Trade liberalisations and market structure: Lecture 1

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How do changes in trade policy shape market structure, market competition, and exporters' market power?

Evidence in this talk comes from:

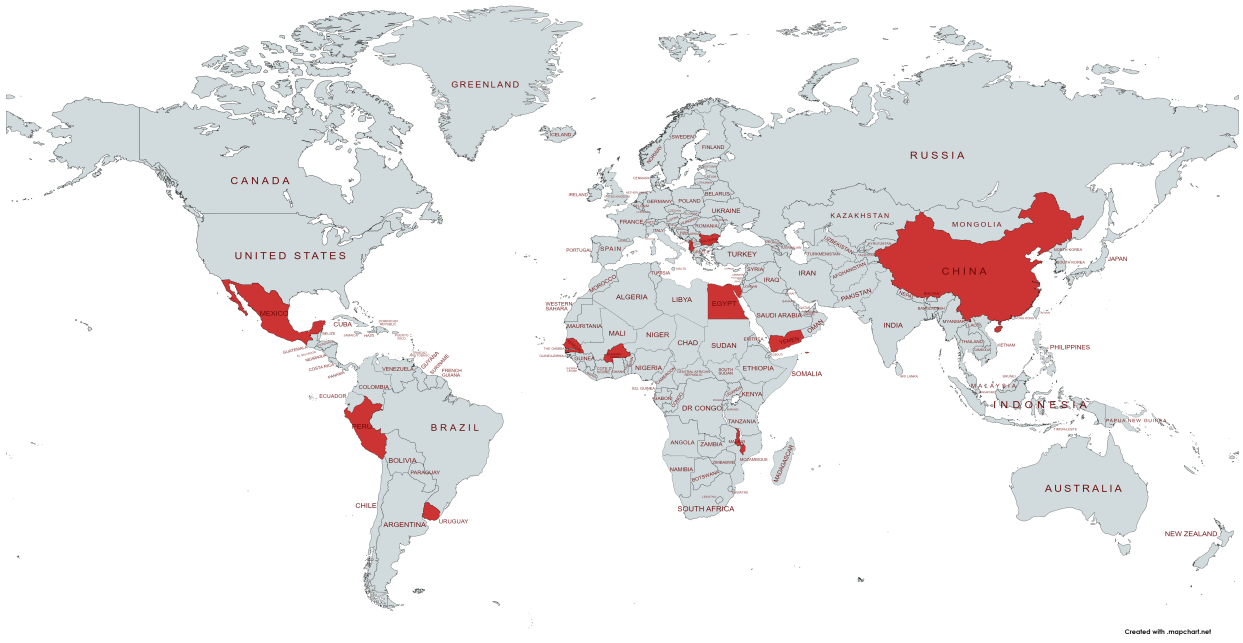
- "The Procompetitive Effects of Trade Agreements," by M. Crowley, L. Han and T. Prayer, *Journal of International Economics*, cond. accepted.
- "The Value of Deep Trade Agreements in the Presence of Pricing to Market," by M. Crowley, L. Han and T. Prayer, World Bank Policy Research Working Paper No. 9600, 2021.

Disclaimer

The views expressed herein are those of the authors and not necessarily those of the Bank of Canada.

Data: 15.7 mil obs on 225k firms from 11 origin countries

exporting to 165 destinations under 25 preferential trade agreements



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

How do tariffs, non-tariff barriers, and trade agreement provisions affect:

- market structure and the number of exporters in over 3600 product markets in each country? and price-cost markups?

