products	2017 Imports		Tariff (%)	
		(# HS-10)	(mil USD)	(%)*	2017	2018
Solar Panels	Feb 7, 2018	8	5,782	0.2	0.0	30.0
Washing Machines	Feb 7, 2018	8	2,105	0.1	1.3	32.2
Aluminum	Mar-Jun, 2018	67	17,685	0.7	2.0	12.0
Iron and Steel	Mar-Jun, 2018	753	30,523	1.3	0.0	25.0
China 1	Jul 6, 2018	1,672	33,510	1.4	1.3	26.2
China 2	Aug 23, 2018	433	14,101	0.6	2.7	27.0
China 3	Sep 24, 2018	9,102	199,264	8.3	3.3	12.9
Total		12,043	302,970	12.7	2.6	16.6

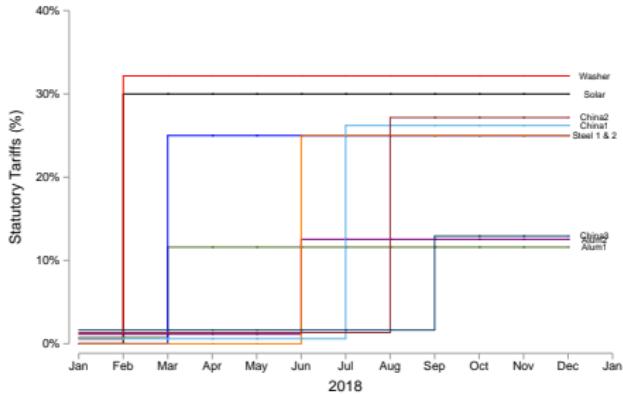
Summary Statistics: Retaliatory Tariffs

Panel B: Retaliatory Tariffs on U.S. Exports Enacted by Trading Partners in 2018

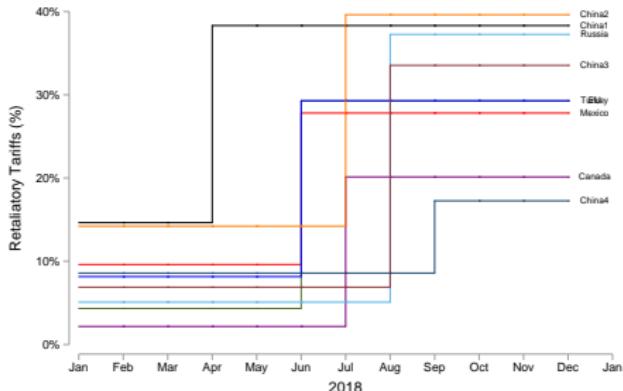
Retaliating Country	Date Enacted	Products	2017 Exports		Tariff (%)	
		(# HS-10)	(mil USD)	(%)*	2017	2018
China	Apr-Sep, 2018	7,474	92,518	6.0	8.4	18.9
Mexico	Jun 5, 2018	232	6,746	0.4	9.6	28.0
Turkey	Jun 21, 2018	244	1,554	0.1	9.7	31.8
European Union	Jun 22, 2018	303	8,244	0.5	3.9	29.2
Canada	Jul 1, 2018	325	17,818	1.2	2.1	20.2
Russia	Aug 6, 2018	163	268	0.0	5.2	36.8
Total		8,073	127,149	8.2	7.3	20.4

Trade War Timeline

U.S. Tariffs



Retaliatory Tariffs



Event Study

- Compare trends of targeted varieties relative to untargeted varieties:

