Trade Wars and Market Power in a Fragmenting World

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Trade wars and market power in a fragmenting world

Part 1: The World Trading System: 1947 -2025

- Open multilateralism: 1947 - 2000s
- China's entry into the World Trading System - 2001
- Receding multilateralism: Mid-2000s to today

Part 2: Evaluating the consequences of trade wars (Cheng, Corsetti, Crowley, and Han; 2025)

- Empirical evidence from 11 origin countries and 165 destination countries
- A multi-country world of oligopolistic competition, production linkages, entry and exit
- Trade wars and the global reallocation of market power: Simulated evidence

What will be the lasting consequences of the trade war?

- The emerging global order, fragmented into as-yet-undefined economic and geopolitical blocs, will exhibit a much higher concentration of market power.
- Within blocs, firms will find substitutes for goods and intermediates that are no longer accessible because of fragmentation. Short-term disruptions will likely fade over time.
- The concentration of market power, however, will not dissipate — and this represents the most significant long-term threat to societal welfare.

The World Trading System

... is an overlapping network of international trade agreements that establish rules for trade in goods under the umbrella of the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade (GATT) 1947 and 1994.

The foundational principle of the WTO system is open, multilateral trade and tariff policy.

Beginning in 1947, trade negotiations over 7 decades reduced policy barriers to trade.

- A tariff cut against one was a tariff cut against all (non-discrimination a.k.a. MFN).
- Membership expanded from 23 to 166 countries (1947-2025).
- Tariffs among high income countries fell from around 25% to 0-ish%. (Bown & Irwin, 2015).

Open multilateralism embodied policy asymetries...

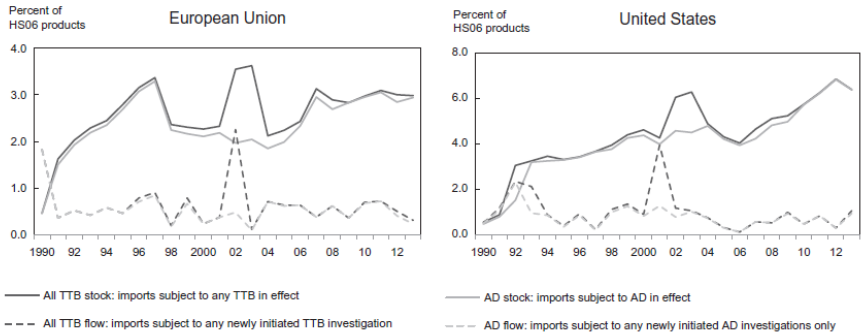
Applied and Bound Import Tariffs, 2013

Country/territory	MFN applied rate, simple average (1)	WTO binding rate, simple average (2)	Products with binding coverage (3)	Products with applied duties > 15% (4)	Products with binding rates > 15% (5)	Maximum MFN applied rate (6)
G20 High-income						
Australia	2.7	10.0	97.0	0.1	13.4	140.0
Canada	4.2	6.8	99.7	6.8	7.3	484.0
European Union	5.5	5.2	100.0	5.1	4.8	511.0
Japan	4.9	4.7	99.6	3.7	3.7	736.0
Korea	13.3	16.6	94.6	10.4	20.5	887.0
United States	3.4	3.5	100.0	2.7	2.7	350.0
G20 Emerging						
Argentina	13.4	31.9	100.0	36.0	97.8	35.0
Brazil	13.5	31.4	100.0	36.2	96.4	55.0
China	9.9	10.0	100.0	15.6	16.4	65.0
India	13.5	48.6	74.4	19.0	71.5	150.0
Indonesia	6.9	37.1	96.6	1.7	90.7	150.0
Mexico	7.9	36.2	100.0	15.7	98.7	210.0
South Africa	7.6	19.0	96.1	20.7	39.6	>1000
Turkey	10.8	28.6	50.3	13.6	28.9	225.0

Source: Bown and Crowley (2016)

...with high-income country liberalism supported by temporary tariffs

Percent of HS06 products subject to a temporary trade barrier, 1990-2013



Punchline: Trade policy by the US and EU consisted of open markets for almost all goods alongside import tariffs and restrictions for a small fraction of goods.

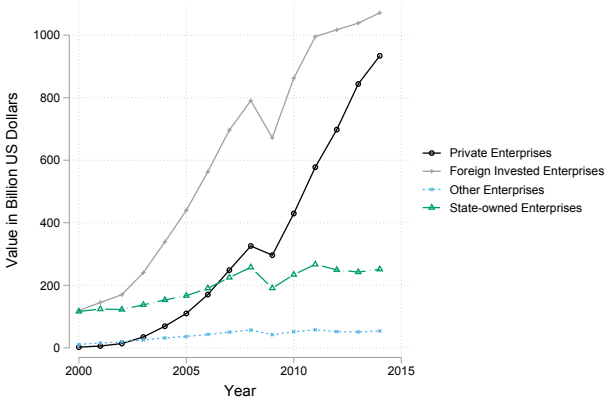
Source: Bown and Crowley (2016)

China's Entry into the WTO in 2001 transformed Global Trade

Between 2001 and 2021, China's trade grew 810% compared to only 180% for overall global trade.

