Trade Policy Through Supply Chains

ECON 871

Overview

Last Week: Effects of the 2018 Trade War on prices, production, and wages.

Today: Effects of tariffs/trade policy through supply chains.

- Last "empirical trade policy" topic.
- Flaaen and Pierce (2019), Bown et al. (2020), Cox (2023)

Key Points: Effects of imposing tariffs on upstream industries...

- Spread through supply chains to downstream industries.
- Can be hard to identify.
- Are persistent.

Flaaen and Pierce (2019)

Goal: Disentangle the effects of the 2018-19 tariffs into three components:

1. Effects of **import protection**.
2. Effects of **export retaliation**.
3. Effects of **rising input costs**.

The authors accomplish this by constructuring industry-level measures capturing each of these channels, then doing an event-study with the 2018 tariffs.

Flaaen and Pierce (2019)

Industry-level measure of **import protection**:

$$\text{Import Protection}_i = \frac{\sum_{pc \in \Omega^I} imp_{ipc} \Delta\tau_{ipc}}{Q_i + imp_i - exp_i}$$

- Ω^I is the list of U.S. imported product-country pairs (pc) subject to new tariffs.
- imp_{ipc} is imports of HS8-digit product from country c.
- imp_i and exp_i are imports and exports in industry i.
- Q_i is domestic production (value of shipments from NBER CES Mfg Industry Database).
- $\Delta\tau_{ipc}$ is the change in tariff rate (p.p.)

Think of this as a weighted average increase in import tariffs in an industry, where the weight is a product $\times$ country share of domestic absorption.

Flaaen and Pierce (2019)

Industry-level measure of **export retaliation** is similar:

$$\text{Export Retaliation}_i = \frac{\sum_{pc \in \Omega^E} exp_{ipc} \Delta\tau_{ipc}}{Q_i}$$

- Ω^E is the list of U.S. exported product-country pairs subject to retaliatory tariffs.
- exp_{ipc} and Q_i are as before.
- $\Delta\tau_{ipc}$ is the increase in tariffs on U.S. exports

Think of this as a weighted average increase in tariffs on U.S. exports, where the weight is the product $\times$ country export share of production.

Flaaen and Pierce (2019)

Lastly, the **rising input cost channel** measures the impact of tariffs via supply-chain linkages.

Using the BEA's input-output tables, they first construct a measure of the **share of input costs of commodity** j **in industry** i:

$$SC_{ij} = \frac{use_{ij}}{M_i + Comp_i}$$

- use_{ij} is the use of commodity j by industry i from the *Use Tables*.
- M_i are the cost of intermediate inputs in industry i.
- $Comp_i$ is compensation of employees in industry i.

Flaaen and Pierce (2019)

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Then, they construct the **tariff-affected import share** of domestic absorption of commodity j as:

$$TIS_j = \frac{\sum_{pc \in \Omega^I} imp_{jpc} \Delta\tau_{jpc}}{Q_j + imp_j - exp_j}$$

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Multiplying the two terms together, they get the **tariff-affected import share of costs in industry** i **from commodity** j:

$$\text{Rising Input Costs}_i = SC_{ij} \times TIS_j$$

Flaaen and Pierce (2019)

Estimating Equation:

$$y_{it} = \alpha + \sum_t \gamma_t \mathbf{1}(M_t = t)(\text{Import Protection}_i) + \sum_t \theta_t \mathbf{1}(M_t = t)(\text{Input Cost}_i)$$
$$\sum_t \lambda_t \mathbf{1}(M_t = t)(\text{Export Retaliation}_i) + \sum_t (\mathbf{1}(M_t = t) \times \mathbf{X_i'} \beta_\mathbf{t}) + \delta_i + \delta_t + \epsilon_{it}$$

- y_{it} is the log of either employment, output, PPI of industry i at time t.
- $\mathbf{1}(M_t = t)$ are month dummies (Feb 2017 to Sep 2019).
- $\mathbf{X_i'}$ are time-varying industry controls, δ_i and δ_t are industry and time FEs.

Flaaen and Pierce (2019)

Main Finding: Rising input costs have the strongest effects of the three channels.

Table 1: Point Estimates of Cumulative Effect by Channel

Variable	Employment	Industrial Production	Producer Prices	Hires	Separations
Import Protection	0.310*	-0.491	-1.266	0.469	0.156
	(0.171)	(1.004)	(0.758)	(1.540)	(1.511)
Rising Input Costs	-3.085***	-1.216	6.538***	-17.351**	3.369
	(0.867)	(2.690)	(1.888)	(6.336)	(2.160)
Export Retaliation	-4.479**	2.732	1.954	-5.190	13.155***
	(1.679)	(2.370)	(3.868)	(9.385)	(4.350)
Industry Fixed Effects	yes	yes	yes	yes	yes
Number of Industries	76	84	82	76	76
Frequency	Month	Month	Month	Quarter	Quarter
Observations	2,508	2,772	2,706	836	836

Sources: Federal Reserve Board, Bureau of Labor Statistics, authors' calculations.
Notes: Table displays coefficient estimates and standard errors of the Finkelstein (2007) approach presented in equation (7) in the text. Estimates for employment are weighted by December 2017 employment, estimates for industrial production and producer prices are weighted by December 2017 value added, and estimates for hires and separations are weighted by fourth quarter 2017 employment. Standard errors (in parentheses) are clustered by 3-digit NAICS industry. $* p < 0.10$, $** p < 0.05$, $*** p < 0.01$.

Cox (2023) Motivation

- Globally integrated supply chains complicate traditional cost-benefit analysis of tariffs.
- **Protection comes at a cost**: tariffs on upstream products raise input costs for downstream manufacturers.
- Tariffs/emergency safeguards often justified as **temporary measures**.
- Little is known about the **long-term behavior** of these spillover effects.

This Paper: Three Contributions

- Create a **new steel-specific input output table** to study the steel tariffs levied by George W. Bush in 2002-2003.
  - Constructed using publicly available exclusion requests filed in response to Trump's tariffs.
- New empirical evidence that **temporary upstream tariffs have persistent impacts** on downstream industries.
  - Exports, output and employment.
- Findings are consistent with a dynamic model of trade featuring **relationship-specific sunk costs** and **uncertainty about future trade policy**.

Literature

- **Empirical Impacts of Trade Policy:** Primarily short-term in nature. Amiti et al. (2019), Cavallo et al. (2019), Fajgelbaum et al. (2020), Flaaen et al. (2020a), Flaaen and Pierce (2019), Handley et al. (2020), Bown et al. (2020), Lake and Liu (2021), Alessandria et al. (2021a)
- **Steel Tariffs:** Correlative or cross-country evidence. Francois and Baughman (2003), Read (2005), Blonigen (2016), Cox and Russ (2020)
- **Input Tariff Liberalization, Transmission of Input Shocks:** Amiti and Konings (2007), Goldberg et al. (2010), Topalova and Khandelwal (2011), Blaum et al. (2018), Boehm et al. (2019), Auer et al. (2019)
- **Sunk Costs, Policy Uncertainty, and Hysteresis:** Baldwin (1988), Baldwin and Krugman (1989), Dixit (1989), Roberts and Tybout (1997), Bernard and Jensen (2004), Das et al. (2007), Atkeson and Burstein (2010), Burstein and Melitz (2013), Alessandria and Choi (2014), Bernard et al. (2018),Caldara et al. (2019), Alessandria et al. (2021b), Xu (2021)