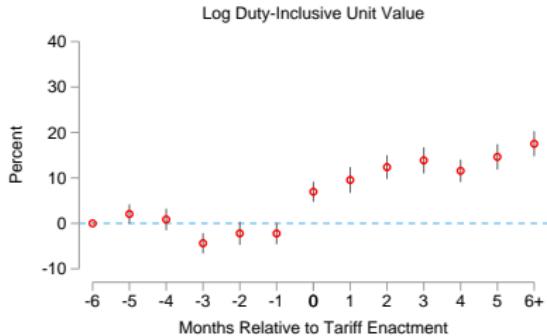
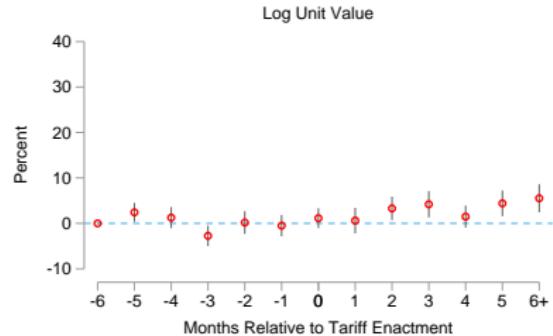
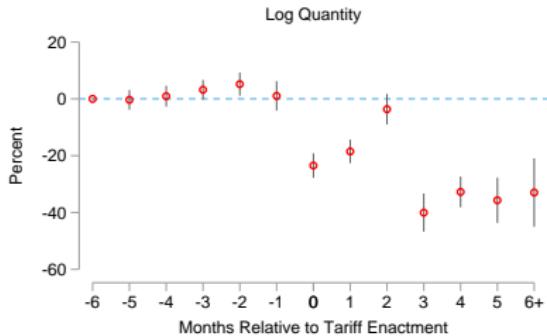
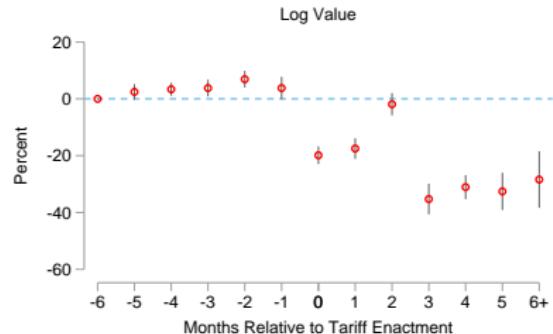
$$\ln y_{igt} = \alpha_{ig} + \alpha_{gt} + \alpha_{it} + \sum_{j=-6}^3 \beta_{0j} I(event_{ig} = j) + \sum_{j=-6}^3 \beta_{1j} I(event_{ig} = j) \times target_{ig} + \epsilon_{igt}$$

- ▶ FEs: variety (α_{ig}), product-time (α_{gt}), country-time (α_{it})
- ▶ cluster: country, HS8

- Event date:

- ▶ $ig \in$ targeted products: assign date of tariff implementation
- ▶ $ig \notin$ targeted products:
 - ★ assign earliest event date within NAICS4
 - ★ if no NAICS4, use: NAICS3, NAICS2, or February 2018

Event Study: Imports



Road Map

- Data and Event Study
- **Elasticity Estimates**
- Aggregate and Regional Impacts

U.S. Demand System

- Nested Constant-Elasticity (CES) demand within tradeable sector
 - ▶ By origin within imports of a product
 - ▶ Across imported products
 - ▶ Between imports and domestic
- Tiers:
 - ▶ Bottom: HS10 Import demand: $m_g = \left(\sum_i a_{ig}^{\frac{1}{\sigma}} m_{ig}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$
 - ▶ Middle: 4-digit NAICS import demand: $M_s = \left(\sum_{g \in \mathcal{G}_s} a_{Mg}^{\frac{1}{\eta}} m_g^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}}$
 - ▶ Upper: sector demand: $C_s + I_s = \left(A_{Ds}^{\frac{1}{\kappa}} D_s^{\frac{\kappa-1}{\kappa}} + A_{Ms}^{\frac{1}{\kappa}} M_s^{\frac{\kappa-1}{\kappa}} \right)^{\frac{\kappa}{\kappa-1}}$

Variety Import Demand and Export Supply

- Imports and exports of product g from country i :

