

# The Return to Protectionism

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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
<b>Total</b>		<b>12,043</b>	<b>302,970</b>	<b>12.7</b>	<b>2.6</b>	<b>16.6</b>

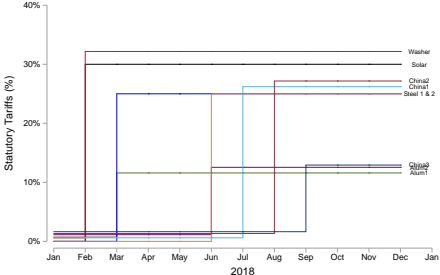
# Summary Statistics: Retaliatory Tariffs

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

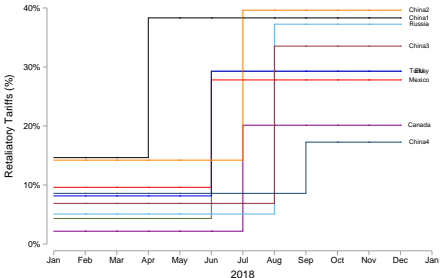
Retaliating Country	Date Enacted	Products	2017 Exports		Tariff (%)	
		(# HS-10)	(mil USD)	(%)*	2017	2018
China	Apr-Sep, 2018	7,474	92,518	6.0	8.4	18.9
Mexico	Jun 5, 2018	232	6,746	0.4	9.6	28.0
Turkey	Jun 21, 2018	244	1,554	0.1	9.7	31.8
European Union	Jun 22, 2018	303	8,244	0.5	3.9	29.2
Canada	Jul 1,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

# Trade War Timeline

### U.S. Tariffs



### Retaliatory Tariffs





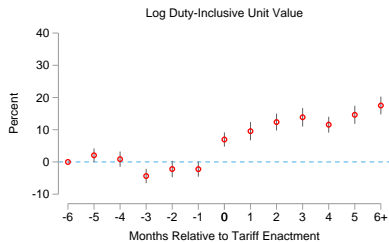
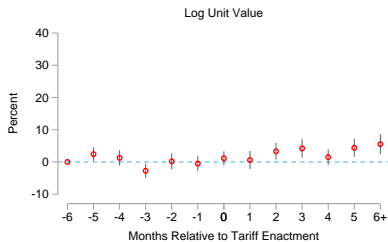
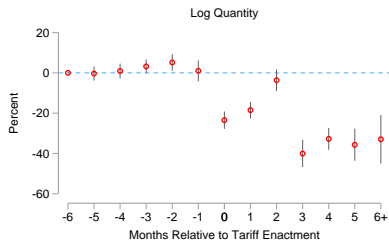
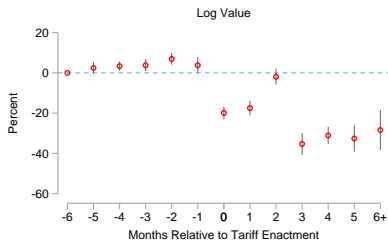
# Event Study

- Compare trends of targeted varieties relative to untargeted varieties:

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

- ▶ FEs: variety ( $\alpha_{ig}$ ), product-time ( $\alpha_{gt}$ ), country-time ( $\alpha_{it}$ )
  - ▶ 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:  $m_g = \left( \sum_i a_{ig}^{\frac{1}{\sigma}} m_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$
- ▶ 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:  $C_s + I_s = \left( A_{D_s}^{\frac{1}{\kappa}} D_s^{\frac{\kappa-1}{\kappa}} + A_{M_s}^{\frac{1}{\kappa}} M_s^{\frac{\kappa-1}{\kappa}} \right)^{\frac{\kappa}{\kappa-1}}$

## Variety Import Demand and Export Supply

- Imports and exports of product  $g$  from country  $i$ :

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

$$p_{igt}^* = z_{igt}^* m_{igt}^{\omega^*}$$

- Estimate:

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

$$\Delta \ln p_{igt}^* = \alpha_{gt}^X + \alpha_{it}^X + \alpha_{is}^X + \omega^* \Delta \ln m_{igt} + \varepsilon_{igt}^X$$