Outline

Policy Setting: Background on the Bush Steel Tariffs

New Steel-Specific Input-Output Table

Estimation Strategy

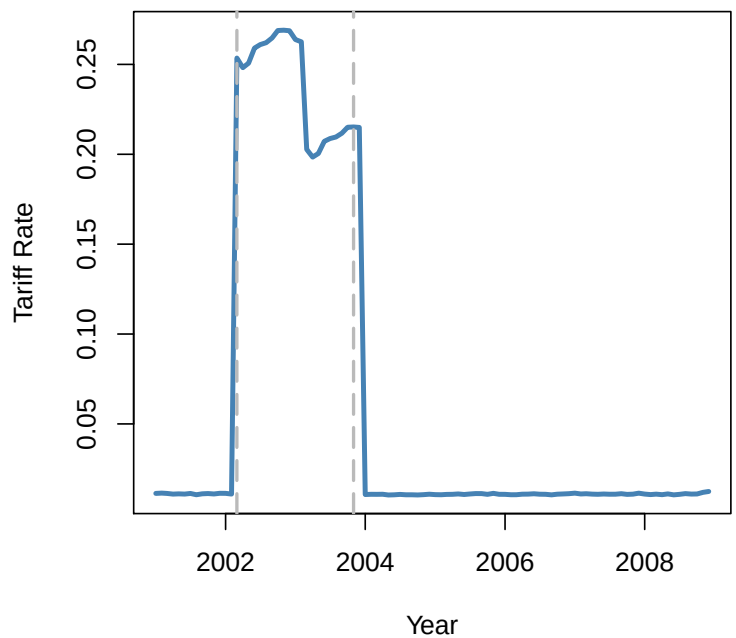
Results

Theoretical Framework

Background: The Bush Steel Tariffs

- Effective March 20, 2002; 3-year phase out.
- 171 steel products (HS8), 13 categories of steel.
- 8 to 30 percent on top of existing rates.
- Eliminated in December 2003.

Figure: Trade-Weighted Average Steel Tariff Rate



▸ Regressions ▸ IRFs

Advantages of this Setting

- **Steel is a broadly used input**—particularly prone to broad downstream effects.
- **Shock!**
  - Temporary increase from near-zero.
  - Politically unexpected.
- **Rates varied** across steel products $\rightarrow$ downstream industries face different input taxes.
- **Long-Term data** available.

Primary Empirical Challenge

- Goal is to compare **relative outcomes of downstream industries** leveraging variation in input tariffs.
- **Empirical Challenge:** linking downstream industries to specific steel inputs/tariffs.
  - **Tariffs highly specific:** *Flat-rolled products of iron or nonalloy steel, of a width of 600 mm or more, hot-rolled, not clad, plated or coated, not in coils, not further worked than hot-rolled, with patterns in relief of a thickness of 4.75mm or more*.
  - **Input-Output table is very broad:** *Iron and Steel Mills and Ferroalloy Manufacturing*.

Outline

Steel-Specific Input-Output Table

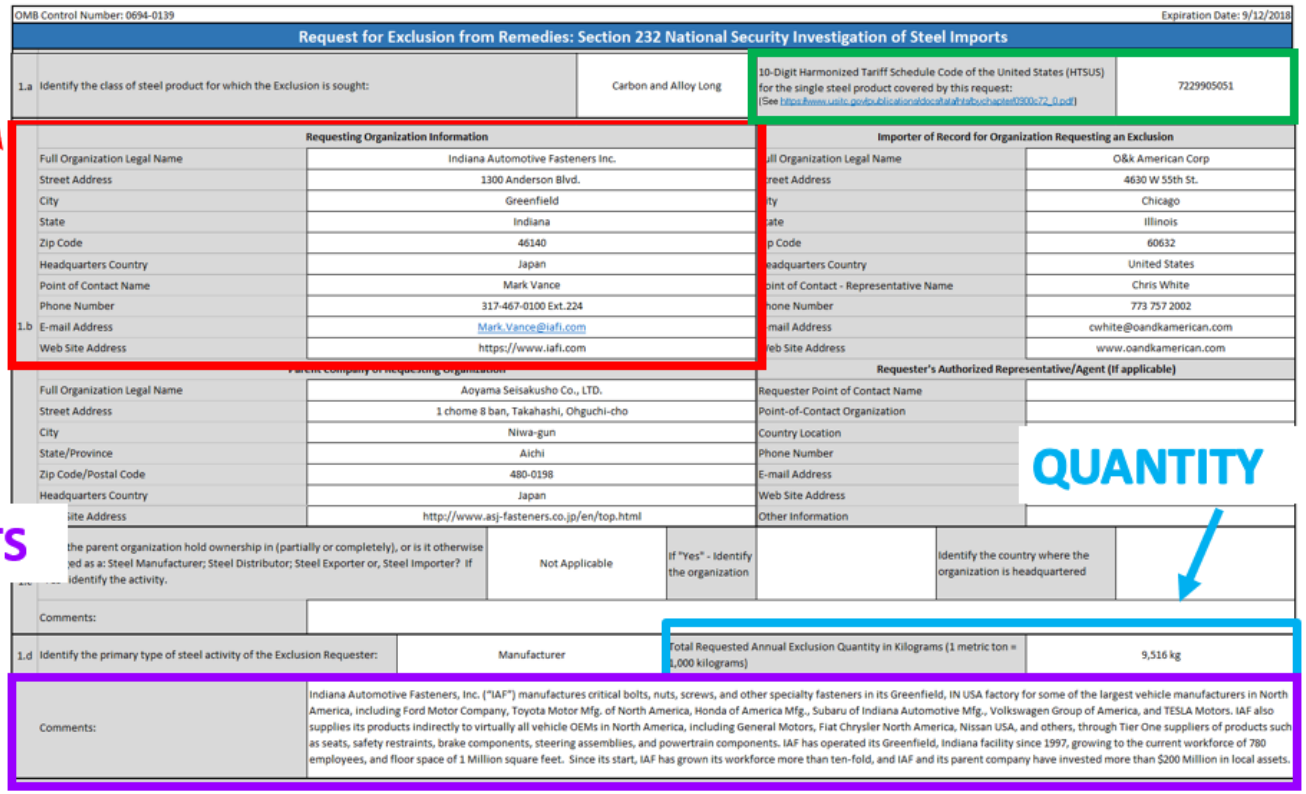
Data: Exclusion requests filed in response to Trump's steel tariffs.

- Firms filed OMB Form 064-0139 for **each individual 10-digit steel product** they wanted excluded from tariffs.
- Publicly available from Regulations.gov.
- Report information on use of the steel product, justification for exclusion, etc.

Example Exclusion Request Form

DOWNSTREAM FIRM

UPSTREAM STEEL INPUT



OMB Control Number: 0694-0139 — Expiration Date: 9/12/2018

Request for Exclusion from Remedies: Section 232 National Security Investigation of Steel Imports

1.a	Identify the class of steel product for which the Exclusion is sought:	Carbon and Alloy Long	10-Digit Harmonized Tariff Schedule Code of the United States (HTSUS) for the single steel product covered by this request: (See https://www.usitc.gov/publications/docs/tata/hts/bychapter/0300c72_0.pdf)	7229905051

Requesting Organization Information		Importer of Record for Organization Requesting an Exclusion	
Full Organization Legal Name	Indiana Automotive Fasteners Inc.	ll Organization Legal Name	O&k American Corp
Street Address	1300 Anderson Blvd.	reet Address	4630 W 55th St.
City	Greenfield	ty	Chicago
State	Indiana	ate	Illinois
Zip Code	46140	p Code	60632
Headquarters Country	Japan	eadquarters Country	United States
Point of Contact Name	Mark Vance	oint of Contact - Representative Name	Chris White
Phone Number	317-467-0100 Ext.224	hone Number	773 757 2002
1.b E-mail Address	Mark.Vance@iafi.com	mail Address	cwhite@oandkamerican.com
Web Site Address	https://www.iafi.com	eb Site Address	www.oandkamerican.com
		Requester's Authorized Representative/Agent (If applicable)	
Full Organization Legal Name	Aoyama Seisakusho Co., LTD.	Requester Point of Contact Name	
Street Address	1 chome 8 ban, Takahashi, Ohguchi-cho	Point-of-Contact Organization	
City	Niwa-gun	Country Location	
State/Province	Aichi	Phone Number	
Zip Code/Postal Code	480-0198	E-mail Address	
Headquarters Country	Japan	Web Site Address	
ite Address	http://www.asj-fasteners.co.jp/en/top.html	Other Information	