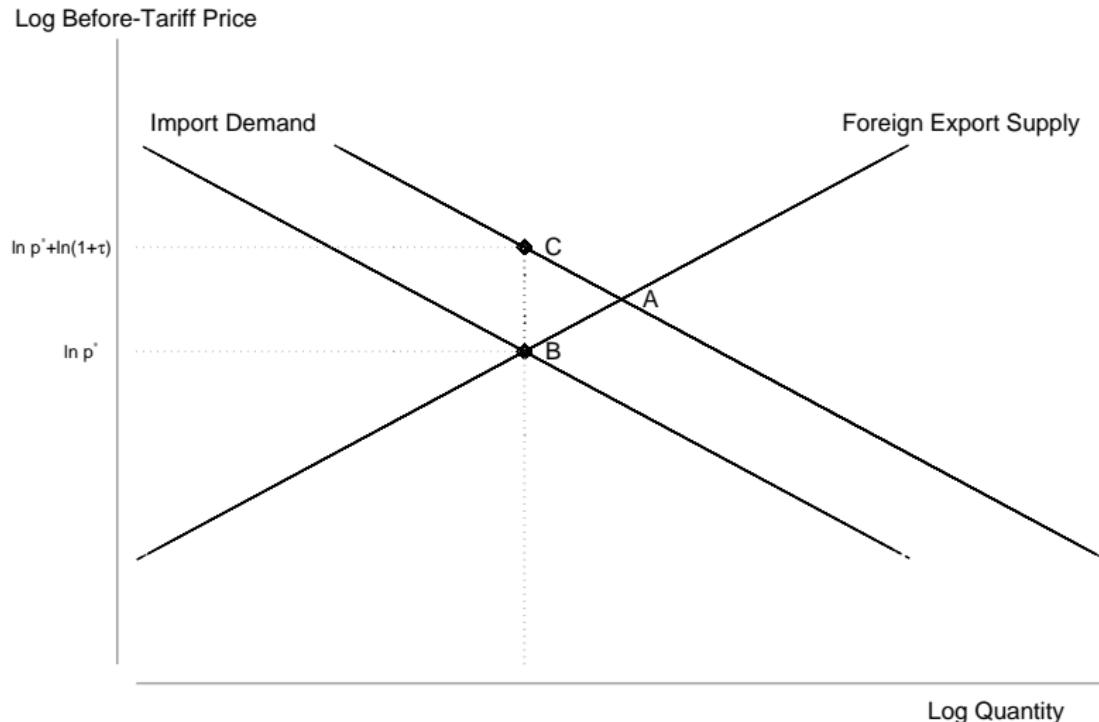
$$m_{igt} = A_{igt} ((1 + \tau_{igt}) p_{igt}^*)^{-\sigma}$$
$$p_{igt}^* = z_{igt}^* m_{igt}^{\omega^*}$$

- Estimate:

$$\Delta \ln m_{igt} = \alpha_{gt}^M + \alpha_{it}^M + \alpha_{is}^M - \sigma \Delta \ln ((1 + \tau_{igt}) p_{igt}^*) + \varepsilon_{igt}^M$$
$$\Delta \ln p_{igt}^* = \alpha_{gt}^X + \alpha_{it}^X + \alpha_{is}^X + \omega^* \Delta \ln m_{igt} + \varepsilon_{igt}^X$$

- τ_{igt} identifies both elasticities if uncorrelated with supply/demand shocks
 - Romalis 04, Zoutman et al. 18
- Checks
 - Correlation with pre-existing trends
 - Event study of targeted vs untargeted varieties
 - Allow for leads/lags

Import Demand, Foreign Export Supply $\{\sigma, \omega^*\}$: Intuition



A denotes the pre-tariff equilibrium. If the tariff increases, import demand falls.
B denotes the price the exporter receives.
C denotes the price the importer pays.

Variety-Level Import Elasticities $\{\sigma, \omega^*\}$

	(1) $\Delta \ln m_{igt}$	(2) $\Delta \ln p_{igt}$	(3) $\Delta \ln p_{igt}^*$	(4) $\Delta \ln m_{igt}$
$\Delta \ln(1 + \tau_{igt})$	-1.47*** (0.24)	0.58*** (0.13)		
$\Delta \ln m_{igt}$			-0.00 (0.05)	
$\Delta \ln p_{igt}$				-2.53*** (0.26)
Product \times Time FE	Yes	Yes	Yes	Yes
Country \times Time FE	Yes	Yes	Yes	Yes
Country \times Sector FE	Yes	Yes	Yes	Yes
1st-Stage F			36.5	21.2
Bootstrap CI			[-0.14, 0.10]	[1.75, 3.02]
R2	0.13	0.11	0.00	.
N	2,454,023	2,454,023	2,454,023	2,454,023

Notes: cluster by country and hs8

- Implies: $\overline{\Delta \ln(p_{igt}^* m_{igt})} = -\sigma \underbrace{\frac{1 + \omega^*}{1 + \omega^* \sigma}}_{2.53} \underbrace{\Delta \ln(1 + \tau_{igt})}_{12.5\%} = -31.7\%$

Other Elasticities

- Aggregate tariffs to product and sector level to estimate upper nests
- Across imported HS-10 products: $s_{Mgt} = a_{Mg} \left(\frac{P_{Mg}}{P_{Ms}} \right)^{1-\eta}$
 - ▶ Estimate $\hat{\eta} = 1.53$ (se 0.27)
 - ▶ Targeted product imports fall 2.5%
 - ▶ No impact of tariffs on product-level import price indexes
- Between imports and domestic in 4-digit NAICS: $\frac{P_{Ms} M_s}{P_{Ds} D_s} = \frac{A_{Ms}}{A_{Ds}} \left(\frac{P_{Ms}}{P_{Ds}} \right)^{1-\kappa}$
 - ▶ Estimate $\hat{\kappa} = 1.19$ (se 0.49)
 - ▶ Targeted sector imports fall 0.2%
- Variety-level exports: $x_{ig} = a_{ig}^* ((1 + \tau_{ig}^*) p_{ig}^X)^{-\sigma^*}$
 - ▶ Estimate $\hat{\sigma^*} = 1.04$ (se 0.32)
 - ▶ Targeted variety exports fall 9.9%