Observation: Few firms active in a product market

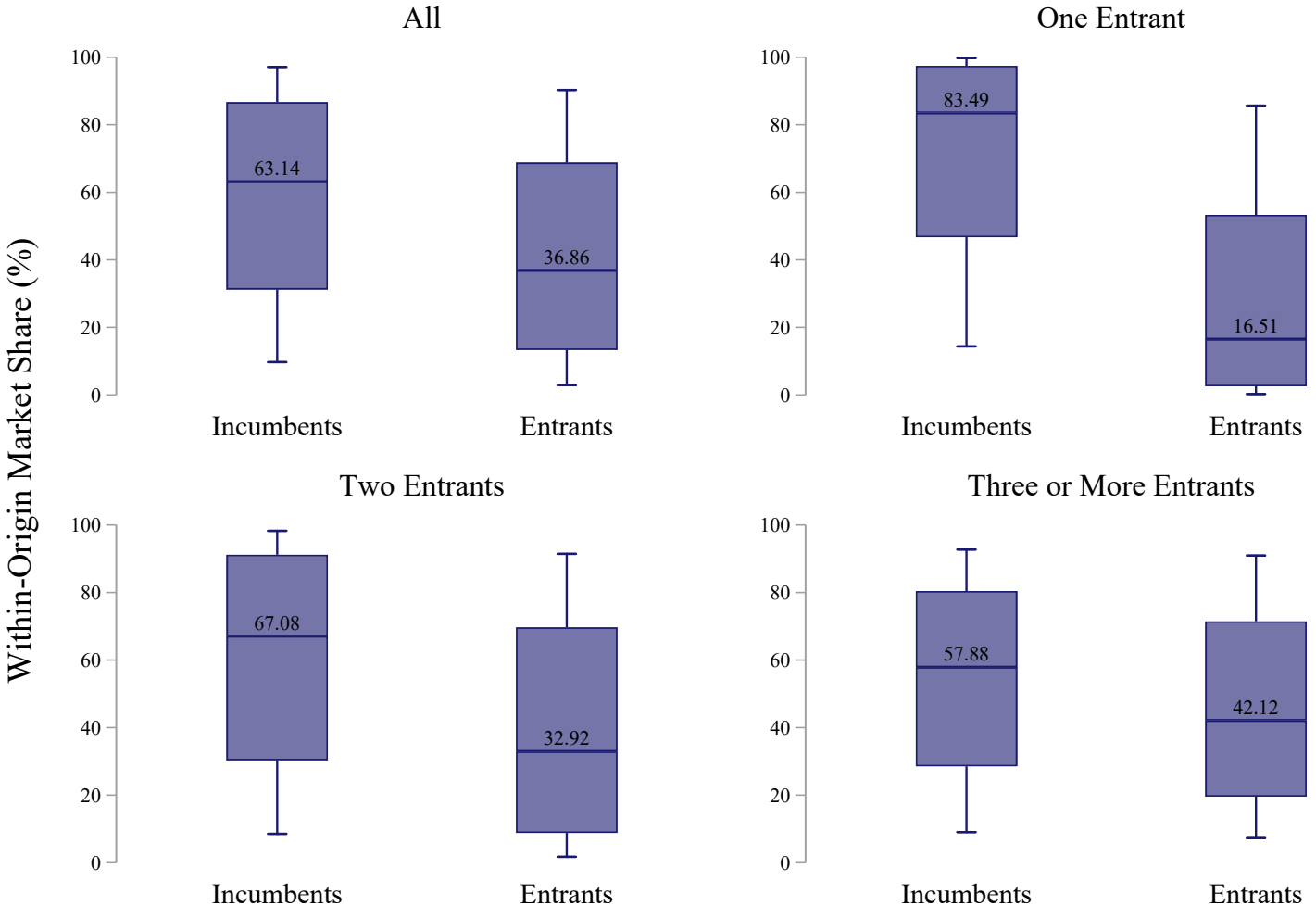
A small number of exporters from low and middle income countries participate in the product markets in 165 destination countries.

	Mean	25th	Median	75th	No. of Markets
# of Firms Active at t	11.97	1.00	3.00	7.00	1,303,733
# of Incumbents at t	4.35	0.00	1.00	2.00	1,303,733
# of Entrants at t	7.62	1.00	2.00	5.00	1,303,733

Notes: This table presents summary statistics for the number of firms from an origin o selling product i to destination d at time t. It is based on data for product-origin-destination markets in our main estimation sample for all years in which there is at least one exporter in these markets.

Entrants capture substantial market share

(conditional on the presence of at least one incumbent and one entrant)



Literature: Market Structure in International Trade Models

1. Technology differences drive trade (perfect competitive)
   - Dornbusch, Fischer, & Samuelson (1977), Eaton & Kortum (2002), Caliendo & Parro (2015), Lenoir, Martin, & Mejean (2023)
2. Increasing returns to scale drive trade (monopolistic competition)
   - Krugman (1979, 1980), Melitz (2003) and a large Melitz-inspired literature
3. Welfare gains from trade are 'complicated' (oligopolistic competition in one market)
   - Brander and Krugman (1983), Brander and Spencer (1984), Helpman and Krugman (1985), Eaton and Grossman (1986)

Gap: Need for a tractable model of multi-market oldigopolistic competition to bridge 2. to 3. $\Rightarrow$ Atkeson and Burstein (2008)

Literature: International Macro Models of Pricing

1. Six puzzles: Obstfeld and Rogoff (2000): Pricing-to-market is the key to resolving the purchasing power parity puzzle in international macro
2. Atkeson and Burstein (2008): Introduce tractable model of multi-market oligopolistic competition with endogenously generated variable markups to address the PPP puzzle in macro
3. Edmond, Midrigan, and Xu (2015): Examine global allocative efficiency implications of a trade liberalisation in a calibrated 2 country Atkeson and Burstein (2008) model