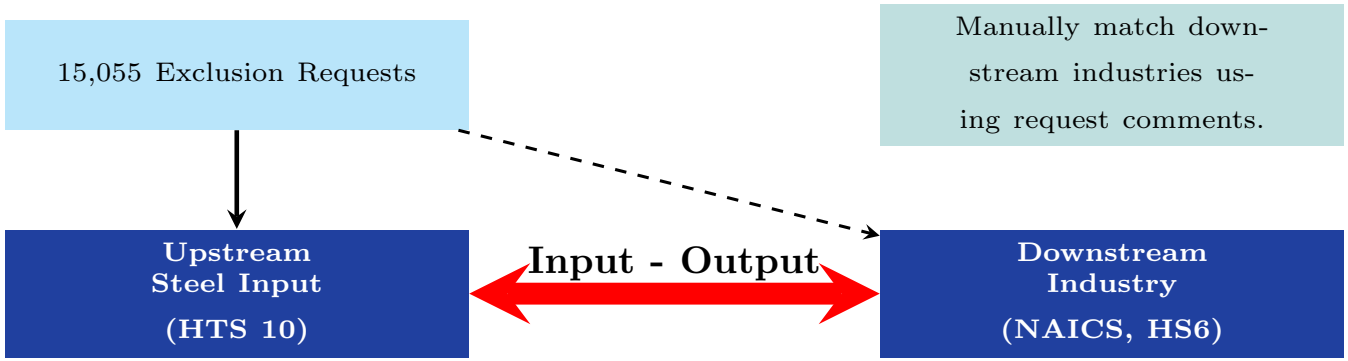
	he parent organization hold ownership in (partially or completely), or is it otherwise ed as a: Steel Manufacturer; Steel Distributor; Steel Exporter or, Steel Importer? If identify the activity.	Not Applicable	If "Yes" - Identify the organization		Identify the country where the organization is headquartered
	Comments:				
1.d	Identify the primary type of steel activity of the Exclusion Requester:	Manufacturer	Total Requested Annual Exclusion Quantity in Kilograms (1 metric ton = 1,000 kilograms)	9,516 kg	
	Comments:	Indiana Automotive Fasteners, Inc. ("IAF") manufactures critical bolts, nuts, screws, and other specialty fasteners in its Greenfield, IN USA factory for some of the largest vehicle manufacturers in North America, including Ford Motor Company, Toyota Motor Mfg. of North America, Honda of America Mfg., Subaru of Indiana Automotive Mfg., Volkswagen Group of America, and TESLA Motors. IAF also supplies its products indirectly to virtually all vehicle OEMs in North America, including General Motors, Fiat Chrysler North America, Nissan USA, and others, through Tier One suppliers of products such as seats, safety restraints, brake components, steering assemblies, and powertrain components. IAF has operated its Greenfield, Indiana facility since 1997, growing to the current workforce of 780 employees, and floor space of 1 Million square feet. Since its start, IAF has grown its workforce more than ten-fold, and IAF and its parent company have invested more than $200 Million in local assets.				

QUANTITY

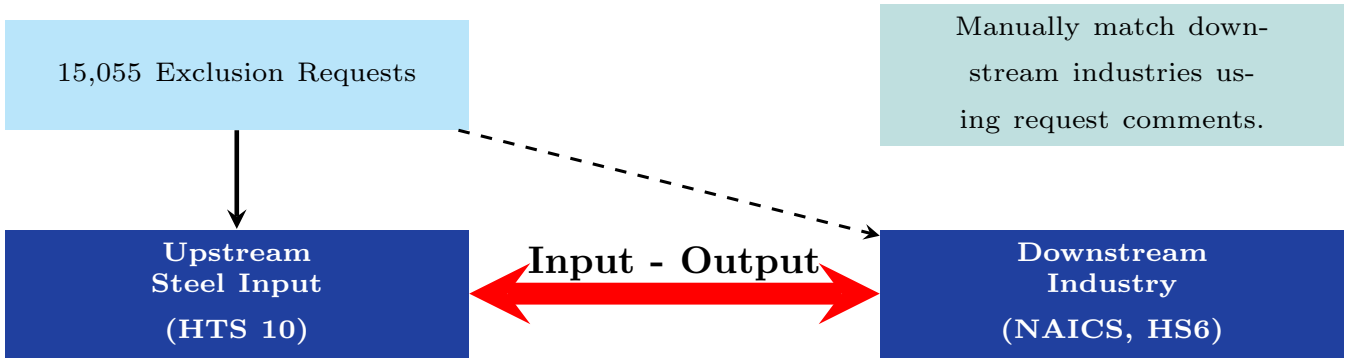
COMMENTS

Exclusion requesting firm is a **downstream user** of a very specific **upstream steel product**.

Steel-Specific Input-Output Table



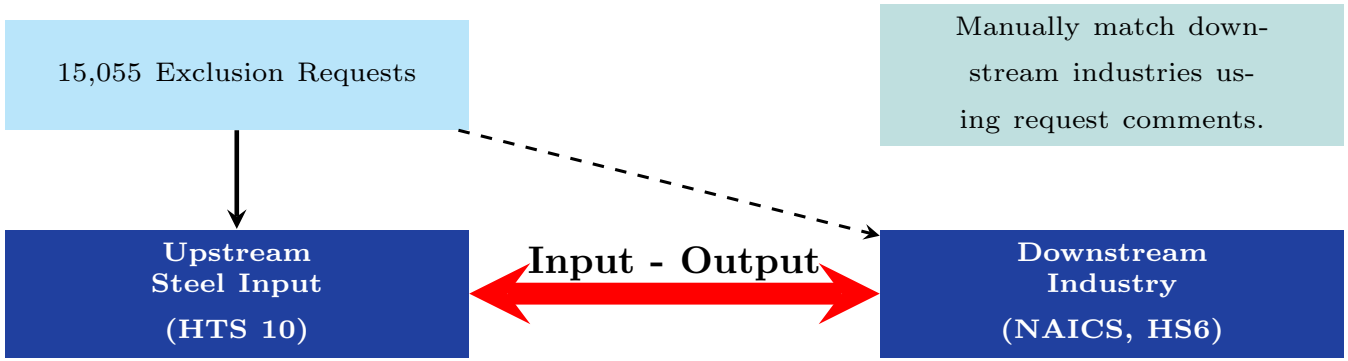
Steel-Specific Input-Output Table



Requested Product: HS 7217105030 (*Heat treated round wire.*)

Description: *Aiken Precision Technologies, LLC (APT) is a cold forging parts maker that manufactures safety-critical automotive parts. The steel for this exclusion request is used to make* ***spark plug housings****.*

Steel-Specific Input-Output Table



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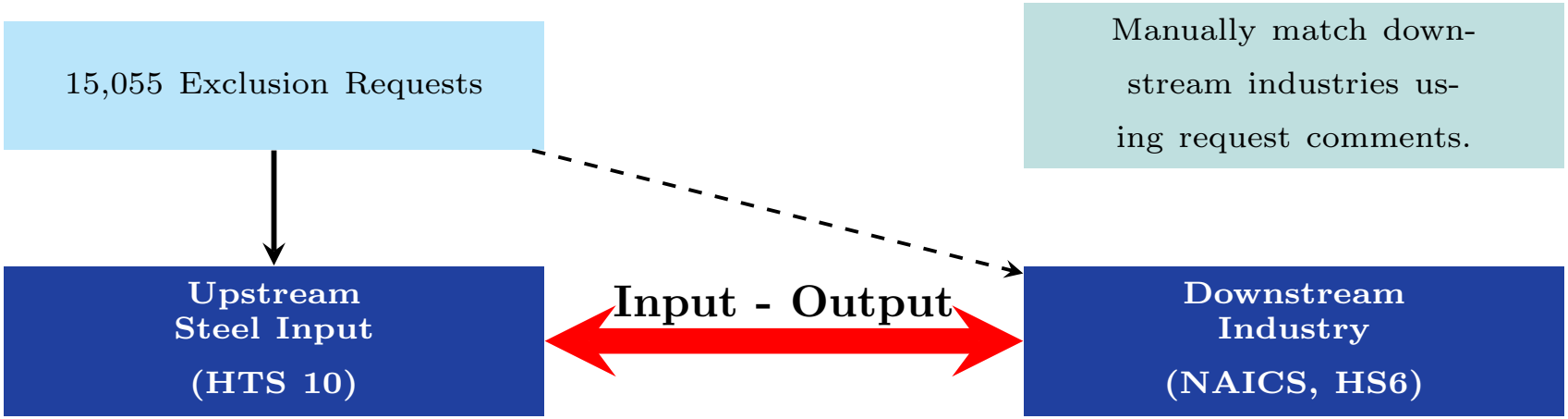
- HS 851110 Internal Combustion Engine Spark Plugs
- NAICS 336320 Motor Vehicle Electrical & Elec. Equip. Mfg.