China WTO membership reduced policy uncertainty and threat of trade wars faced by Chinese exporters

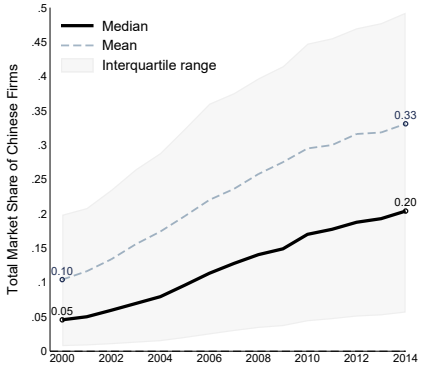
- $\Rightarrow$ boom in Chinese export value to the US, with large entry of new exporters from China
- $\Rightarrow$ sharpest rise in Foreign Investment Enterprises in China



Value of exports from China, by type of enterprises
Source: Corsetti, Crowley, Han, and Song (2025)

Rising market power of Chinese exporters

The share supplied by China in all countries' import markets



The evolution of the (import) market shares of exporters from China at the 6-digit-HS-product and destination level for over 100k product-destination pairs with positive trade flows from China.

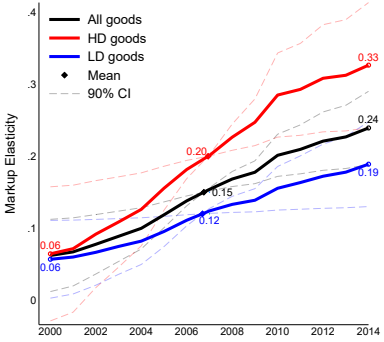
The black solid and the gray dashed lines show the median and weighted mean of all product-destination pairs within a year, respectively.

The gray shaded area indicates the 25th and 75th percentile of the market share distribution in each year.

Source: Corsetti, Crowley, Han, and Song (2025)

Rising market power of Chinese exporters: Pricing to market

Growth of markup elasticity to the exchange rate over time



Note: This figure plots the evolution of markup elasticities with respect to the exchange rate of Chinese exporters estimated by Corsetti Crowley Han and Song CCHS (2024) distinguishing between High Differentiation, and Low Differentiation goods (CCHS classification). Diamonds at the center of each line mark the average markup elasticity. Dashed lines denote 90% confidence intervals.

Receding multilateralism under American leadership

The US loses confidence in its capacity to shape global rules at the World Trade Organisation.

- President Obama (2009-2017)
  - US becomes frustrated with policy negotiation and dispute resolution at the WTO
  - "Pivot to Asia" and mega regionalism as a strategy to contain China.
- President Trump I (2017-2021)
  - US frustration leads to "shut down" of WTO's Dispute Resolution System.
  - 2018 US-China Trade War: US (Chinese) tariffs on 50% of Chinese (US) imports
- President Biden (2021-2025)
  - Maintains "shut down" of WTO's Dispute Resolution System and US-China Trade War
  - Return to industrial policy action with Inflation Reduction Act
- President Trump II (2025-)
  - 2025 US-China Trade War: Tariffs extended to 100% of imports
  - supply-chain independence from China as industrial policy - US-Japan Agreement
  - contain China through security and trade policy alignment to US
    - US-Malaysia and US-Cambodia Agreements; Mexican tariff hikes on China

EU strategic trade and industrial policy under WTO rules

The EU imposes import tariffs on Chinese Electric Vehicles: 31 Oct 2024

Employees work on the assembly line of C11 electric SUV at a factory of Chinese EV startup Leapmotor on April 26, 2023 in Jinhua, Zhejiang Province of China.
Vcg / Visual China Group / Getty Images

"From wind to steel, from batteries to electric vehicles, our ambition is crystal clear: The future of our clean tech industry has to be made in Europe."

"...global markets are now flooded with cheaper Chinese electric cars. And their price is kept artificially low by huge state subsidies."

- Von der Leyen, 13 September 2023

- European Chips Act of 2023 $\Rightarrow$ €43 billion of policy-driven investment
- The EU imposed import tariffs of 17-35% on Chinese Electric Vehicles in Oct 2024

How should research on firms' engagement in the global economy inform policy analysis and policy design?

Economic modelling of firms that trade

1979: Paul Krugman introduces the revolutionary idea that gains from trade exist among economies:

- populated by firms featuring increasing returns to scale production (e.g. high fixed start-up costs and low per unit production costs) and
- workers who love to consume a variety of goods.

1980s-1990s: International trade and policy analysis shifts focus to oligopolistic markets characterized by limited competition in industries like aircraft, semiconductors and autos. (Krugman, Helpman, Grossman, Eaton, Brander, & Spencer, Venables,...)

2003: Melitz introduces a more realistic rendering of Krugman's model featuring heterogeneous firms. This model combined with advanced computing power and increased availability of big data spawns a vast, new, empirically-driven approach to trade.

The price-cost markups of exporting firms:

Global firms hold and exploit their market power

Research on pricing and exchange rates has found exchange rate disconnect (Amiti, Itskhoki, Konings, 2014), pricing to market (Fitzgerald and Haller, 2014) and that larger, more productive firms adjust markups more in response to exchange rate fluctuations (Berman, Martin and Mayer, 2012).

Research (Corsetti, Crowley, Han 2022; Corsetti, Crowley, Han,& Song 2025; and Crowley, Han, and Prayer, 2024) using the universe of international trade transactions for the UK (2010-2017); China (2000-2014); and 11 low and middle-income countries (2000-2012) has found evidence of pricing-to-market. Pricing-to-market is correlated with observables and more prevalent for:

- highly differentiated products (all),
- consumer versus intermediate goods (all),
- goods exported by foreign-invested firms (China),
- goods invoiced in the local currency of the destination (UK), but
- markups decline with trade agreements and tariff cuts that stimulate entry and intensify market competition.

Punchline: A wealth of empirical evidence shows firms hold and exploit market power in pricing.