Gap: Empirical analysis of pricing-to-market and markups under trade liberalisations in the presence of multi-market oligopoly

Literature: Pro-competitive effects of trade

1. Empirics: de Loecker, Goldberg, Khandelwal and Pavcnik (2016)
   Analyse markups of Indian firms using firm balance sheet data
   Findings: Increased competition after India's trade liberalisation:
   ⇒Prices fell in output and input markets. Input prices fell more.
   ⇒Price-cost markups rose Additional empirical studies

2. Theory: Arkolakis, Costinot, Donaldson & Rodriguez-Clare (2018)
   Extension of ACR calibrates price impacts for a large class of demand functions, including Atkeson and Burstein (2008)
   Conclusion:No pro-competitive gains under a trade liberalisation because domestic markup reductions are just offset by markup increases of foreign exporters.
   Key: No entry of new foreign exporters.

Gap: Empirical analysis of exporters' markups and import market structure changes under a trade liberalisation. Issue: Vinerian trade creation and trade diversion under a Preferential Trade Agreement (PTA).

Return

Crowley, Han and Prayer, JIE, conditionally accepted

Theoretical: We introduce a PE trade model featuring oligopolistic competition from multiple origins and variable markups.

- We show how an exporter's optimal markup changes in response to entry from competitors under a trade liberalisation.

Empirical: Using product-level exports from 225k firms located in 11 emerging and low-income countries to 165 destinations, we examine 25 PTAs to estimate impacts on

- number of firms participating in a market,
- market shares and markups.

Cheng, Corsetti, Crowley, and Han - under development

In progress: We estimate a GE version of the trade model featuring oligopolistic competition from multiple origins and variable markups.

- Estimate model parameters using SMM and conduct counterfactual policy analysis
- How do markups from multiple exporting countries change under a preferential trade liberalization that only benefits a subset?

Theoretical Contribution

Goal: Develop a multi-country model of oligopolistic competition with...

- A large number of heterogeneous products and firms
- Endogenous entry by firms with products
- A limited number of firms at product-origin-destination level
- Variable markups which depend on market structure

Approach: Extend open macro pricing model of Atkeson and Burstein (2008)...

1. to include multiple origins competing in multiple destinations
2. with layered CES preferences that allow for more intense competition among firms from the same origin

Market structure

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

Across products
$$Y_{dt} = \left(\int_i y_{idt}^{\frac{\eta-1}{\eta}} di \right)^{\frac{\eta}{\eta-1}},$$

Within product, across origins
$$y_{idt} = \left(\sum_o y_{iodt}^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}},$$

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

where $\sigma \geq \rho \geq \eta$.

Notation: f (firm), i (product), o (origin), d (destination), t (time)

Markups and demand elasticities

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

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

$$\mu_{fiodt} = \frac{\varepsilon_{fiodt}}{\varepsilon_{fiodt} - 1}$$

where

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

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

$\Rightarrow$ Demand facing a firm could become more or less elastic, depending on which of the two forces dominates

$\Rightarrow$ Markups may rise or fall

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 $\sigma = \rho = \eta$:

$$\varepsilon_{fiodt} = \sigma \quad \Rightarrow \text{Constant markups:} \quad \mu_{fiodt} = \frac{\sigma}{\sigma - 1}$$

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)