Steel-Specific Input-Output Table



- Expanding single row of a more aggregated I-O table.
- **Coverage:** 270 steel products (HS8)
  - 136 protected by Bush Tariffs.
  - Map to 787 downstream industries (HS6).
- Comparable to more automated approach. ▸ Automated Version
- Benefits over alternative strategies:
  - Publicly available.
  - More detailed matches than Census.

Benefits Over Alternative Data Sources

Description 1

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Description 2

Aiken Precision Technologies, LLC (APT) is a cold forging parts maker that manufactures safety-critical automotive parts. The steel for this exclusion request is used to make ***seat belt components****.*

- HS 870821 “Safety Seat Belts for Motor Vehicles”
- NAICS 336360 “Motor Vehicle Seating & Interior Trim Mfg”

▸ Downstream Industries: Trump vs Bush

Construction of Tariff Variable

Consider a downstream industry d that uses set Ω_d of upstream steel inputs, s.

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$\omega_{s,d}$ = share of consumption of steel input s in downstream industry d:

$$\omega_{s,d} = \frac{p_s Q_{s,d}}{\sum_{s' \in \Omega_d} p_{s'} Q_{s',d}}$$

$Q_{s,d}$ = quantity of input s used by firms in industry d.

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Scaled change in input tariff due to Bush Tariffs:

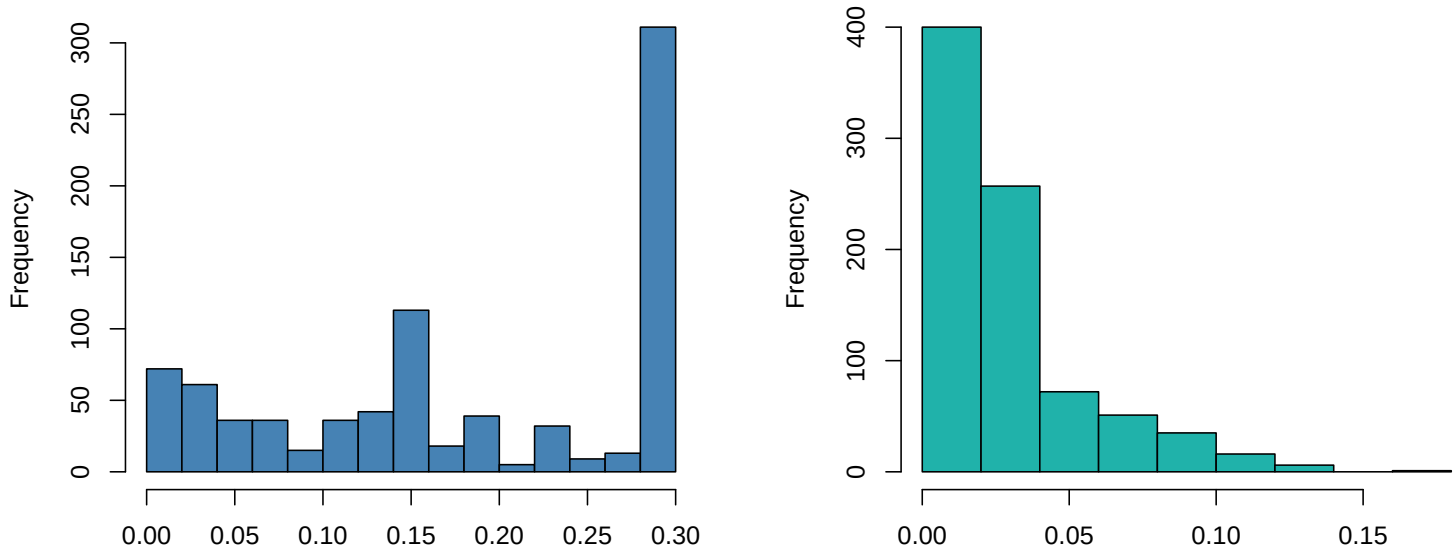
$$\Delta \tilde{\tau}_d = \left(\tau_{d,2003} - \tau_{d,2001}\right) \times \alpha^{BEA}_{\text{steel},k}$$

where $\alpha^{BEA}_{\text{steel},k}$ is industry d's steel cost share from the BEA I-O table.

Distribution of Tariff Variables

Figure: Distribution of Constructed Variables: $\Delta\tau_d$ and $\Delta\tilde{\tau}_d$

(a) $\Delta\tau_d$ (b) $\Delta\tilde{\tau}_d$



NOTE. The left panel shows the distribution of the change in tariffs that downstream industries faced on their steel inputs as a result of the Bush steel tariffs. The right panel shows the change in tariffs scaled by the industry's steel cost share.

Proof of Concept: Overview

Key Questions for Evaluation:

1. **Matching:** Am linking right inputs to the right industries?
2. **Timing:** Are I-O relationships in 2017 good proxy for 2002?

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Exercise: Changes in steel tariffs for matched inputs predict changes in price of materials in downstream industries.

Data:

- Price index of mfg industry (downstream) material costs, $p_{d,y}$.
  Source: NBER CES Mfg Industry Database
- Change in steel tariffs faced by downstream industry, $\Delta\tau_d$.

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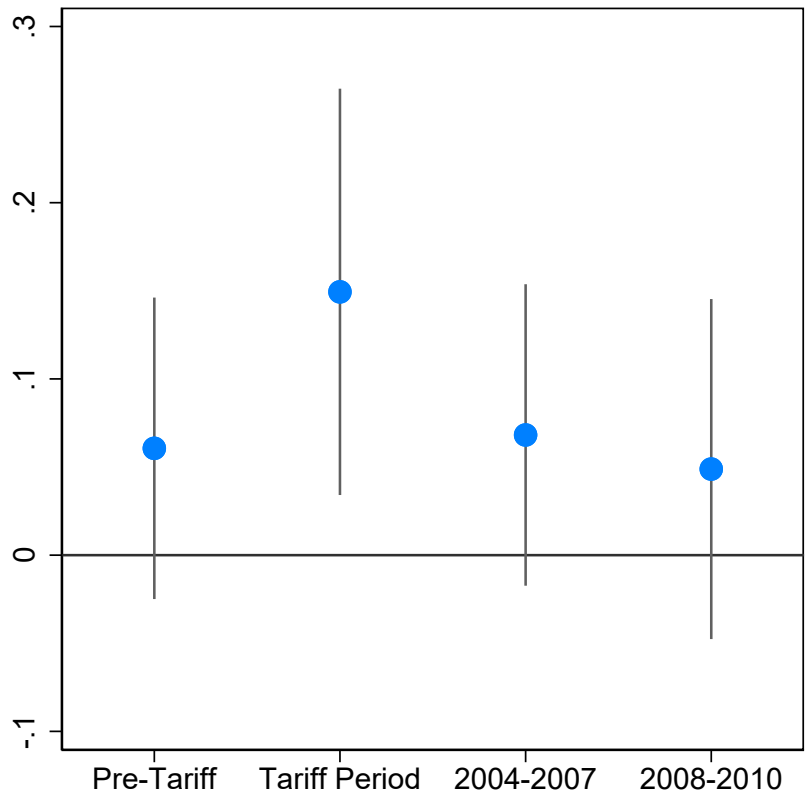
$$p^{mc}_{d,y} - p^{mc}_{d,2001} = \alpha + \sum_t \gamma_t \mathbf{1}(y \in P_t)(\Delta\tau_d) + \sum_t \theta_t \mathbf{1}(y \in P_t)(\alpha^{BEA}_{\text{Steel},d}) + \delta_y + \delta_n + \varepsilon_{d,y} \quad (1)$$