Road Map

- Data and Event Study
- Trade Elasticities
- **Aggregate and Regional Impacts**

Aggregate Impacts

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

- **Neoclassical Model**

- ▶ Static
- ▶ Flexible prices
- ▶ No labor mobility

- **U.S. demand**

- ▶ Cobb-Douglas over 88 traded sectors, 1 NT sector
- ▶ Within sector: CES (σ, η, κ) over products and countries

- **U.S. supply**

- ▶ Cobb-Douglas in labor and capital (fixed), intermediate inputs (may adjust)
- ▶ 3067 U.S. counties

- **Trade partners**

- ▶ Movements along variety-level demand (σ^*) and supply (ω^*)

- **Matched to 2016 County Business Patterns, I-O tables, trade**

Import Prices

$$\hat{p}_{ig} = \frac{\omega^*}{1 + \omega^* \sigma} \left(\hat{E}_s + (\kappa - 1) \hat{P}_s + (\eta - \kappa) \hat{P}_{Ms} + (\sigma - \eta) \hat{p}_{gM} \right) + \frac{1}{1 + \omega^* \sigma} \frac{d\tau_{ig}}{1 + \tau_{ig}}$$
$$\approx \frac{d\tau_{ig}}{1 + \tau_{ig}}$$

- Implies:

- ▶ $m' \Delta p^M = -.27\%$ of GDP
- ▶ = import share of GDP (15%) \times targeted share of imports (13%) \times avg. tariff increase (14%)

Export Prices

$$\hat{p}_{ig}^X = \hat{p}_s = \frac{1}{\Phi_s} \left(DomExp_s + Tariff_s + Cost_s \right)$$

where (imposing $\omega = 0$)

$$DomExp_s \equiv \frac{P_{Ds} D_s}{p_s Q_s} \hat{E}_s$$

$$Tariff_s \equiv (\kappa - 1) \sum_{g \in \mathcal{G}_s} \sum_{i \in \mathcal{I}} \frac{P_{Ds} D_s}{p_s Q_s} \frac{p_{ig} m_{ig}}{E_s} \frac{d\tau_{ig}}{1 + \tau_{ig}} - \sigma^* \sum_{g \in \mathcal{G}_s} \sum_{i \in \mathcal{I}} \frac{P_{Dg} x_{ig}}{p_s Q_s} \frac{d\tau_{ig}^*}{1 + \tau_{ig}^*}$$

$$Cost_s \equiv \frac{\alpha_{I,s}}{\alpha_{K,s}} \hat{\phi}_s + \sum_{r \in \mathcal{R}} \frac{p_s Q_{sr}}{p_s Q_s} \frac{\alpha_{L,s}}{\alpha_{K,s}} \hat{w}_{sr}$$

$$\Phi_s \equiv \frac{1 - \alpha_{K,s}}{\alpha_{K,s}} + \frac{P_{Ds} D_s}{p_s Q_s} \frac{P_{Ds} D_s}{E_s} + \frac{P_{Ds} D_s}{p_s Q_s} \left(1 - \frac{P_{Ds} D_s}{E_s} \right) \kappa + \left(1 - \frac{P_{Ds} D_s}{p_s Q_s} \right) \sigma^*$$

- Implies:

- ▶ $x' \Delta p^X = 0.05\% \text{ of GDP}$
- ▶ $= \text{export share of GDP (7\%)} \times \text{export price increase (0.7\%)}$

Export Prices, No Retaliation

$$\hat{p}_{ig}^X = \hat{p}_s = \frac{1}{\Phi_s} \left(DomExp_s + Tariff_s + Cost_s \right)$$

where (imposing $\omega = 0$)

$$DomExp_s \equiv \frac{P_{Ds} D_s}{p_s Q_s} \hat{E}_s$$

$$Tariff_s \equiv (\kappa - 1) \sum_{g \in \mathcal{G}_s} \sum_{i \in \mathcal{I}} \frac{P_{Ds} D_s}{p_s Q_s} \frac{p_{ig} m_{ig}}{E_s} \frac{d\tau_{ig}}{1 + \tau_{ig}}$$

