The Return to Protectionism

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

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

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

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

U.S. Tariffs

Statutory Tariffs (%)

Retaliatory 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 ($\alpha_{ig}$), 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: \( m_g = \left( \sum_i a_{ig} m_{ig} \right)^{\frac{\sigma}{\sigma-1}} \)
  - Middle: 4-digit NAICS import demand: \( M_s = \left( \sum_{g \in G_s} a_{Mg} m_g^\frac{\eta}{\eta-1} \right)^{\frac{\eta}{\eta-1}} \)
  - 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 $i$:
  \[ m_{igt} = A_{igt} \left((1 + \tau_{igt}) p^*_{igt}\right)^{-\sigma} \]
  \[ p^*_{igt} = z^*_{igt} m^\omega_{igt} \]

- Estimate:
  \[ \Delta \ln m_{igt} = \alpha^M_{gt} + \alpha^M_{it} + \alpha^M_{is} - \sigma \Delta \ln \left((1 + \tau_{igt}) p^*_{igt}\right) + \varepsilon^M_{igt} \]
  \[ \Delta \ln p^*_{igt} = \alpha^X_{gt} + \alpha^X_{it} + \alpha^X_{is} + \omega^* \Delta \ln m_{igt} + \varepsilon^X_{igt} \]

- $\tau_{igt}$ 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 \( \{\sigma, \omega^*\} \)

<table>
<thead>
<tr>
<th>( \Delta \ln (1 + \tau_{igt}) )</th>
<th>( \Delta \ln m_{igt} )</th>
<th>( \Delta \ln p_{igt} )</th>
<th>( \Delta \ln p^*_{igt} )</th>
<th>( \Delta \ln m_{igt} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta \ln (1 + \tau_{igt}) )</td>
<td>-1.47***</td>
<td>0.58***</td>
<td>0.00</td>
<td>-2.53***</td>
</tr>
<tr>
<td>( \Delta \ln m_{igt} )</td>
<td>(0.24)</td>
<td>(0.13)</td>
<td></td>
<td>(0.05)</td>
</tr>
<tr>
<td>( \Delta \ln p_{igt} )</td>
<td></td>
<td></td>
<td></td>
<td>(0.26)</td>
</tr>
</tbody>
</table>

Product × Time FE | Yes | Yes | Yes | Yes |
Country × Time FE | Yes | Yes | Yes | Yes |
Country × 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 | 0.00 |
N | 2,454,023 | 2,454,023 | 2,454,023 | 2,454,023 |

Notes: cluster by country and hs8

\[ \Delta \ln \left( p^*_{igt} m_{igt} \right) = -\sigma \left( 1 + \omega^* \right) \left( 1 + \omega^* \sigma \right) \Delta \ln (1 + \tau_{igt}) = -31.7\% \]
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:  
  \[ x_{ig} = a_{ig}^* \left( \left( 1 + \tau_{ig}^* \right) p_{ig}^X \right)^{-\sigma^*} \]
  - 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

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

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

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

where (imposing \( \omega = 0 \))

\[
\text{DomExp}_s \equiv \frac{P_{Ds} D_s}{p_s Q_s} \hat{E}_s
\]

\[
\text{Tariff}_s \equiv (\kappa - 1) \sum_{g \in G_s} \sum_{i \in I} \frac{P_{Ds} D_s}{p_s Q_s} \frac{p_{ig} m_{ig}}{E_s} \frac{d \tau_{ig}}{1 + \tau_{ig}} - \sigma^* \sum_{g \in G_s} \sum_{i \in I} \frac{P_{Dg} x_{ig}}{p_s Q_s} \frac{d \tau^*_{ig}}{1 + \tau^*_{ig}}
\]

\[
\text{Cost}_s \equiv \frac{\alpha_{I,s}}{\alpha_K,s} \hat{\phi}_s + \sum_{r \in R} \frac{p_s Q_{sr}}{p_s Q_s} \frac{\alpha_{L,s}}{\alpha_K,s} \hat{w}_{sr}
\]

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

- Implies:
  - \( x' \Delta p^X = 0.05\% \) of GDP
  - \( = \) export share of GDP (7%) \( \times \) export price increase (0.7%)
Export Prices, No Retaliation

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

where (imposing \( \omega = 0 \))

\[ \text{DomExp}_s \equiv \frac{P_{Ds}D_s}{p_sQ_s} \hat{E}_s \]

\[ \text{Tariff}_s \equiv (\kappa - 1) \sum_{g \in G} \sum_{i \in I} \frac{P_{Ds}D_s}{p_sQ_s} \frac{p_{ig}m_{ig}}{E_s} \frac{d_{	au_{ig}}}{1 + \tau_{ig}} \]

\[ \text{Cost}_s \equiv \frac{\alpha_{I,s}}{\alpha_{K,s}} \Phi_s + \sum_{r \in R} \frac{p_sQ_{sr}}{p_sQ_s} \frac{\alpha_{L,s}}{\alpha_{K,s}} \hat{w}_{sr} \]

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

- Implies:
  - \( x' \Delta p^X = 0.09\% \text{ of GDP} \)
  - \( = \text{export share of GDP (7\%) } \times \text{export price increase (1.2\%)} \)
## Aggregate Impacts

\[
-m' \Delta p^M_{EV^M} + x' \Delta p^X_{EV^X} + \Delta R = EV
\]

<table>
<thead>
<tr>
<th></th>
<th>EV^M</th>
<th>EV^X</th>
<th>ΔR</th>
<th>EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>Change ($ b)</td>
<td>-51.0</td>
<td>9.4</td>
<td>34.3</td>
<td>-7.2</td>
</tr>
<tr>
<td></td>
<td>[-54.8,-47.2]</td>
<td>[4.1,15.6]</td>
<td>[32.3,36.1]</td>
<td>[-14.4,0.8]</td>
</tr>
<tr>
<td>Change (% GDP)</td>
<td>-0.27</td>
<td>0.05</td>
<td>0.18</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>[-0.29,-0.25]</td>
<td>[0.02,0.08]</td>
<td>[0.17,0.19]</td>
<td>[-0.08,0.00]</td>
</tr>
</tbody>
</table>

### 2018 Trade War

### 2018 U.S. Tariffs and No Retaliation

\{ \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

‘How Long Can We Last?’ Trump’s Tariffs Hit Home in the U.S.

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

- Indiana: 2,050.0
- Pennsylvania: 1,640.0
- Alabama: 1,200.0
- Ohio: 1,200.0
- Michigan: 1,020.0

Whirlpool Wanted Washer Tariffs. It Wasn’t Ready for a Trade Showdown.

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 Farmer’s 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.

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

Trump’s Trade War Leaves American Whiskey on the Rocks

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

Mean = 1.11 p.p., std = 0.91
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

Mean = 4.17 p.p., std = 2.67
U.S. Tariffs, Retaliation, and 2016 GOP Presidential Vote Share

The graph shows the relationship between County Import Tariff Change and County Retaliatory Tariff Change, as well as the 2016 GOP Presidential Vote Share. The graph includes lines representing Import Tariffs and Retaliatory Tariffs, with the y-axis indicating the change in tariffs and the x-axis showing the vote share. The data suggests a correlation between higher tariffs and the vote share for the 2016 GOP presidential candidate.
Real wage decline across counties: avg. 1.0% (s.d. 0.5%).
Tradeable Wages and 2016 GOP Vote Share

Δ Real Tradeable Wage (%) vs. 2016 GOP Presidential Vote Share

- Full War
- Without Retaliation

Graph showing the relationship between Δ Real Tradeable Wage (%) and 2016 GOP Presidential 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,...