Proof of Concept

Timing: Change in **steel tariffs** for matched inputs predicts **temporary increase in the price of materials downstream**:

$$p^{mc}_{d,y} - p^{mc}_{d,2001} = \alpha + \sum_t \gamma_t \mathbf{1}(y \in P_t)(\Delta\tau_d) + \sum_t \theta_t \mathbf{1}(y \in P_t)(\alpha^{BEA}_{\text{Steel},d}) + \delta_y + \delta_n + \varepsilon_{d,y}$$



NOTE. The Pre-Tariff period runs from 1995-2001 and the Tariff Period runs from 2002-2003, when the Bush Steel Tariffs were in place.

Proof of Concept

Matching: Placebo test shows that steel-specific IO table is predictive, while randomized mapping of steel inputs to downstream industries is not.

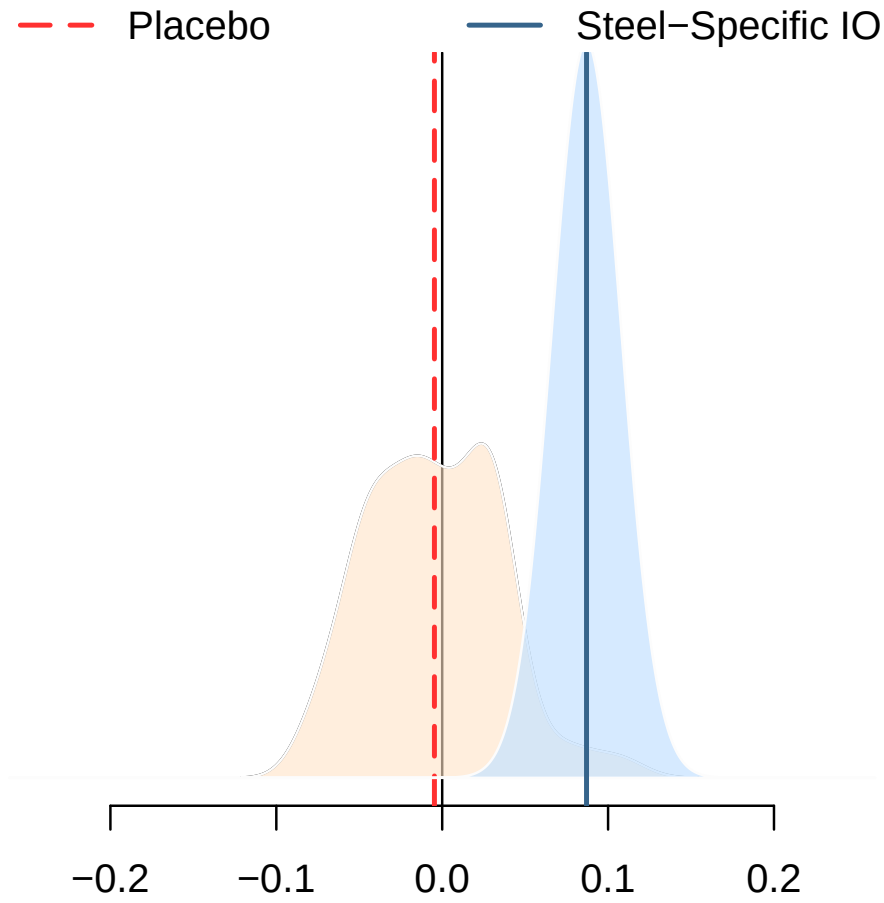
- Pooled version of same specification for 2002-2003:

$$p^{mc}_{d,y} - p^{mc}_{d,2001} = \alpha + \gamma \Delta \tau_d + \theta \alpha^{BEA}_{\text{Steel},d} + \varepsilon_{d,y}$$

- **Baseline:** Use τ_d constructed from steel-specific IO table.
  Plot coefficient, γ, and asymptotic distribution.

- **Placebo:** Randomly assign steel inputs to downstream industries (100$\times$).
  Plot kernel density of estimated γ's.

Proof of Concept



NOTE. This figure shows estimates of γ using the actual τ_d in blue, and the kernel density of 100 estimates of γ from running the same specification using a randomized measure of τ_d in red.

Outline

Main Question

What are the **long-term effects** of the Bush Tariffs (higher input costs) on ***steel-using* industries**?

- Main focus is on exports (largely for data reasons).
- Also look at value of shipments, employment.

Estimation: Dynamic Specification

Local projection approach (Jordà, 2005; Dube et al., 2022):

$$y_{d,t} - y_{d,2001} = \alpha_t + \theta_t \Delta\tilde{\tau}_d + \psi_t \alpha^{BEA}_{d,\text{Steel}} + \gamma_t X_{d,2001} + \delta_{h,t} + \varepsilon_{d,t}.$$

- **Details:**
  - $\Delta\tilde{\tau}_d =$ scaled change in steel tariff.
    Interpretation: Change in input tariff rate.
  - Controls:
    - $\alpha^{\text{BEA}}_{d,\text{Steel}}$ = industry d's steel cost share.
    - $\delta_{h,t} =$ HTS Section $\times$ year fixed effects.
    - Share of steel inputs imported from exempt countries in 2001.
  - Standard errors clustered by HS4 industry.
- **Alternative Specifications:**
  - Pooled, event study "diff-in-diff."
- **Robust to Controls:** Δ Chinese export share

Endogeneity Concerns

Endogeneity of trade policy challenges identification of tariff impacts, particularly along supply chains.

Trefler (1993), Gawande et al. (2012), Bown et al. (2020)

Potential Sources:

1. **Counter-Lobbying** by downstream industries.
   - Anecdotal evidence: tariffs seen as a gift to the steel industry.

     ▸ Quote

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1. **Counter-Lobbying** by downstream industries.
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     ▸ Quote
2. **Omitted variables** (e.g., productivity shock by foreign input suppliers or domestic downstream producers).
   - No pre-trends in main results.
   - **Identifying assumption**: Variation in τ_d is exogenous.

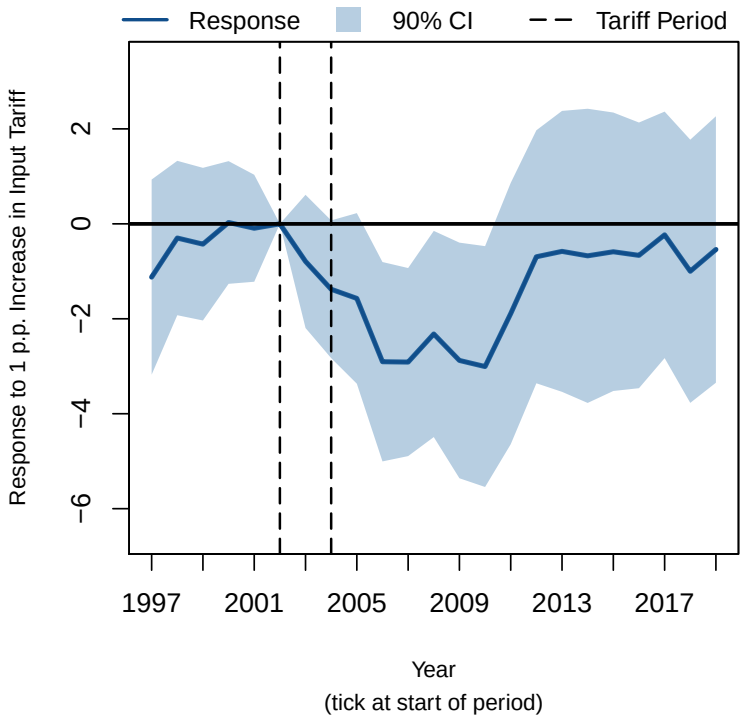
**Endogeneity will bias my results in the opposite direction.