Markup adjustments to a trade policy change

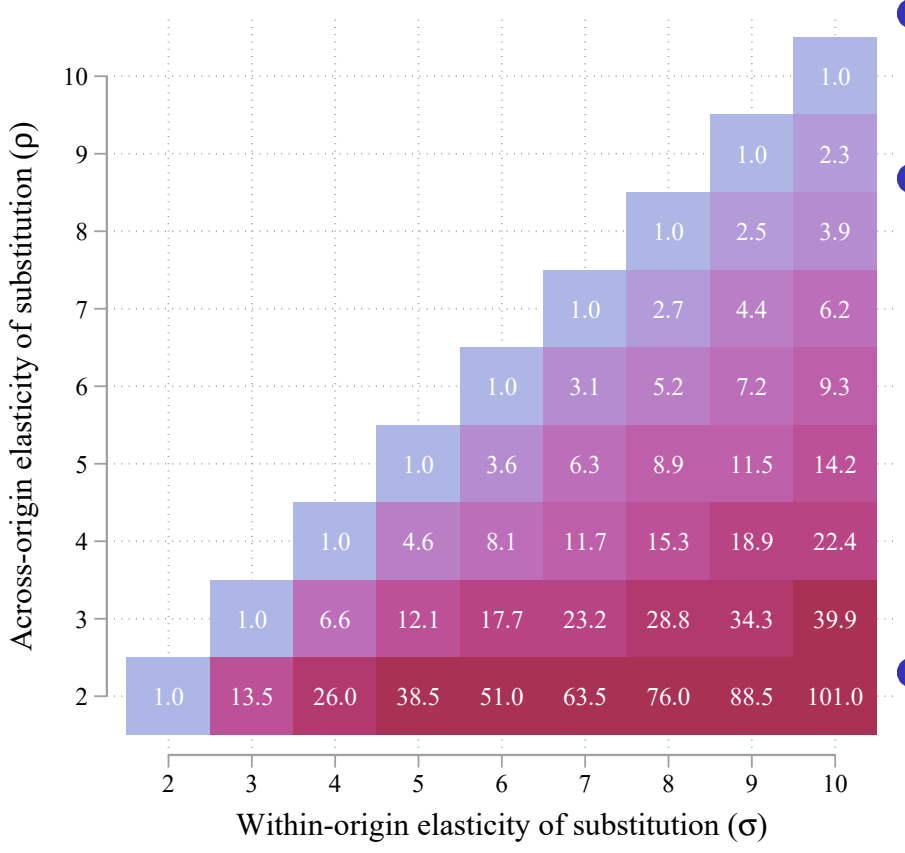
Markup adjustments can be decomposed into two channels:

$$\widehat{\mu}_{fiodt} = \underbrace{A(\sigma, \rho, \eta, ms_{fiodt}, ms_{iodt}) \cdot \widehat{ms}_{fiodt}}_{\text{Within-origin reallocation effect}} + \underbrace{B(\sigma, \rho, \eta, ms_{fiodt}, ms_{iodt}) \cdot \widehat{ms}_{iodt}}_{\text{Cross-origin reallocation effect}}$$

- When $\sigma = \rho$, $A(.) = B(.) > 0 \Rightarrow$ Direction of markup adj. depends solely on the sign of $\widehat{\omega}_{fiodt} = \widehat{ms}_{fiodt} + \widehat{ms}_{iodt}$ = change in firm's market share for product i in destination d
  - $\widehat{\mu}_{fiodt} < 0$ iff $\widehat{\omega}_{fiodt} < 0$ [As in Atkeson & Burstein (2008)]
- When $\sigma > \rho$, $A(.) > B(.) > 0 \Rightarrow$ Direction of markup adj. also depends on the magnitude of $A(.)$ and $B(.)$
  - $\widehat{\mu}_{fiodt} < 0$ even if $\widehat{\omega}_{fiodt} \geq 0$
  - The markup can fall even if the firm's market share for product i in destination d increases.

Relative importance of two market share changes on markup adjustment

Ratio of the within-origin to across origin reallocation of market share for $ms_{fiodt} = 0.5$ and $ms_{iodt} = 0.1$ and $\eta = 1.2$