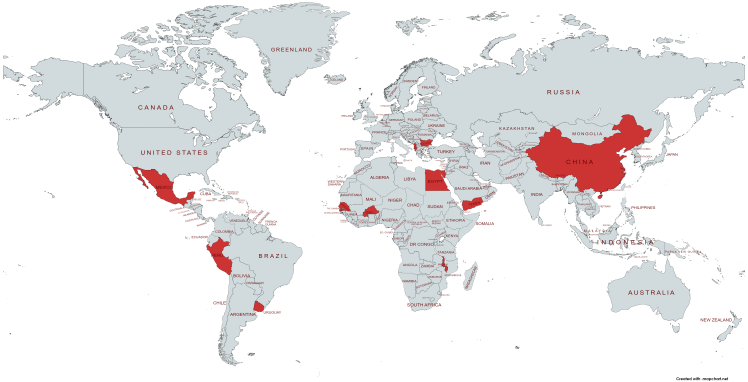
How does trade policy shape market structure, exporters' market power, prices, and welfare?

Evidence from:

- "The Procompetitive Effects of Trade Agreements," by M. Crowley, L. Han and T. Prayer, *Journal of International Economics*, 2024.
- "Trade Wars and the Reallocation of Market Power in Global Export Markets," by C. Cheng, G. Corsetti, M. Crowley, and L. Han, mimeo.

Data: 13.3 mil obs on 225k firms in 11 origin countries

exporting to 165 destinations under tariffs of WTO and 25 preferential trade agreements



Albania	2004-2012	Egypt	2005-2013	Senegal	2000-2012	Uruguay	2001-2012
Burkina Faso	2005-2012	Malawi	2006-2012	Bulgaria	2001-2006	Mexico	2000-2012
China	2000-2006	Peru	2000-2013	Yemen	2008-2012		

Combined with origin-destination-product-year-level data from UNcomtrade and WTO

Fact 1: Only a few firms are active in each foreign product market

Number of firms from an origin o selling product i to destination d at time t.

Average over 165 countries	25th Percentile	Median	75th Percentile
Number of firms	7.00	3.00	1.00
Cumulative market share cond. on ≥ 1 incumbent and ≥ 1 entrant			
– Incumbents	30.3%	61.9%	85.7%
– Entrants	69.7%	38.1%	14.3%
United States	25th Percentile	Median	75th Percentile
Number of firms	24.00	7.00	2.00
Cumulative market share cond. on ≥ 1 incumbent and ≥ 1 entrant			
– Incumbents	49.4%	81.9%	95.2%
– Entrants	51.6%	18.1%	4.8%

Note: Summary statistics for 1.3 million product-origin-destination-year markets based on 3600 products, 11 origins, 165 destinations, and 12 years. At least one exporter is operating in each market. A product is defined as a 6-digit HS product.

Fact 2: Different exporter responses to common vs. specific tariff changes

Compare responses to destination's common (MFN) vs. bilateral origin-specific tariffs

	Quantity_{fiodt}
Destination's average MFN tariff_{idt}	-0.78***
	(0.06)
Bilateral (FTA/GSP) tariff_{iodt}	-2.40***
	(0.13)
Observations	13.3M
R^2	0.715

Firm-product-origin-year and product-destination fixed effects in all regressions

- Evaluate firm's response to destination's common (MFN) and bilateral origin-specific (FTA or GSP) tariffs

$\Rightarrow$ If competition is monopolistic$\Rightarrow$ same quantity response to both types of tariffs

$\Rightarrow$ If competition is oligopolistic $\Rightarrow$ diff. responses due to changes in rel. competitiveness

$\Rightarrow$ Oligopoly is the empirically-validated structure

Fact 2: Different exporter responses to common vs. specific tariff changes

Compare responses to destination's common (MFN) vs. bilateral origin-specific tariffs

	Quantity_{fiodt}	Markup_{fiodt}
Destination's average MFN tariff_{idt}	-0.78***	0.05**
	(0.06)	(0.02)
Bilateral (FTA/GSP) tariff_{iodt}	-2.40***	0.23***
	(0.13)	(0.03)
Observations	13.3M	13.3M
R^2	0.715	0.888

Firm-product-origin-year and product-destination fixed effects in all regressions

$\Rightarrow$ Counterintuitively, markups increase as tariffs rise (fall as tariff are cut!)

As discussed below, reallocation of market shares explain the puzzling response of markups (Crowley, Han, Prayer; JIE 2024)

Fact 2: Different exporter responses to common vs. specific tariff changes

Compare responses to destination's common (MFN) vs. bilateral origin-specific tariffs

	Quantity$_{fiodt}$	Markup$_{fiodt}$	Within-origin market share$_{fiodt}$	Origin's market share in dest$_{iodt}$
Destination's average MFN tariff$_{idt}$	-0.78***	0.05**	1.18***	-1.19**
	(0.06)	(0.02)	(0.09)	(0.11)
Bilateral (FTA/GSP) tariff$_{iodt}$	-2.40***	0.23***	3.54***	-3.89***
	(0.13)	(0.03)	(0.16)	(0.22)
Observations	13.3M	13.3M	13.3M	13.3M
R^2	0.715	0.888	0.776	0.887

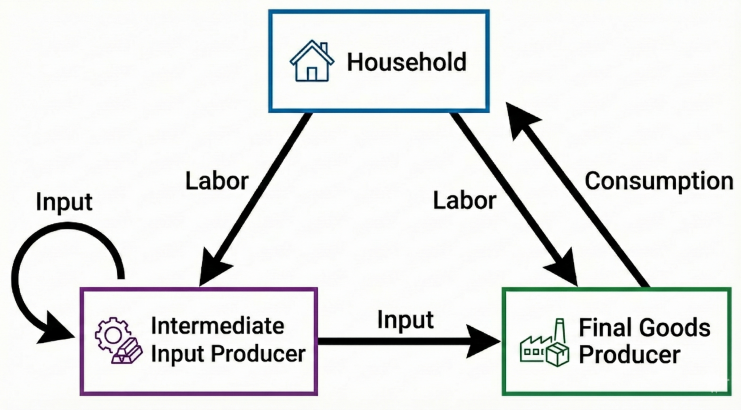
Firm-product-origin-year and product-destination fixed effects in all regressions