Outline

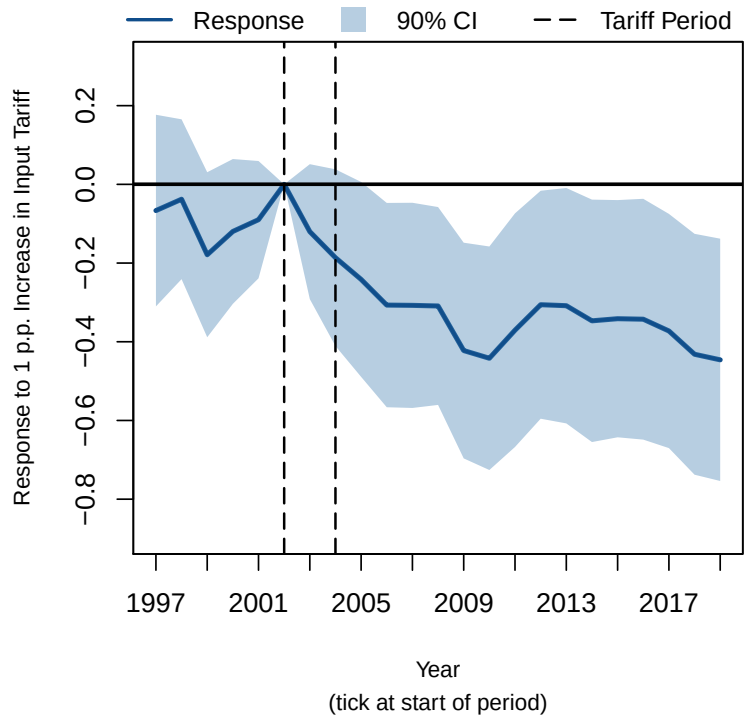
Competitiveness of U.S. Exporters (Downstream)

Relative effect of a 1 p.p. increase in $\Delta\tilde{\tau}_d$:

(a) Export Values



(b) Export Shares

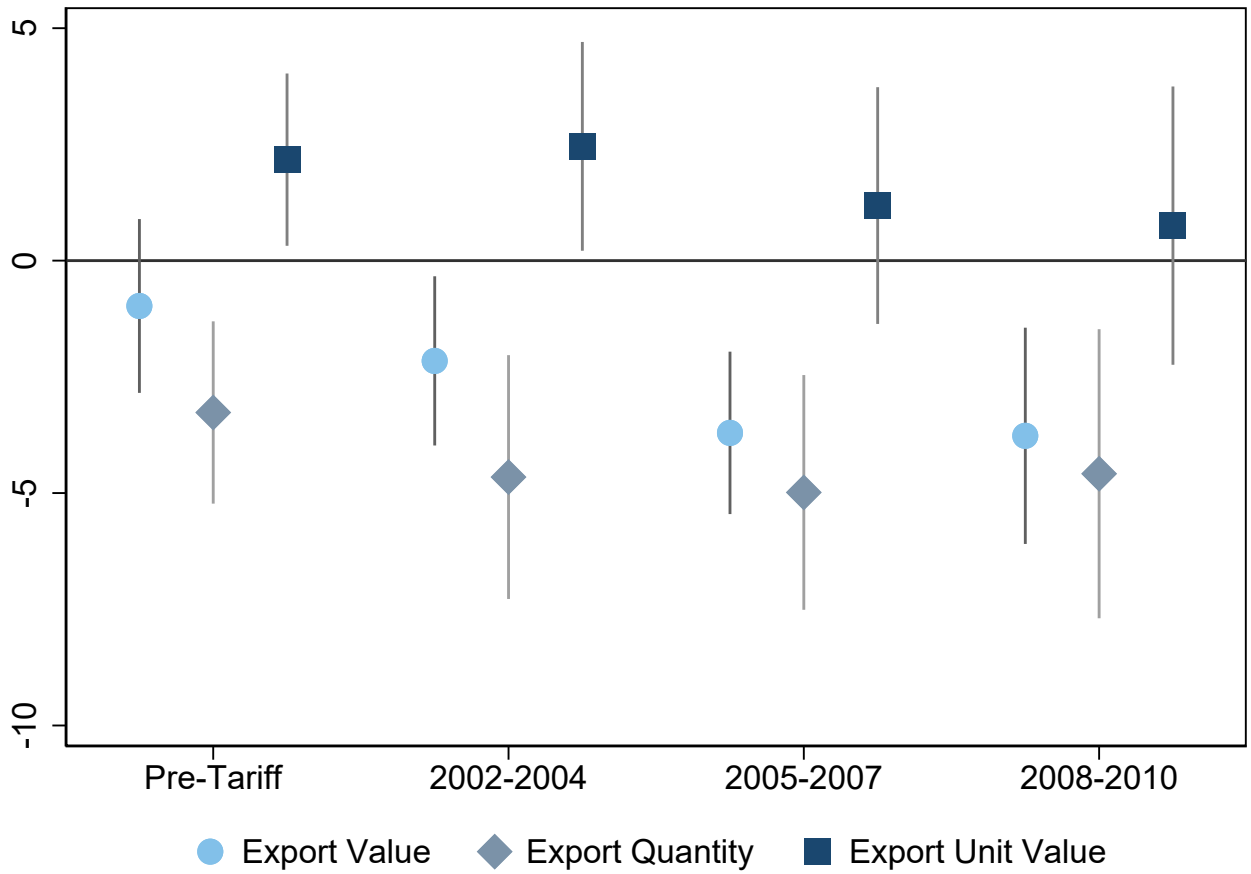


▸ Diff-in-Diff ▸ China ▸ Zeros

Decline Driven by Export Quantities

Pooled version of same specification:

$$\Delta x_{d,y} = \sum_t \theta_t \mathbf{1}(y \in P_t)\Delta\tilde{\tau}_d + \sum_t \psi_t \mathbf{1}(y \in P_t)\alpha^{BEA}_{d,\text{Steel}} + \gamma_t \sum_t \mathbf{1}(y \in P_t)X_{d,2001} + \delta_y + \delta_h + \varepsilon_{d,y},$$