$$Cost_s \equiv \frac{\alpha_{I,s}}{\alpha_{K,s}} \hat{\phi}_s + \sum_{r \in \mathcal{R}} \frac{p_s Q_{sr}}{p_s Q_s} \frac{\alpha_{L,s}}{\alpha_{K,s}} \hat{w}_{sr}$$

$$\Phi_s \equiv \frac{1 - \alpha_{K,s}}{\alpha_{K,s}} + \frac{P_{Ds} D_s}{p_s Q_s} \frac{P_{Ds} D_s}{E_s} + \frac{P_{Ds} D_s}{p_s Q_s} \left(1 - \frac{P_{Ds} D_s}{E_s} \right) \kappa + \left(1 - \frac{P_{Ds} D_s}{p_s Q_s} \right) \sigma^*$$

- Implies:

- ▶ $x' \Delta p^X = 0.09\%$ of GDP
- ▶ = export share of GDP (7%) \times export price increase (1.2%)

Aggregate Impacts

$$\underbrace{-\mathbf{m}' \Delta \mathbf{p}^M}_{EV^M} + \underbrace{\mathbf{x}' \Delta \mathbf{p}^X}_{EV^X} + \Delta R = EV$$

	EV^M (1)	EV^X (2)	ΔR (3)	EV (4)
2018 Trade War				
Change (\$ b)	-51.0 [-54.8,-47.2]	9.4 [4.1,15.6]	34.3 [32.3,36.1]	-7.2 [-14.4,0.8]
Change (% GDP)	-0.27 [-0.29,-0.25]	0.05 [0.02,0.08]	0.18 [0.17,0.19]	-0.04 [-0.08,0.00]

	2018 U.S. Tariffs and No Retaliation			
Change (\$ b)	-50.9 [-52.9,-49.0]	16.6 [13.2,20.3]	34.8 [32.8,36.5]	0.5 [-4.0,5.7]
Change (% GDP)	-0.27 [-0.28,-0.26]	0.09 [0.07,0.11]	0.19 [0.18,0.20]	0.00 [-0.02,0.03]

$\{\hat{\sigma} = 2.53, \hat{\eta} = 1.53, \hat{\kappa} = 1.19, \hat{\omega}^* = -0.00, \hat{\sigma}^* = 1.04\}$. Bootstrapped 10% confidence intervals based on 1000 simulations.

Regional Impacts in the News: Imports

The New York Times



Chicago Tribune

As tariffs begin, Northwest Indiana auto workers and farmers share concerns



THE WALL STREET JOURNAL.

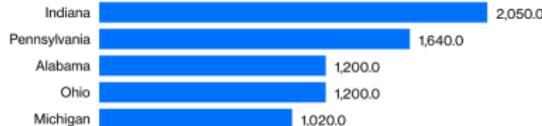
In a Pennsylvania Steel Town, Donald Trump's Tariff Is a Winner

U.S. Steel to Expand Under Tariffs

Metal maker to restart construction at Alabama plant as higher profit

Swing State Steel

States with the biggest number of metal-refining furnace operators and tenders



Bloomberg Businessweek

You can't find a clearer example of the steel industry's disagreement over the Trump tariffs than in Canton, Ohio, where the tariffs are pitting Timken against Timken. TimkenSteel Corp., which makes steel

Regional Impacts in the News: Exports

The New York Times



Trump's Trade War Leaves American Whiskey on the Rocks



The Washington Post

North Dakota soybean farmers, caught in the trade war, watch the season run out on their crop

Des Moines Register

Iowa farming's \$2.2 billion trade loss could ripple through state's economy

THE WALL STREET JOURNAL.