- Two market share reallocation effects are in play:

$\Rightarrow$ Individual market shares of surviving firms from that origin increase (due to exit of less productive firms from same origin)

$\Rightarrow$ The collective market share of firms from the same origin decreases (as firms from the origin become less competitive relative to exporters from other origins)

The economic structure in each country



- Variety-loving households provide labour to firms that produce differentiated goods.
- Only a few firms produce each intermediate input or final consumer good due to fixed entry costs. $\Rightarrow$ Oligopolistic competition and variable markups

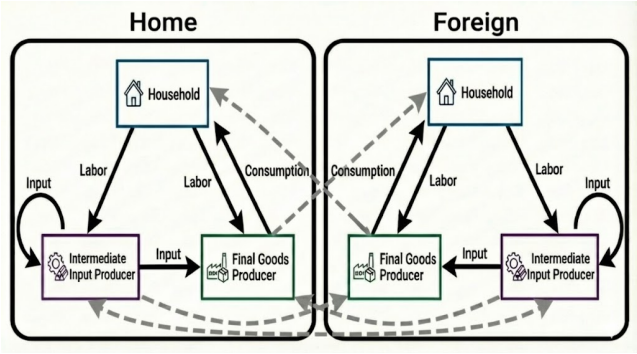
Market structure and production

Cobb-Douglas production: total output of firm f selling product i from origin o is given by

$$q_{fiot} = \underbrace{A_{fiot}\left(\frac{L_{fiot}}{\nu}\right)^{\nu}\left(\frac{M_{fiot}}{1-\nu}\right)^{1-\nu}}_{supply} = \underbrace{\sum_{d} q_{fiodt}}_{Demand}$$

- q_{fiot} total quantity produced with L_{fiot} labour and M_{fiot} units of a (local to *origin*) intermediate input bundle M_{ot}; A_{fiot} is productivity
- q_{fiodt} quantity demanded in (and exported to) each destination market d

The global economic structure (two country example)



- Only a few firms can cover the fixed costs to enter a foreign market

  $\Rightarrow$ Oligopolistic competition and variable markups
- Final and intermediate firms use foreign-sourced inputs.
- Products are differentiated not only by industry (i.e., cars versus bikes) but also by origin (two types of bikes from China are more substitutable than Chinese and German bikes).

Oligopolistic competition in final goods markets

A triple nested CES demand structure with limited number of firms within each origin to incorporate imperfect competition

Across products

$$Y_{dt} = \left(\int_{i \in \mathcal{FD}} (\alpha_{id})^{\frac{1}{\eta}} y_{idt}^{\frac{\eta-1}{\eta}} di \right)^{\frac{\eta}{\eta-1}},$$

Within product, across origins

$$y_{idt} = \left(\sum_{o \in \mathcal{C}} (\alpha_{od})^{\frac{1}{\rho}} y_{iodt}^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}},$$

Across firms within an origin

$$y_{iodt} = \left(\sum_{f \in \mathcal{F}_{iodt}} q_{fiodt}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}},$$

where $\sigma \geq \rho \geq \eta > 1$

Notation: f (firm), i (product), o (origin), d (destination), t (time). $\mathcal{FD}$ is the set of products used for final demand; α_{id} and α_{od} are demand shifters; $\mathcal{F}_{iodt}$ is set of active firms at product-origin-destination level

Oligopolistic competition in intermediate input markets

Same structure with different demand shifters:

Across products
$$M_{dt} = \left(\int_{i \in \mathcal{IM}} \left(\alpha^M_{id}\right)^{\frac{1}{\eta}} m_{idt}^{\frac{\eta-1}{\eta}} \, di \right)^{\frac{\eta}{\eta-1}},$$

Within product, across origins
$$m_{idt} = \left(\sum_{o \in \mathcal{C}} \left(\alpha^M_{od}\right)^{\frac{1}{\rho}} m_{iodt}^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}},$$

Across firms within an origin
$$m_{iodt} = \left(\sum_{f \in \mathcal{F}^M_{iodt}} q_{fiodt}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}},$$

where $\sigma \geq \rho \geq \eta > 1$

Notation: f (firm), i (product), o (origin), d (destination), t (time). $\mathcal{IM}$ is set of products used for intermediate input; α^M_{id} and α^M_{od} are demand shifters; $\mathcal{F}^M_{iodt}$ is set of active firms at product-origin-destination level

Markups and demand elasticities

The triple nested market structure implies two distinct market shares that matter for the demand elasticity ε_{fiodt} and the markup μ_{fiodt}:

$$\varepsilon_{fiodt} = \sigma - ms_{fiodt}[\sigma - \rho + (\rho - \eta)ms_{iodt}]$$
$$\mu_{fiodt} = \frac{\varepsilon_{fiodt}}{\varepsilon_{fiodt} - 1}$$

where

- ms_{fiodt}: firm f's market share **among all firms from origin** o selling product i in d at t
- ms_{iodt}: origin o's market share of product i in destination d at time t

Implication: A bilateral tariff increase leads to $\Downarrow ms_{iodt}$ and $\Uparrow ms_{fiodt}$

$\Rightarrow$ Demand facing a firm could become more or less elastic, depending on which force dominates