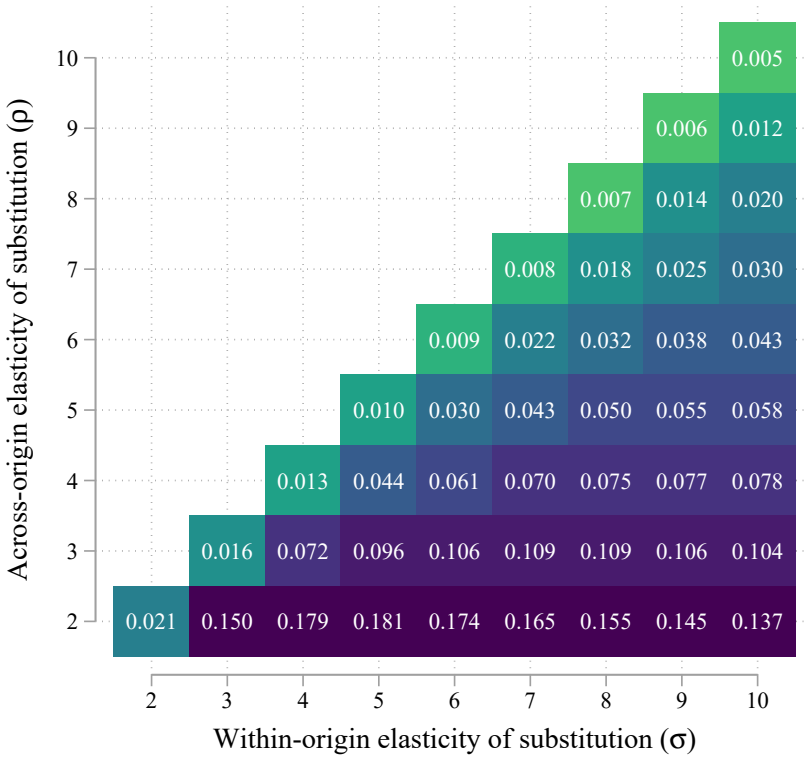


- Diagonal elements are special case of Atkeson and Burstein
- Lower triangle values show within-origin reallocation of import market share has a more powerful effect on firm's markup than shifting market share to the firm's origin country
- At $\sigma = 10$ and $\rho = 2$, the within-origin effect is 100 times larger than the cross-origin effect.

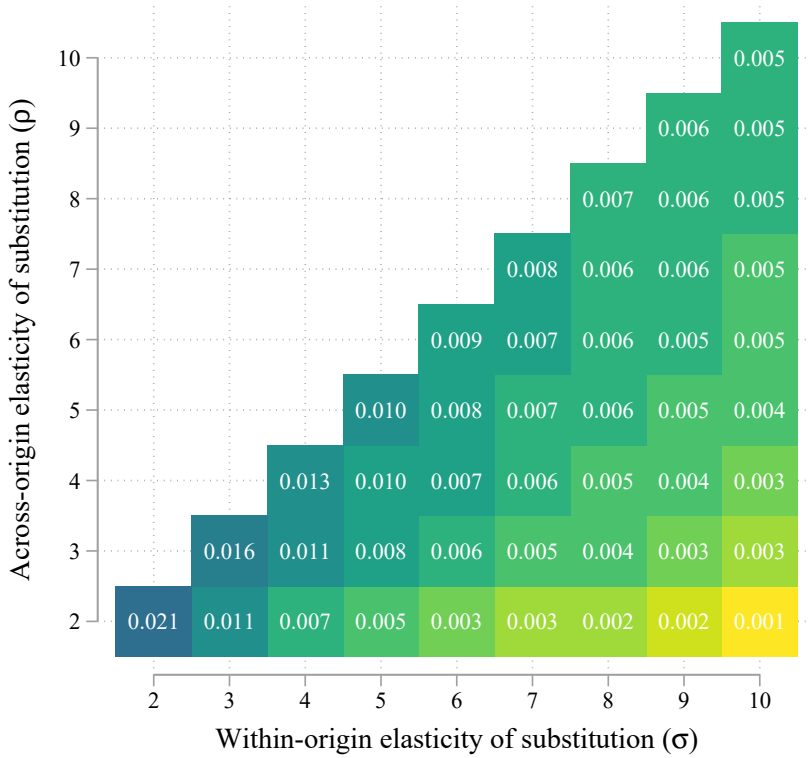
Markup adjustments to a 1% market share change

A(.) and B(.) fixing $ms_{fiodt} = .5$, $ms_{iodt} = .1$, $\eta = 1.2$ and varying ρ and σ

(A) Within-origin reallocation effect ($\widehat{\mu}_{fiodt}$ when $\widehat{ms}_{fiodt} = 1\%$)



(B) Cross-origin reallocation effect ($\widehat{\mu}_{fiodt}$ when $\widehat{ms}_{iodt} = 1\%$)



- Within-origin reallocation effect is larger in magnitude when $\sigma \neq \rho$ e.g. $\widehat{\mu}_{fiodt} < 0$ if $\widehat{ms}_{fiodt} = -1\%$ and $\widehat{ms}_{iodt} = 1\%$

Following Amiti, Itskhoki and Konings (2019), we can write the change in the optimal markup as:

$$\widehat{\mu}_{fiodt} = \frac{\partial \mu_{fiodt}}{\partial p_{fiodt}} \frac{p_{fiodt}}{\mu_{fiodt}} \widehat{p}_{fiodt} + \sum_{k \neq f \in \mathcal{F}_{iodt}} \frac{\partial \mu_{fiodt}}{\partial p_{kiodt}} \frac{p_{kiodt}}{\mu_{fiodt}} \widehat{p}_{kiodt}$$
$$+ \sum_{f', o' \in \mathcal{F}_{idt} \setminus \mathcal{F}_{iodt}} \frac{\partial \mu_{fiodt}}{\partial p_{f'io'dt}} \frac{p_{f'io'dt}}{\mu_{fiodt}} \widehat{p}_{f'io'dt} + \widehat{E}_{fiodt}$$

where the four terms refer to:

1. changes in the firm's own price $\widehat{p}_{fiodt}$
2. changes in the prices of other firms from the same origin $\widehat{p}_{kiodt}\ \forall k \neq f \in \mathcal{F}_{iodt}$,
3. changes in the prices of firms from other origins and the destination $\widehat{p}_{f'io'dt}\ \forall f', o' \in \mathcal{F}_{idt} \setminus \mathcal{F}_{iodt}$ and
4. changes due to new entrants from the same origin $\widehat{E}_{fiodt}$.