Take Our Cheese, Please: American Cheese Makers Suffer Under New Tariffs

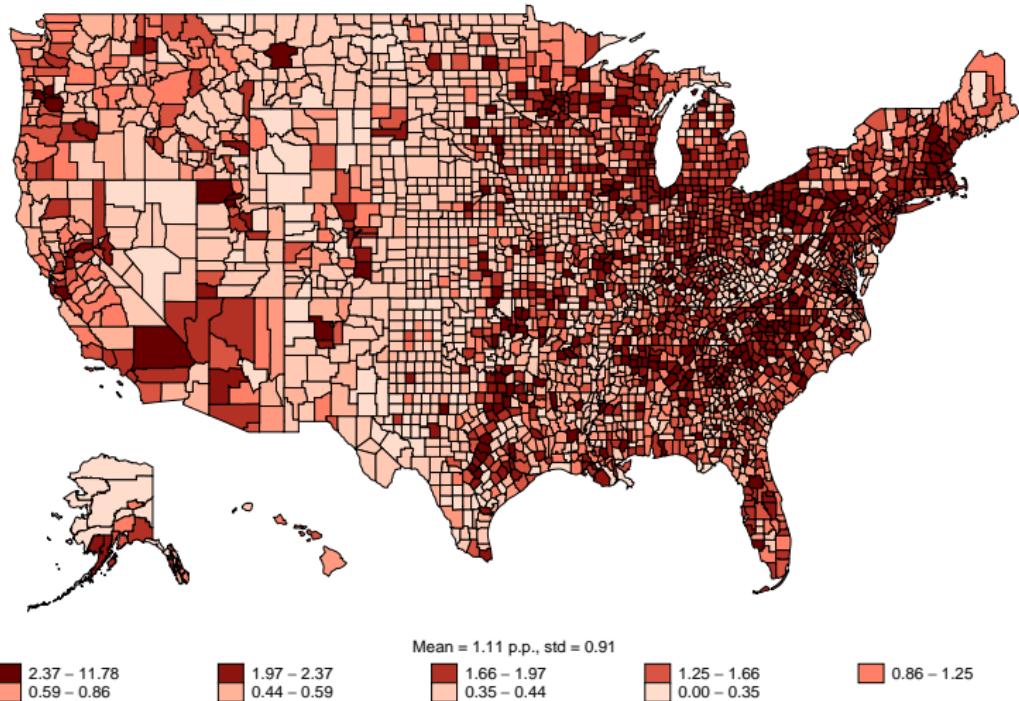
Chinese, Mexican tariffs on U.S. cheese and whey are hurting farmers and driving up stockpiles



County-Level Import Tariff Changes

Panel A: Tariff Increase on US Imports, 2017-2018

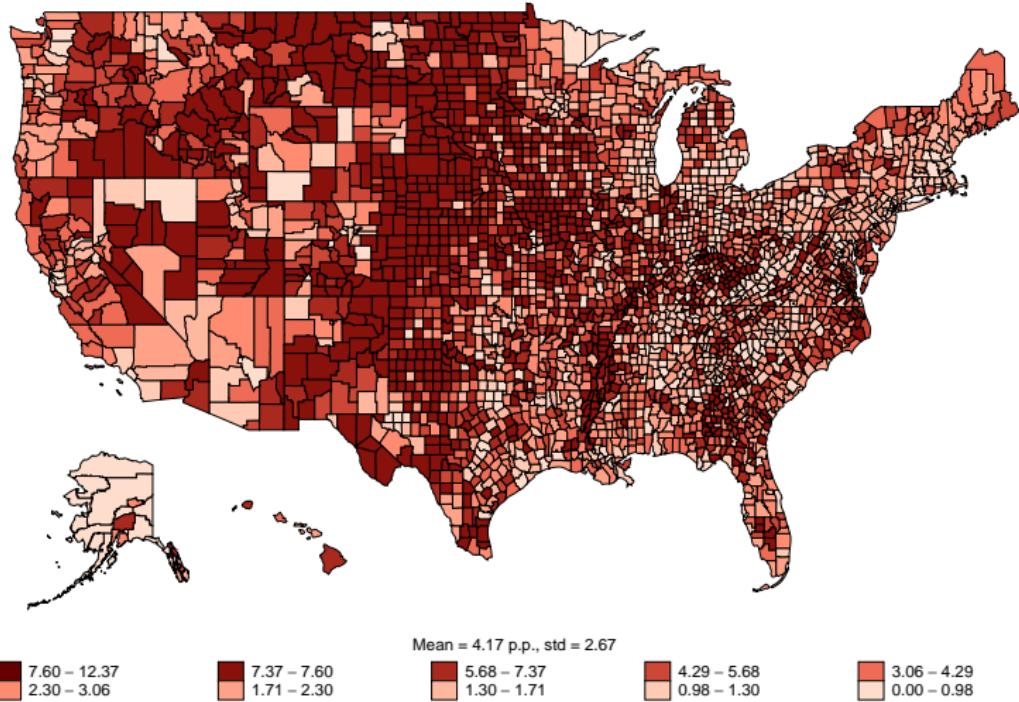
Weighted by Variety-Level US Import Share and County-Level 2016 Tradeable Sector Employee Wage Bill