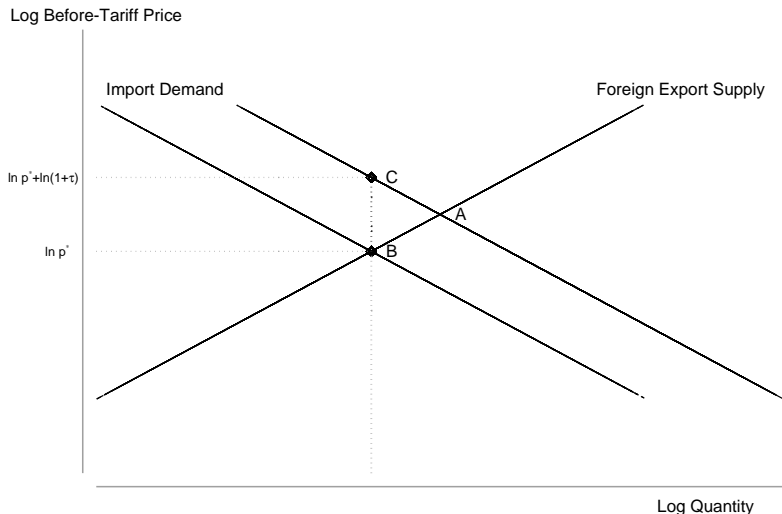
- $\tau_{igt}$  identifies both elasticities if uncorrelated with supply/demand shocks

- ▶ 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)	(2)	(3)	(4)
	$\Delta \ln m_{igt}$	$\Delta \ln p_{igt}$	$\Delta \ln p_{igt}^*$	$\Delta \ln m_{igt}$
$\Delta \ln(1 + \tau_{igt})$	-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:  $\overline{\Delta \ln(p_{igt}^* m_{igt})} = -\underbrace{\sigma}_{2.53} \underbrace{\frac{1 + \omega^*}{1 + \omega^* \sigma} \Delta \ln(1 + \tau_{igt})}_{12.5\%} = -31.7\%$

# Other Elasticities

- Aggregate tariffs to product and sector level to estimate upper nests

- Across imported HS-10 products:  $s_{Mgt} = a_{Mgt} \left( \frac{P_{Mgt}}{P_{Ms}} \right)^{1-\eta}$

- ▶ 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:  $x_{ig} = a_{ig}^* \left( (1 + \tau_{ig}^*) p_{ig}^X \right)^{-\sigma^*}$

- ▶ 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

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

## ● Neoclassical Model

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

## ● U.S. demand

- ▶ Cobb-Douglas over 88 traded sectors, 1 NT sector
- ▶ Within sector: CES ( $\sigma, \eta, \kappa$ ) 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 ( $\sigma^*$ ) and supply ( $\omega^*$ )

## ● 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:

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

# Export Prices

$$\hat{p}_{ig}^X = \hat{p}_s = \frac{1}{\Phi_s} \left( \text{DomExp}_s + \text{Tariff}_s + \text{Cost}_s \right)$$

where (imposing  $\omega = 0$ )

$$\text{DomExp}_s \equiv \frac{P_{D_s} D_s}{p_s Q_s} \hat{E}_s$$

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

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

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

- Implies:

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

# Export Prices, No Retaliation

$$\hat{p}_{ig}^X = \hat{p}_s = \frac{1}{\Phi_s} \left( \text{Dom}\hat{\text{Exp}}_s + \text{Tariff}_s + \hat{\text{Cost}}_s \right)$$

where (imposing  $\omega = 0$ )

$$\text{Dom}\hat{\text{Exp}}_s \equiv \frac{P_{D_s} D_s}{p_s Q_s} \hat{E}_s$$

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

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

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

## • Implies:

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

# Timeline: 2019 Waves

- **\$436b imports targeted, \$203b retaliations**

- *May 2019*

- ▶ 15% tariff increase on \$200b of already targeted Chinese varieties
- ▶ China retaliates on already targeted \$60b of US exports
- ▶ US removes steel/aluminum tariffs on Canada and Mexico (but not EU/others)

- *June 2019*

- ▶ US removes India from Generalized System of Preferences (GSP) list
- ▶ India retaliates with tariffs on \$1.3b of US exports (mostly agriculture)

- *Sept 2019*

- ▶ 10% tariff increase on ~\$125b of previously untargeted Chinese varieties
- ▶ China retaliates on previously untargeted ~\$75b of US exports

- *Oct 2019*

- ▶ US enacts 10-25% tariffs increases on ~\$7.5b imports from the EU.
- ▶ EU promises retaliation, but has not yet acted.