The effect of entry on incumbent exporters' markups

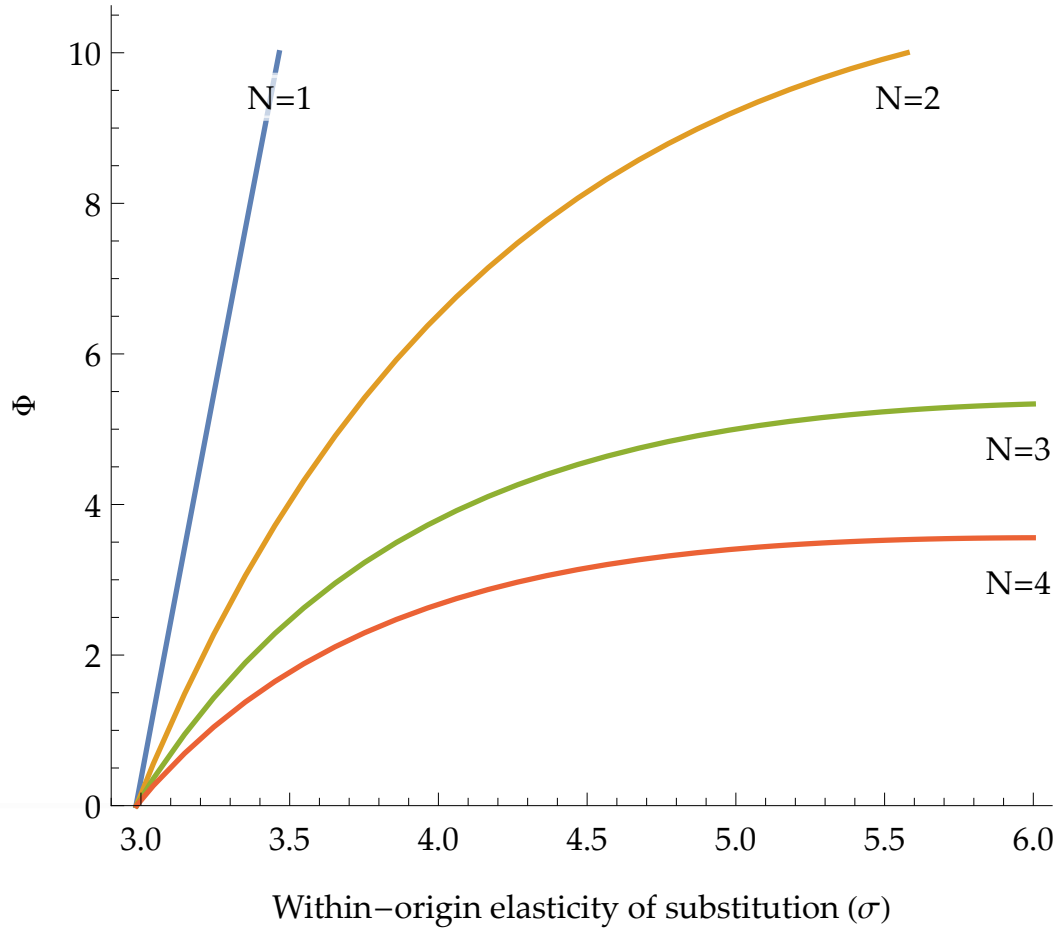
Under a 1% preferential tariff reduction, the markup adjustment (in percentage) of firms from the preferred origin (up to a first order approximation) is given by:

$$\widehat{\mu}_{fiodt} \approx \Upsilon_{fiodt} - \underbrace{(1 - \Upsilon_{fiodt})\,\Phi_{iodt}\,\widetilde{ms}_{jiodt}}_{\textbf{Entry effect}}$$

where

1. $0 \leq \Upsilon_{fiodt} < 1$ is the markup adjustment in absence of entry;
2. Φ_{iodt} captures the strength of the entry effect;
3. $\widetilde{ms}_{jiodt}$ is the sum of within-origin market shares of new entrants from origin o in product-market id (due to the preferential tariff reduction).