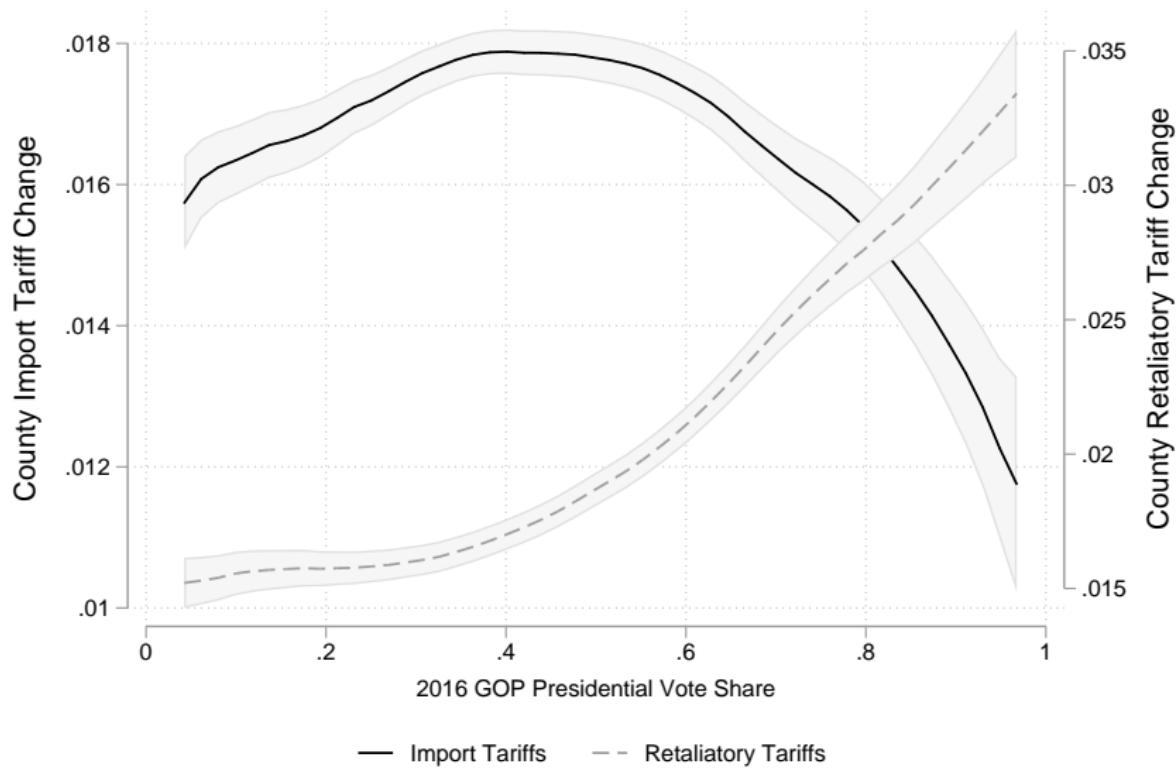
County-Level Retaliatory Tariff Changes

Panel B: Tariff Increase on US Exports, 2017-2018

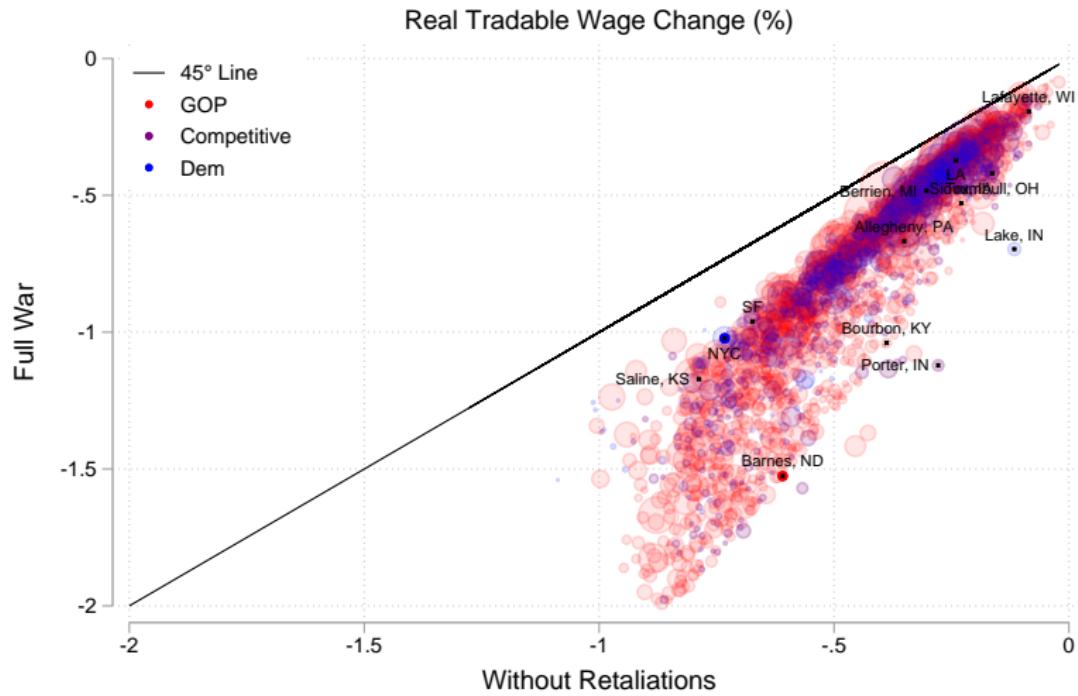
Weighted by Variety-Level US Export Share and County-Level 2016 Tradeable Sector Employee Wage Bill