- *Dec 2019*

- ▶ US and China call off further escalations. Both countries lower some, but not all, trade war tariffs. China commits to increase purchases of U.S. exports. Negotiations continue...

## Aggregate Impacts: + 2019 Waves

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

	$EV^M$	$EV^X$	$\Delta R$	$EV$
	(1)	(2)	(3)	(4)
	Full Trade War			
Change (\$ b)	-65.2	13.0	44.7	-7.4
Change (% GDP)	-0.35	0.07	0.24	-0.04
	Without Retaliation			
Change (\$ b)	-63.0	13.5	47.7	-1.8
Change (% GDP)	-0.34	0.07	0.26	-0.01

top= $\{\hat{\sigma} = 2.53, \hat{\eta} = 1.53, \hat{\kappa} = 1.19, \hat{\omega}^* = -0.00, \hat{\sigma}^* = 1.04\}$ .

bottom= $\{\hat{\sigma} = 2.35, \hat{\eta} = 1.1, \hat{\kappa} = 1.19, \hat{\omega}^* = 0.06, \hat{\sigma}^* = 1.05\}$ .

# 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

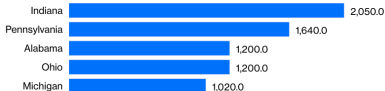
### U.S. Steel to Expand Under Tariffs

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



### A Farmers Tough Year on the Trade War's Kansas Front

From planning to harvest, the grain belt's rhythms and prospects have been disrupted by the government's tariff battle with China.

### *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

PART OF THE USA TODAY NETWORK

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

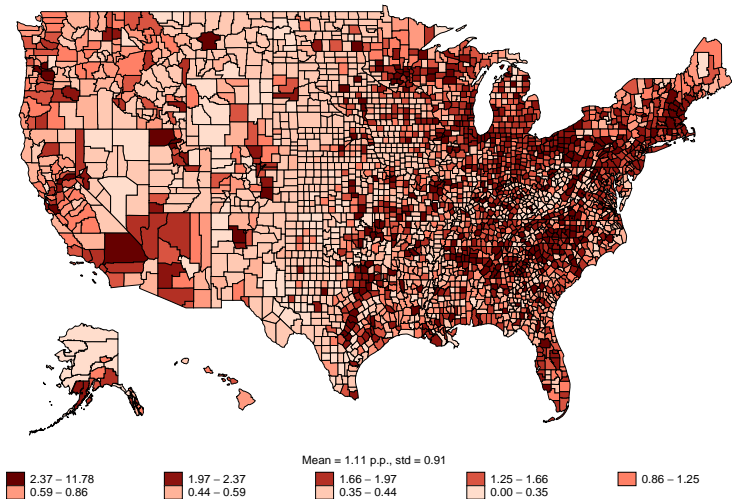
Chinese, Mexican tariffs on U.S. cheese and why are hurting farmers and driving up stockpiles



# County-Level Import Tariff Changes

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

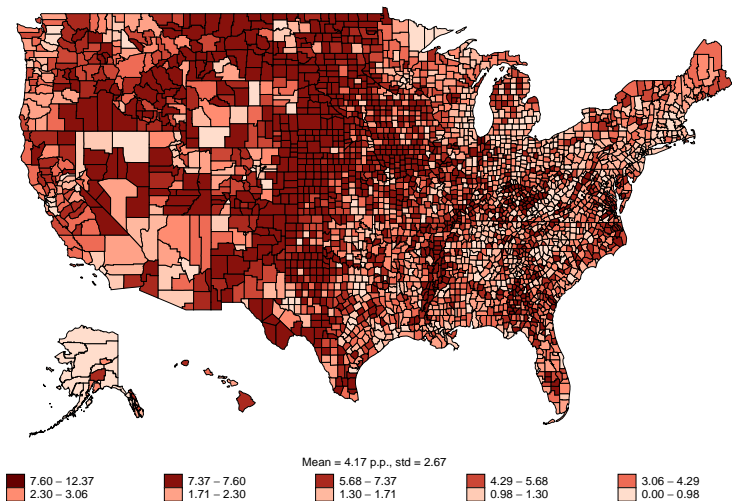
Weighted by Variety-Level US Import Share and County-Level 2016 Tradeable Sector Employee Wage Bill