$\Rightarrow$ Markups may rise or fall (Crowley, Han, Prayer; JIE 2024)

Calibrating the model to data

1. Calibrate key elasticities using firm-level exports data Details

2. Calibrate demand shifters to match market shares in final demand and input-output linkages using World Input-Output Database 2014 Details

   - 45 countries integrated into 6 groups: US, China, Canada, Mexico, EU, and ROW
   - 56 industries integrated into 9 categories, with 50 similar products per category, i.e., 450 products
     $\Rightarrow$ For each product, there are 60 potential firms (5 per country)

List of industry categories: 1. Agriculture & Natural Resources, 2. Food, Textiles & Basic Manufacturing, 3. Heavy & Chemical Manufacturing, 4. Electronics & Machinery, 5. Transport Equipment Manufacturing, 6. Other Manufacturing & Repair, 7. Utilities & Construction, 8. Trade & Transport, 9. Knowledge, Public & Personal Services

Trade war experiment

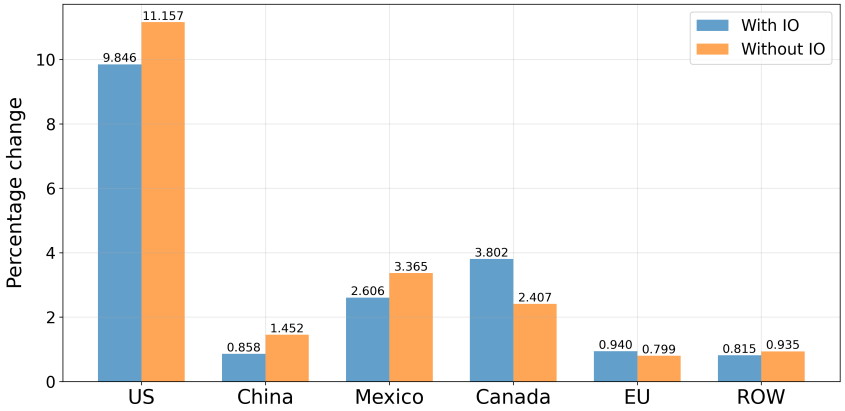
All countries begin from a free trade equilibrium.

A trade war erupts with the following changes:

- US vs China: bilateral tariffs increase to 30%
- US vs Canada, Mexico, EU and ROW: bilateral tariffs increase to 10%

Concentration rises in response to trade war

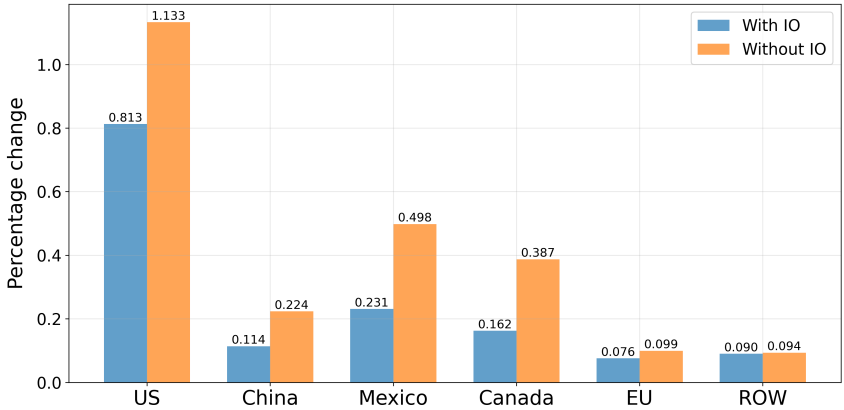
Changes in Herfindahl-Hirschman Index in tradable sectors



- Significant global increase in market concentration driven by reduced competition and the exit of foreign firms

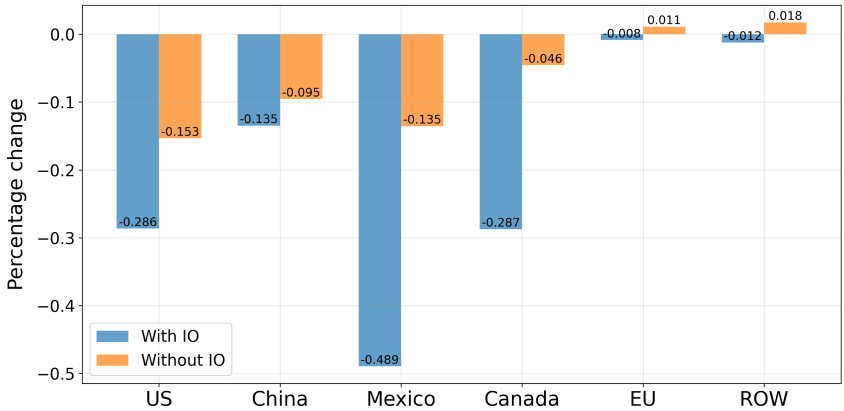
The trade war results in higher firms' market power world-wide

Markup adjustments in tradable sectors



- Firms gain market power and raise markups
- Input-output network drives cost increases for domestic and foreign firms
  $\rightarrow$ a more limited impact on relative competitiveness and markup adjustments

Rise in market power correlated with welfare losses



- Larger welfare losses when firms are linked by an input-output network, driven by greater cost changes and stronger entry and exit responses

Welfare decomposition

Extend Baqaee and Farhi 2024 to allow for extensive margin adjustment:

$$\mathrm{d}\log W_d \approx \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\tau_{ad}}_{\Delta\text{Tariff wedge}} \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\mu_{ad}}_{\Delta\text{Markup wedge}} \underbrace{-\sum_b \left(\tilde{\lambda}_{bd}-\Lambda_{bd}\right)\mathrm{d}\log\Lambda_b}_{\Delta\text{Factor income wedge}} + \underbrace{E_d}_{\text{Variety effect}}$$