The strength of the entry effect, Φ_{iodt}



Notes: The figure plots the Φ_{iodt} function for different values of σ and the number of incumbent firms N in the market before the tariff cut hits with $ms_{fiodt} = 1/N$, $ms_{iodt} = 0.1$, $\rho = 3$ and $\eta = 1.2$.

Theoretical predictions

$\Rightarrow$ Preferential tariff cuts **raise** the market shares of the origin in the destination (Vinerian trade creation and trade diversion), but **reduce** the market shares of individual exporters from the (preferred) destination.

$\Rightarrow$ Markups fall when the impact of entry on incumbents' market shares is sufficiently strong.

Estimation

Use a multi-origin multi-destination panel of firm-level product exports to address two problems in identifying markups:

- Marginal cost for a product produced by a firm varies over time.
- Demand for a product in a destination fluctuates over time.

Approach:

- With firms that export to multiple destinations:
  use firm-product-origin-year fixed effects to control for product-level time-varying marginal cost.
- With firms from multiple origins exporting to a destination:
  use product-destination-year fixed effects to control for changes in demand.

Impact of trade policy changes

$$\text{Outcome}_{fiodt} = \beta_1 \cdot \text{PTA}_{odt} + \beta_2 \cdot \text{Tariff}_{iodt} + \text{Fixed Effects} + \zeta_{fiodt}$$

with f, i, o, d, t denoting firm, HS06 product, origin, destination, and year.

where Outcome_{fiodt} is:

- export value, used to estimate elast. of firm's mkt share in the destin. ω_{fiodt}
- FOB unit value used to estimate elasticity of the markup μ_{fiodt}

Fixed effects:

- δ_{fiot}: firm-product-origin-year fixed effects (control for e.g. marginal cost)
- δ_{idt}: product-destination-year fixed effects (e.g. changes in demand)
- δ_{od}: origin-destination fixed effects (e.g. gravity variables)

Identifying market share elasticities

$$\text{Outcome}_{fiodt} = \beta_1 \cdot \text{PTA}_{odt} + \beta_2 \cdot \text{Tariff}_{iodt} + \text{Fixed Effects} + \zeta_{fiodt}$$

When $Outcome_{fiodt}$ is:

- ln(export value) and *idt* fixed effects are included $\Rightarrow$

  β_2 is elast. of a firm's mkt share in the destin. to tariff.

$$\omega_{fiodt} = sales_{fiodt} / Consumption_{idt}$$

$$\ln(v_{fiodt}) = \ln(\omega_{fiodt}) + \underbrace{\ln(\sum_{f,o} v_{fiodt})}_{\text{absorbed by } idt \text{ fixed effects}}$$

Identifying markup elasticities

$$\text{Outcome}_{fiodt} = \beta_1 \cdot \text{PTA}_{odt} + \beta_2 \cdot \text{Tariff}_{iodt} + \text{Fixed Effects} + \zeta_{fiodt}$$

When $Outcome_{fiodt}$ is:

- ln(FOB unit value) and *fiot* fixed effects are included $\Rightarrow$

  β_2 is the elasticty of a firm's markup to the tariff.

$$\ln(p_{fiodt}) = \ln(\mu_{fiodt}) + \underbrace{\ln(mc_{fiot})}_{\text{absorbed by } fiot \text{ fixed effects}}$$

Impacts of PTAs on Firm's Market Share in the Destination

	Firm's mkt share in dest. $\ln(\omega_{fiodt})$
Tariff_{iodt}	-0.78***
	(0.244)
PTA_{odt}	0.02
	(0.021)
Observations	15,712,501
Fixed Effects	
Firm-prod-origin-year	✓
Product-destin-year	✓
Origin-destination	✓

PTA effects come via tariff cuts

10% cut in tariff $\Rightarrow$

- MS $\uparrow$ 8%

- The preferential tariff cut increases the market access of firms from the preferred origin (at the expense of firms from other origins and domestic firms).

How *should* markups adjust?

Predictions from Atkeson-Burstein (2008) Nested CES Model

The markup of firm f selling product i from origin o in destination d is:

$$\mu_{fiodt} = \frac{\varepsilon(\omega_{fiodt})}{\varepsilon(\omega_{fiodt}) - 1}$$

where the demand elasticity is a function of the firm's market share in the destination ω_{fiodt}, the elasticity of substitution within product ρ, and across products η:

$$\varepsilon(\omega_{fiodt}) = \rho - (\rho - \eta)\omega_{fiodt}$$

when $\rho >> \eta$.

Implication: If a bilateral tariff cut leads the firm's market share to increase, then it will face a less elastic demand curve and its markup will increase.