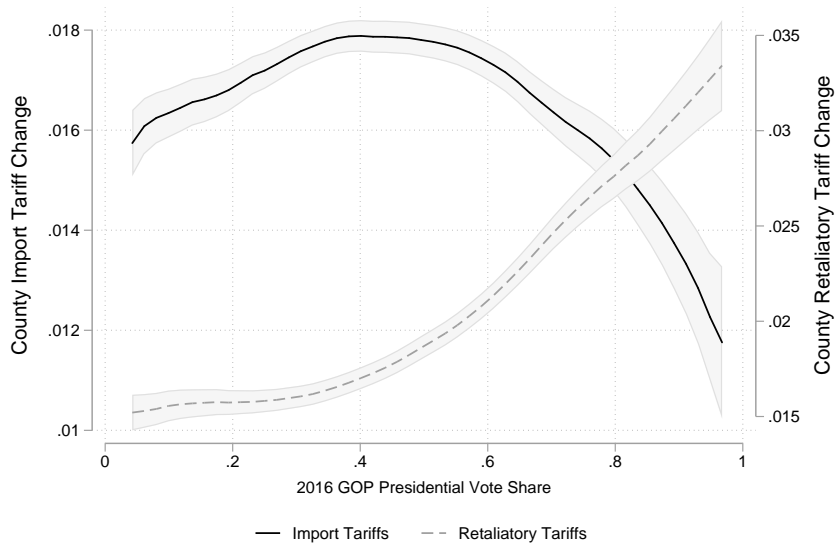
# County-Level Retaliatory Tariff Changes

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

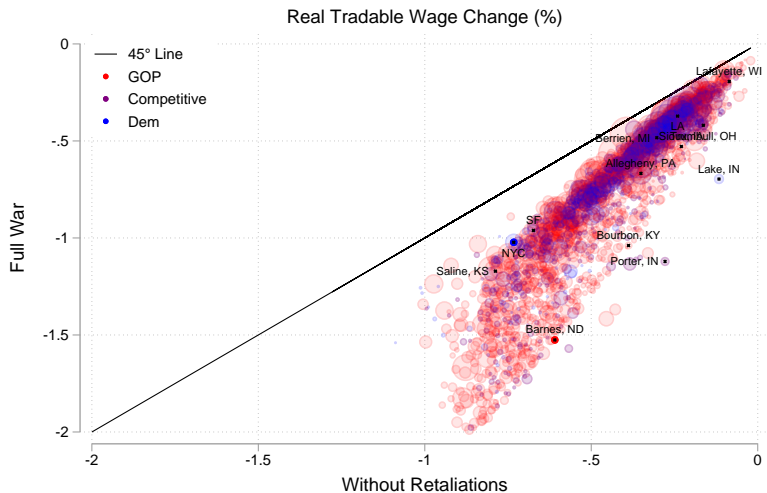
Weighted by Variety-Level US Export Share and County-Level 2016 Tradeable Sector Employee Wage Bill



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

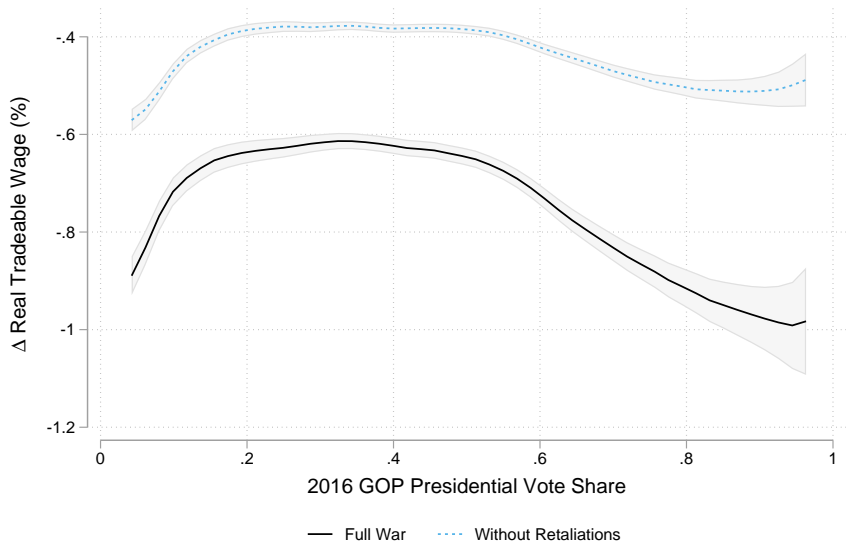


# Real Wage Change (Full War vs No Retaliation)



● 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,...