- first three terms capture welfare changes brought by continuing firms
- a is firm-product-origin triplet; b captures labor, tariff revenue, and profit 'factor'
- $\tilde{\lambda}_{ad}$: d's expenditure exposure to a; Λ_{bd} : share of factor b in d's income
- Λ_b : share of factor b in world income

What drives welfare changes?

$$\mathrm{d}\log W_d \approx \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\tau_{ad}}_{\Delta\text{Tariff wedge}} \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\mu_{ad}}_{\Delta\text{Markup wedge}} \underbrace{-\sum_b (\tilde{\lambda}_{bd}-\Lambda_{bd})\,\mathrm{d}\log\Lambda_b}_{\Delta\text{Factor income wedge}} + \underbrace{E_d}_{\text{Variety effect}}$$

Country	Welfare	Allocation			Variety
		Markup	Tariff	Factor Income	
US	-0.287	-0.191	-0.725	0.833	-0.219
China	-0.135	-0.054	-0.061	0.093	-0.070
Mexico	-0.491	-0.101	-0.701	0.458	-0.177
Canada	-0.288	-0.054	-0.741	0.609	-0.114
EU	-0.008	-0.023	-0.132	0.157	-0.009
ROW	-0.012	-0.033	-0.156	0.187	-0.009

- Losses from markup and tariff wedges more or less offset by factor income gains
- Welfare losses primarily due to the contraction in product innovation (variety), a key effect of market concentration

▸ Net effects ▸ Home vs foreign markup contributions

Conclusions: Trade Wars and Market Power in a Fragmenting World

- Cheng, Corsetti, Crowley and Han (2025) document:
  - highly concentrated (origin-destination-product) export markets.
  - exporters respond differently to common (across-the-board) vs bilateral (targeted) tariff changes

  $\Rightarrow$ Evidence of strategic behaviour by foreign exporters (and domestic firms)

- We embed this evidence in a state-of-the-art GE model of global trade,

  $\Rightarrow$ the welfare consequences of a trade war, driven by reduced competition, are significant.

  - Exit of existing (large) exporters is only partially offset by the entry of third country exporters and domestic firms
  - Market power inhibits product innovation (varieties)
  - Loss of variety effects and markup increases account for most of the loss of welfare under a trade war

References

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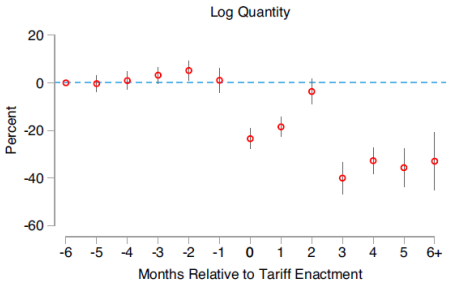
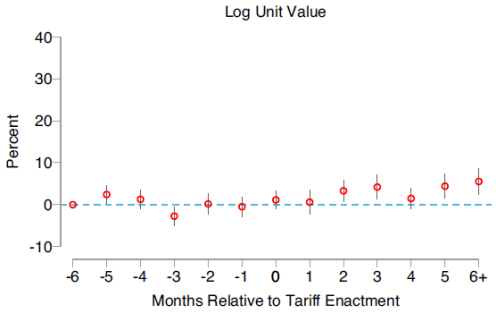
Appendix

Estimated impacts of the 2018 US-China Trade War

Decline in US imports from China



Prices (ex.tariff) of Chinese exporters to US



Source: Figure II from Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020)

Similar price effects found in Amiti, Redding and Weinstein (2019) and Carvallo, Gopinath, Neiman, and Tang (2021)

Market structure and demand elasticities

General case: oligopolistic competition within origin and industry

$$\varepsilon_{fiodt} = \sigma - ms_{fiodt}[\sigma - \rho + (\rho - \eta)ms_{iodt}]$$

Special cases:

1. **Monopolistic competition** (e.g. Melitz 2003)
   when N_{iodt} is large and/or $\sigma = \rho = \eta$:

   $$\text{Constant markup:} \quad \frac{\varepsilon_{fiodt}}{\varepsilon_{fiodt} - 1} = \frac{\sigma}{\sigma - 1}$$

2. **Oligopolistic competition within industry** (e.g. Atkeson and Burstein 2008)
   when $\sum_o N_{iodt}$ is finite and $\sigma = \rho > \eta$:

   $$\varepsilon_{fiodt} = \rho - (\rho - \eta)ms_{fiodt}ms_{iodt}$$

3. **Oligopolistic competition within origin**
   when N_{iodt} is finite but $\sum_o N_{iodt}$ is large:

   $$\varepsilon_{fiodt} \to \sigma - ms_{fiodt}(\sigma - \rho)$$

Note: Elasticity of substitution within origin (σ), across origins (ρ), across products (η)

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1. Calibrating key model parameters

Simulate a model with 450 products; SMM to match empirical estimates

Estimated parameters	Value
Within-origin elasticity of substitution σ	6.05
Cross-origin elasticity of substitution ρ	3.49
Productivity dispersion (inverse)	7.50
Heterogeneous demand preference	0.39

	Data		Model	
Targeted tariff elasticity estimates	Common	Bilateral	Common	Bilateral
Quantity	-0.78	-2.40	-1.58	-2.39
Markup	0.05	0.23	0.11	0.22
Firm's within-origin market share	1.18	3.54	1.16	2.70
Origin's market share in dest.	-1.19	-3.89	-1.41	-3.93