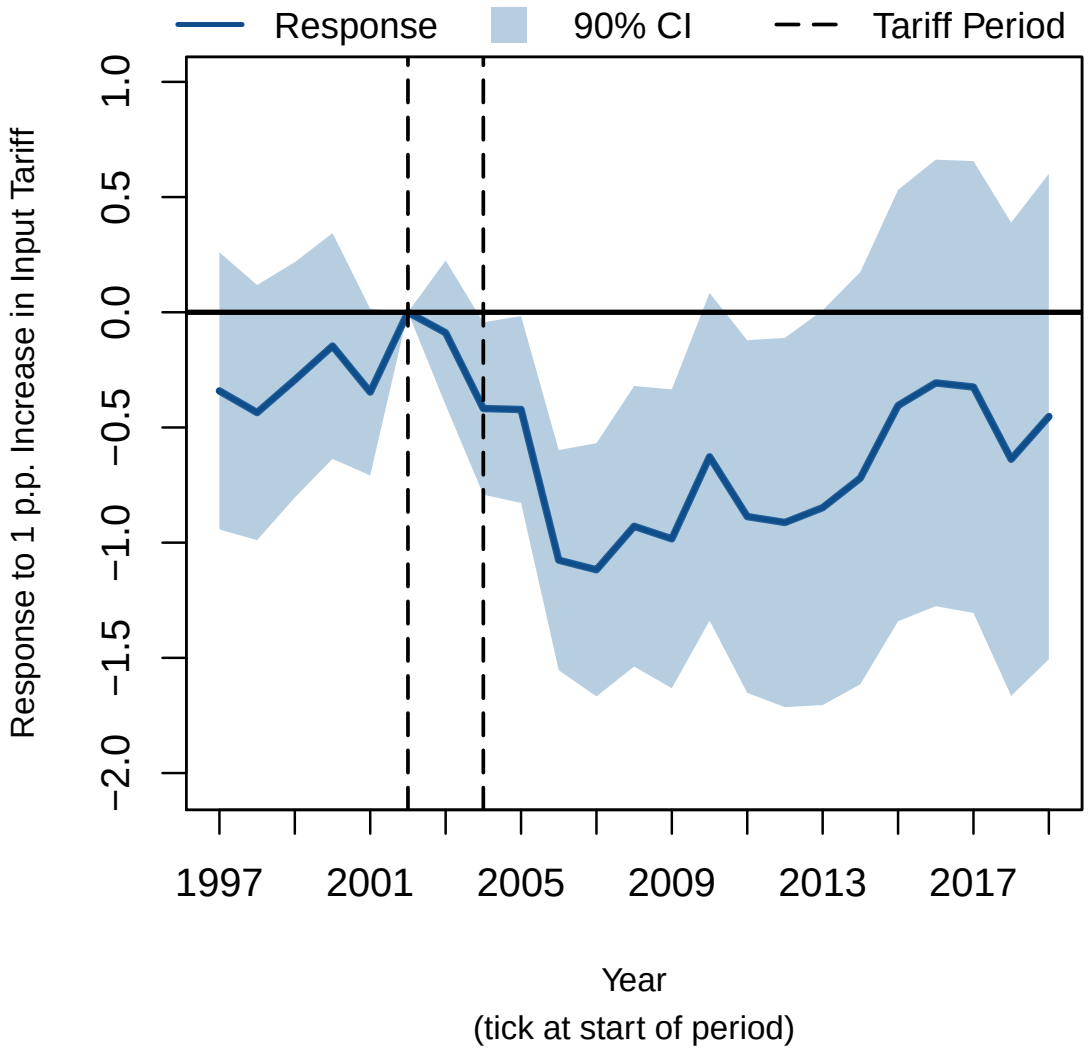
Evidence Points To Extensive Margin

Are reductions in exports occurring on the intensive or extensive margin?

Proxy for extensive margin using **industry-level data:**

- Customs district-level U.S. exports from Schott (2008).
- "Trade relationship" $=$ (district $\times$ product $\times$ country) triplet.
  e.g., A golf cart exported from Savannah, GA to Japan
- 47 customs districts, and in 2001 the mean (median) 10-digit product had 120 (172) trade relationships.

Evidence Points to Extensive Margin



Evidence Points to Extensive Margin

Anecdotal evidence confirms loss of customers:

- *"These additional tariffs are a disaster for our business. They make us much more vulnerable to foreign competition."*
  ▸ A.J. Rose
- *"Soon after the 201 tariffs were put into effect, [we] lost a major contract with a well-established customer."*
  ▸ G.R. Spring and Stamping
- *"Unless things change rapidly, my company will lose business to foreign competition."* ▸ Wren Industries

Market share appears to shift to other top exporters:

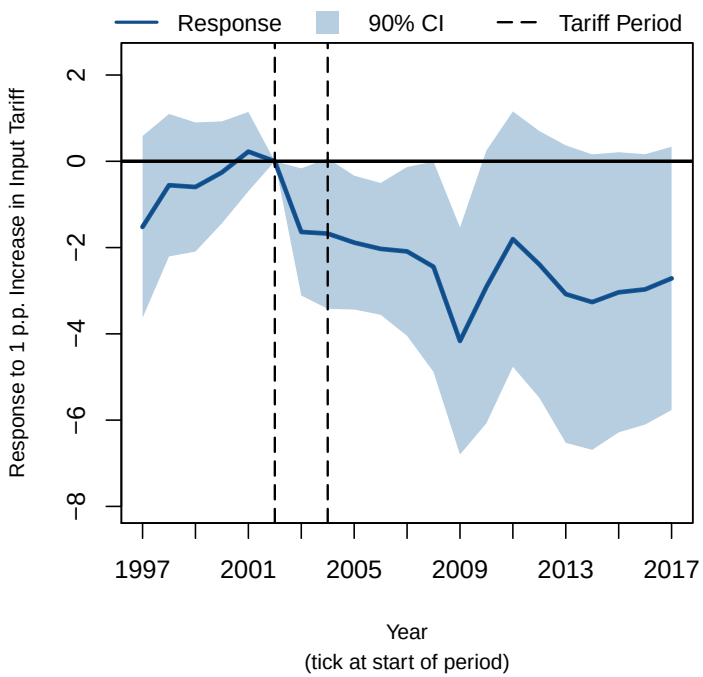
- Japan, Germany, UK, South Korea
  ▸ IRFs

Other Results: Value of Shipments and Employment

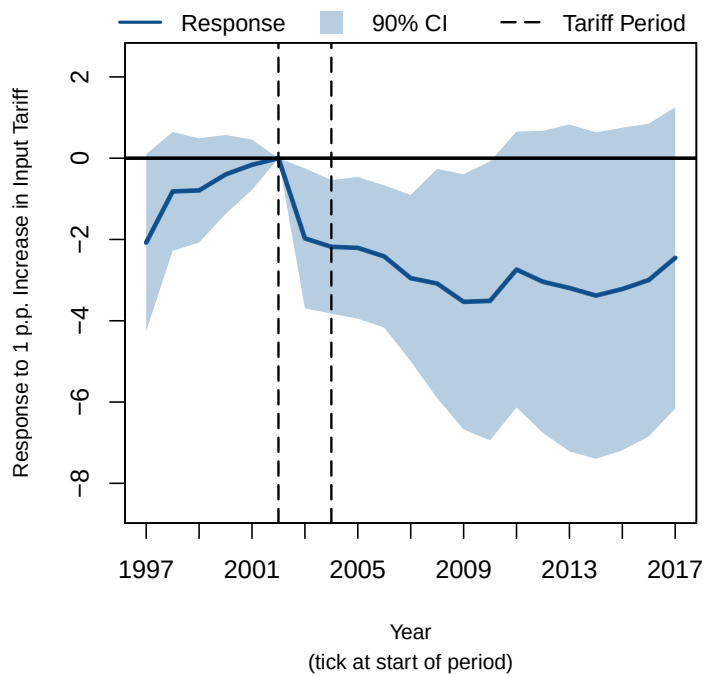
Using data from NBER CES Mfg Industry Database (NAICS 6):

$$y_{d,t} - y_{d,2001} = \alpha_t + \theta_t \Delta\tilde{\tau}_d + \psi_t \alpha^{BEA}_{d,\text{Steel}} + \gamma_t X_{d,2001} + \delta_{n,t} + \varepsilon_{d,t}.$$

(a) Value of Shipments



(b) Employment



Outline

Theoretical Framework

Goal: What model features can match persistent response to temporary shock in the data?

Set-Up:

- Partial equilibrium
- Two asymmetric countries (H and F).
- **Sector of Interest:** Downstream manufacturing sector produces tradable goods using labor and composite of home and foreign steel.
- **Main focus:** Where do consumers in each country buy downstream manufactured products from?

Dynamic Sourcing Problem

- Consumers in each country consume CES bundle of downstream goods, d.
- For each good, d, consumers in each country choose cheapest source $s \in \{H, F\}$.
- Downstream good d from source s is sold at unit cost, so is
  - Function of the price of the steel composite.
  - In turn, a function of the tariff rate country s imposes on steel imports.