U.S. Tariffs, Retaliation, and 2016 GOP Presidential Vote Share

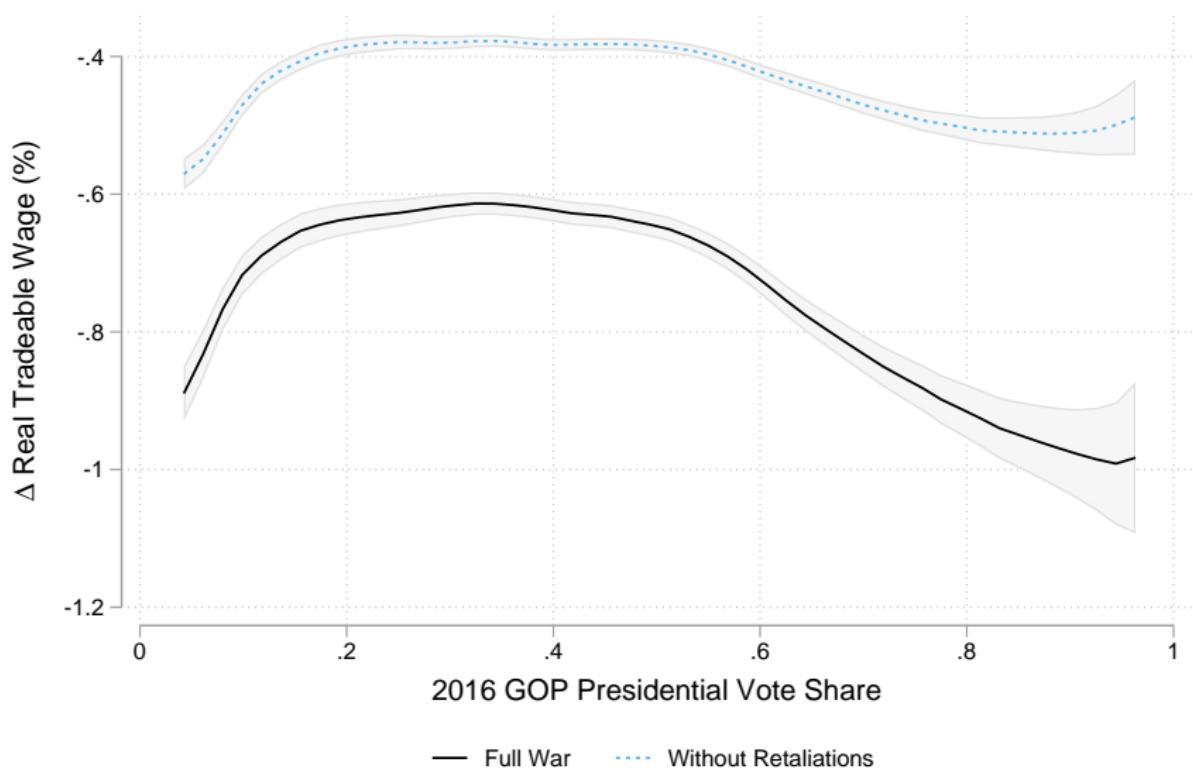


Real Wage Change (Full War vs No Retaliation)



- Real wage decline across counties: avg. 1.0% (s.d. 0.5%).

Tradeable Wages and 2016 GOP Vote Share



Conclusion

- ① **Large and declines in import and export values**
- ② **No import price decline from targeted countries**
 - ▶ Complete pass-through to import prices
- ③ **Very small aggregate effect (-.04% GDP)**
 - ▶ Consumer loss (final use+intermediate): -.27% GDP
- ④ **Higher import protection in electorally competitive counties**
 - ▶ but...Republican counties most negatively affected due to retaliation
- **Caveats**
 - ▶ Retail prices, uncertainty, country-level effects, longer run,...