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2. Calibrating model to match World Input-Output Database (WIOD)

We calibrate the demand shifters $(\alpha_{id}, \alpha_{od}, \alpha_{id}^{M}, \alpha_{od}^{M})$ to match the market shares in final demand and intermediate input markets

Details

- Inner loop: for given demand shifters, solve the model to get trade shares
- Outer loop: compare model vs data shares and update demand shifters

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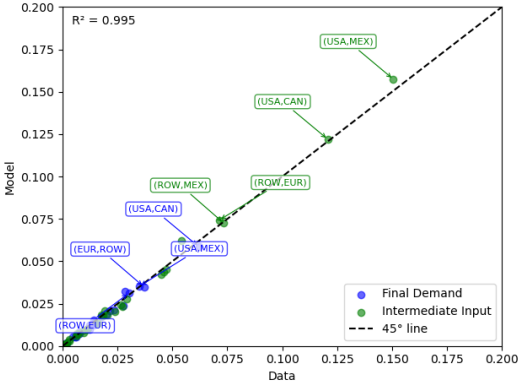
Adjustments made to facilitate computation:

- Aggregate 45 countries into 6 groups: US, China, Canada, Mexico, EU, and ROW
- Aggregate 56 industries into 9 categories (with 50 similar products per category)

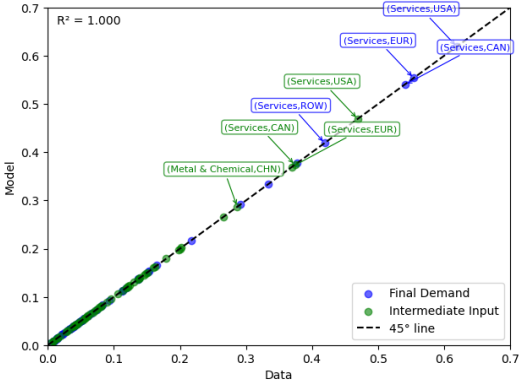
List of industry categories: 1. Agriculture & Natural Resources, 2. Food, Textiles & Basic Manufacturing, 3. Metals & Chemical Manufacturing, 4. Electronics & Machinery, 5. Transport Equipment Manufacturing, 6. Other Manufacturing & Repair, 7. Utilities & Construction, 8. Wholesale, Retail & Transportation Services, 9. Knowledge, Public & Personal Services

Model's fit

(a) Origin's share in destination



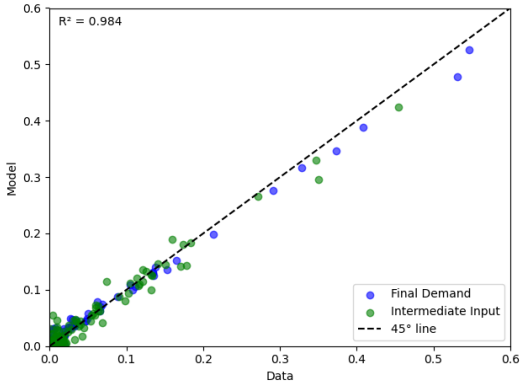
(b) Industry's share in destination



- Perfect match at the origin-destination and industry-destination level

Model's fit

(c) Origin-industry's share in destination



- Good fit at the industry-origin-destination level

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Model calibration: Existing approaches and how we differ

There are different ways to include production network and calibrate the trade share

- Baqee and Farhi (2024 Econometrica):
  - Ex-ante trade shares are directly imported from the data
  - Ex-post change in trade shares relies on changes in markup, which are exogenously given
- Mukhin (2022 AER):
  - Ex-ante trade shares are pinned down by demand shifters in Cobb-Douglas form
  - No ex-post change in trade shares possible
- Ferrante, Graves and Iacoviello (2023 JME):
  - Ex-post change in trade shares are possible as consumption and input are CES aggregates
  - Ex-ante trade shares are not guaranteed to match the data because demand shifters are the same as the trade shares

We propose an alternative method to match ex-ante trade shares and predict ex-post change in trade shares

Numerical algorithm

Inner-loop (solving firm's problem and check GE conditions):

1. Guess initial outputs, nominal wages, and market shares
2. Derive prices, entry decisions, and updated market shares
3. Derive updated outputs, labor demand, and values of imports and exports
4. If the maximum error is sufficiently small, stop. If not, update guesses and proceed
5. If labor supply exceeds labor demand, increase output guesses. If exports exceed imports, increase wage guesses. Return to step 1

Outer-loop (matching trade shares):

1. Guess initial demand shifters
2. Derive simulated trade shares based on the guess
3. If the maximum error is sufficiently small, stop. If not, update guesses and proceed
4. If observed trade share is smaller than simulated trade share, increase demand shifter. Normalize the demand shifters, and return to step 1

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Trade Statistics

Share of total sales by destination

Origin / Dest.	US	China	Mexico	Canada	EU	ROW
US	0.938	0.004	0.006	0.009	0.015	0.029
China	0.011	0.924	0.001	0.002	0.012	0.051
Mexico	0.125	0.003	0.827	0.009	0.010	0.025
Canada	0.108	0.005	0.003	0.827	0.013	0.045
EU	0.014	0.008	0.001	0.002	0.902	0.072
ROW	0.016	0.024	0.002	0.002	0.029	0.926

Share of total purchase by origin

Origin / Dest.	US	China	Mexico	Canada	EU	ROW
US	0.923	0.004	0.084	0.090	0.014	0.015
China	0.011	0.941	0.018	0.015	0.011	0.027
Mexico	0.009	0.000	0.830	0.006	0.001	0.001
Canada	0.011	0.001	0.004	0.832	0.001	0.002
EU	0.015	0.009	0.021	0.022	0.923	0.042
ROW	0.031	0.046	0.043	0.035	0.051	0.913