Dynamic Sourcing Problem

- **Key Model Feature:** Consumers must pay adjustment cost, κ_t to form a new relationship with a supplier.

$$\kappa_t = \begin{cases} \bar{\kappa} + e_t, \text{ if } s_t \neq s_{t-1} \\ 0, \text{ if } s_t = s_{t-1} \end{cases}$$

- **Sourcing Decision:** In each period, consumers choose source, s, for each good, j, in each sector D to minimize costs today plus expected future costs:

$$C_{i,d}(s, \kappa, \tau) = \min_{s'} \left[p_{s',d}(\tau) + \kappa \times \mathbf{1}(s' \neq s) + \beta \mathbb{E}_i \left[C_{i,d}(s', \kappa', \tau') \right] \right]$$

- Consumers must form expectations of path of future prices $\implies$ expectations of future tariff policy in both countries.

Expectations of Tariff Policy

- In each country, there are two states of the world: $w_{i,t} \in \{\ell, h\}$.
- Tariffs depend on state of the world: $\tau_{id,t} \in \{\tau_{id}^{\ell}, \tau_{id}^{h}\}$
- Transition matrix:

$$\Pi = \begin{bmatrix} \pi_{\ell,\ell} & \pi_{\ell,h} \\ \pi_{h,\ell} & \pi_{h,h} \end{bmatrix}$$

Calibration and Simulation

Draw 2000 goods. Goods have three characteristics:

1. Tariff on inputs drawn uniformily from 0 to 15 percent.
   Set to match scaled input tariff $\tilde{\tau}_d$.

2. Productivity δ (governs relative price between *H* and *F*)
   On average, *H* is *slightly* more productive than *F*.
   (Vary this in counterfactuals.)

3. Indicator for "fixed cost relief" drawn each period.
   $\bar{\kappa} = 0.1$, $\kappa_t = 0$ with 2 percent probability.
   (Vary $\bar{\kappa}$ in counterfactuals.)

Estimate impulse responses for 2-period tariff shock in *H*.
World is in the "bad" state for two periods.

Calibration and Simulation

- Consumers have "correct" beliefs about tariffs in country they are purchasing from (consistent with simulated shock):

$$\Pi = \begin{bmatrix} 0.79 & 0.21 \\ 0.76 & 0.24 \end{bmatrix}$$

- Relative to "correct" beliefs, more uncertainty about persistence of shock in other country:

$$\Pi' = \begin{bmatrix} 0.79 & 0.21 \\ 0.60 & 0.40 \end{bmatrix}$$

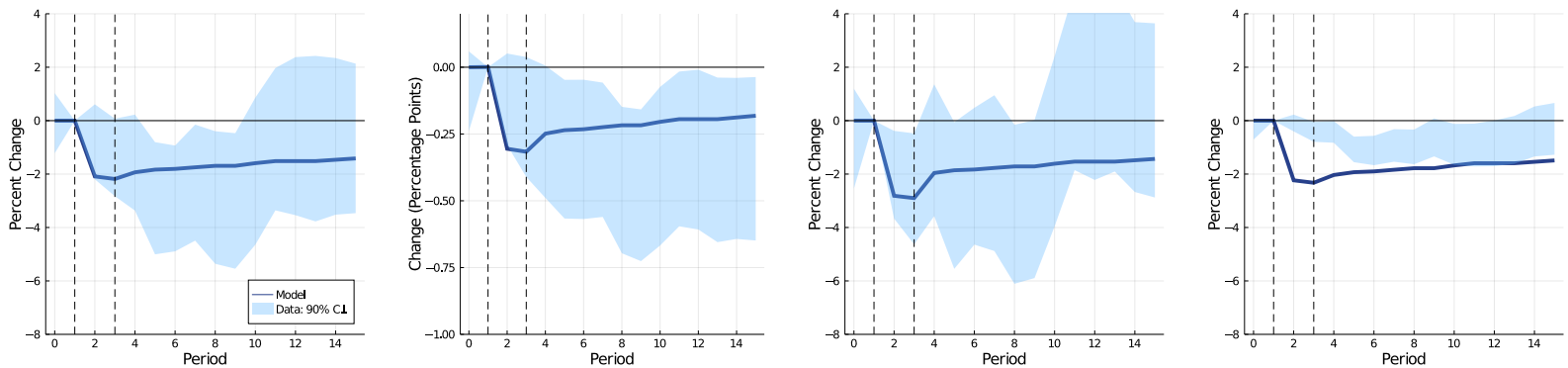
- Also will vary this in counterfactuals.

Model-Simulated Regression Results

Exercise 1: Regress change in exports/imports relative to pre-tariff levels on industry tariff rate. (Reproduce reduced form results.)

Figure: Model-Simulated Regression Results

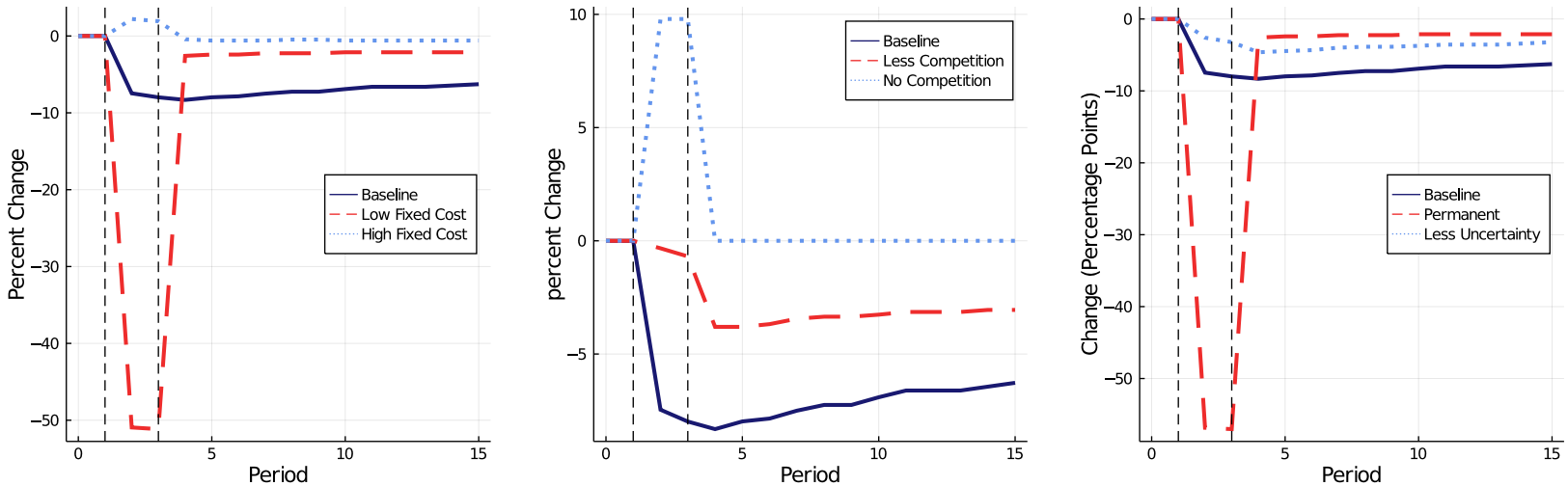
(a) Exports (b) Quantities (c) Export Share (d) # of Exporters



Counterfactual Simulations

Figure: Counterfactual Simulations: Path of Aggregate Exports

(a) Fixed Costs (b) Price Competition (c) Uncertainty



NOTE. The figures above show counterfactual simulations of aggregate exports. The left panel shows variations in the fixed cost parameter. The middle panel shows variations in the degree of price competition. The right panel shows variations in beliefs about the persistence of the tariff shock.

Conclusion

- Case study of the Bush steel tariffs using a new method for identifying highly detailed input-output relationships.
- Temporary upstream steel tariffs have **persistent negative impacts** on downstream industries.
- Persistence of export response driven by restructuring of global trade flows.
- Consistent with a dynamic model of trade featuring relationship-specific sunk costs and uncertainty about trade policy.

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