- EU and ROW are much less directly exposed to the US relative to Mexico and Canada

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Welfare approximation with and without variety effects

$$\mathrm{d}\log W_d \approx \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\tau_{ad}}_{\Delta\text{Tariff wedge}} \underbrace{-\sum_a \tilde{\lambda}_{ad}\,\mathrm{d}\log\mu_{ad}}_{\Delta\text{Markup wedge}} \underbrace{-\sum_b (\tilde{\lambda}_{bd}-\Lambda_{bd})\,\mathrm{d}\log\Lambda_b}_{\Delta\text{Factor income wedge}} + \underbrace{E_d}_{\text{Variety effect}}$$

Country	Change in Welfare (in %)		
	Model	Approxi-mation	Approximation Ignoring Variety Effects
US	-0.287	-0.301	-0.083
China	-0.135	-0.090	-0.020
Mexico	-0.491	-0.515	-0.338
Canada	-0.288	-0.306	-0.192
EU	-0.008	-0.007	0.002
ROW	-0.012	-0.011	-0.002

Decomposing changes in markup wedges

Country	Total	Main Components	
		Domestic	Foreign
US	-0.191	-0.189	-0.002
China	-0.054	-0.052	-0.001
Mexico	-0.101	-0.134	0.033
Canada	-0.054	-0.094	0.041
EU	-0.023	-0.021	-0.001
ROW	-0.033	-0.034	0.001

- The main welfare loss from markup adjustments stems from higher domestic markups
- Little impact from foreign firms due to two offsetting reallocation effects

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The net welfare contributions of markups and tariffs

Country	Net Effects	
	Markup	Tariff
US	-0.094	-0.057
China	-0.015	-0.005
Mexico	-0.019	-0.171
Canada	-0.003	-0.140
EU	-0.014	-0.032
ROW	-0.018	-0.025

- The net welfare losses from endogenous markup adjustments can be as large as those from direct tariff changes.

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Approximation of variety effect

$$E_d \approx \underbrace{-\frac{1}{\theta_d}\left[\sum_{e\in\mathcal{E}_d}\tilde{\lambda}_{ed} - \sum_{x\in\mathcal{X}_d}\tilde{\lambda}_{xd}\right]}_{\text{Effect on aggregate price (a la Feenstra 94)}} + \underbrace{\sum_{e\in\mathcal{E}_d}\Lambda_{ed} - \sum_{x\in\mathcal{X}_d}\Lambda_{xd}}_{\text{Effect on factor income}}$$

- $\mathcal{E}_d$, $\mathcal{X}_d$: the sets of entrants and exiters in d
- $\tilde{\lambda}_{ed}$: d's expenditure exposure to e (based on the extended HAIO; element of $(I-\widetilde{\Omega})^{-1}$)
- Λ_{ed} : share of profit e in d's income
- θ_d : trade elasticity

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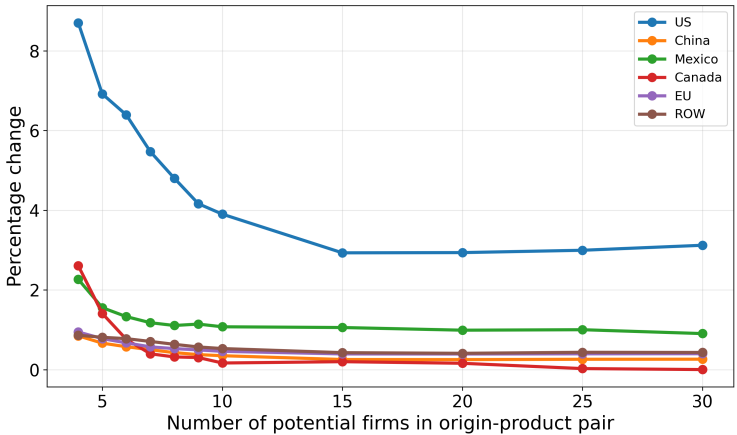
Welfare impacts and concentration

Experiment:

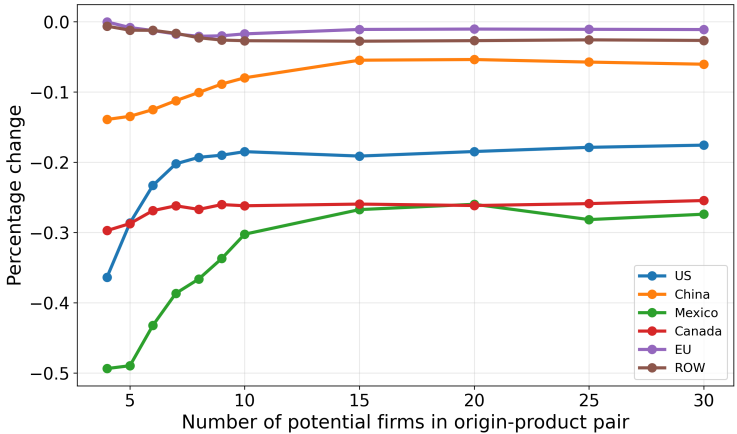
- Fix total number of firms in an economy, but change number of industries
  - Many small industries consisting of a few firms $\Longrightarrow$ oligopoly with market power
  - A few big industries consisting of many firms $\Longrightarrow$ Melitz

Changes in Herfindahl-Hirschman index in tradable sectors



- Concentration rises more when initial market concentration is already high

Changes in welfare



- Welfare cost of the trade war to US, China, Mexico, and Canada is larger when initial market concentration is higher.