Impacts of PTAs on Markups

	Firm's mkt share in dest. $\ln(\omega_{fiodt})$	Markups FOB $\ln(\mu_{fiodt})$
Tariff_{iodt}	-0.78***	**0.41*** **
	(0.244)	(0.073)
PTA_{odt}	0.02	-0.02**
	(0.021)	(0.008)
Observations	15,712,501	15,712,501
Fixed Effects		
Firm-prod-origin-year	✓	✓
Product-destin-year	✓	✓
Origin-destination	✓	✓

Signing a PTA $\Rightarrow$

- Markups $\downarrow$ 2%

10% cut in tariff $\Rightarrow$

- Mkt shares $\uparrow$ 8%
- Markups $\downarrow$ 4%

Puzzle: Markups fall as market power (firm's mkt sh in the destin) increases!
Findings contradict predictions of A-B oligopolistic comp. model.

Decomposing market share changes

$$\text{Mkt share measures} = \beta_1 \cdot \text{PTA}_{odt} + \beta_2 \cdot \text{Tariff}_{iodt} + \text{Fixed Effects} + \zeta_{fiodt}$$

1. Firm's within-origin mkt share

$$ms_{fiodt} = \frac{v_{fiodt}}{\sum_{f \in \mathcal{F}_{iodt}} v_{fiodt}}$$

2. Origin's mkt share in destination-product market

$$ms_{iodt} = \frac{v_{iodt}}{\sum_{o} v_{iodt}}$$

- A firm's market share in a destination is $\omega_{fiodt} = ms_{fiodt} * ms_{iodt}$

f, i, o, d, t = firm, HS06 product, origin, destination, and year

Understanding market share changes

	Firm's mkt share in dest. $\ln(\omega_{fiodt})$	Origin's mkt share ms_{iodt}	Firm's within-origin mkt share ms_{fiodt}
Tariff_{iodt}	-0.78***	**-3.67*** **	**2.87*** **
	(0.244)	(0.428)	(0.322)
PTA_{odt}	0.02	-0.04	0.06**
	(0.021)	(0.031)	(0.027)
Observations	15,712,501	15,712,501	15,712,501
Fixed Effects			
Firm-prod-origin-year	✓	✓	✓
Product-destin-year	✓	✓	✓
Origin-destination	✓	✓	✓

10% cut in tariff $\Rightarrow$

- Origin's mkt share $\uparrow$ 37%
- Average within-origin mkt share $\downarrow$ 29%

Firm's market share in destination is $\omega_{fiodt} = ms_{fiodt} ms_{iodt}$

Tariff cut **raises** the market power of the origin in the destination, but **reduces** the within-origin market power of individual firms.

Trade policy changes induce market structure changes

	Firm's mkt share in dest. $\ln(\omega_{fiodt})$	Origin's mkt share ms_{iodt}	Firm's within-origin mkt share ms_{fiodt}	Number of firms PPML
Tariff_{iodt}	-0.78***	-3.67***	**2.87*** **	**-2.45*** **
	(0.244)	(0.428)	(0.322)	(0.184)
PTA_{odt}	0.02	-0.04	0.06**	-0.06
	(0.021)	(0.031)	(0.027)	(0.011)
Observations	15,712,501	15,712,501	15,712,501	1,563,040
Fixed Effects				
Firm-prod-origin-year	✓	✓	✓	
Product-origin-year				✓
Product-destin-year	✓	✓	✓	✓
Origin-destination	✓	✓	✓	✓

10% tariff cut $\Rightarrow$25% $\uparrow$ in number of exporters.

A preferential tariff cut increases the origin's market share in the destination **relative to other origins**.

But the tariff cut induces so much **entry** from the preferred origin, it **reduces** the within-origin market shares of individual firms.

Trade policy changes induce market structure changes

	Number of firms (PPML)	Firm's within-origin mkt share	Markups
Tariff_{iodt}	-2.45***	2.88***	**0.41*** **
	(0.184)	(0.322)	(0.073)
PTA_{odt}	-0.06***	0.06**	-0.02**
	(0.011)	(0.027)	(0.008)
Observations	1,563,040	15,712,501	15,712,501
Fixed Effects			
Firm-prod-origin-year		✓	✓
Product-origin-year	✓		
Product-destin-year	✓	✓	✓
Origin-destination	✓	✓	✓

10% cut in tariff $\Rightarrow$

- Markups $\downarrow$ 4%

Tariff-induced entry reduces the market power of exporters, leading to a **reduction in price-cost markups**.

Additional empirical findings

The impact on entry, market shares and markups was notably larger:

- for more highly differentiated goods vs. commodities,
- for final consumption goods vs. intermediate inputs,

Markup variation by product

- for markets in high and middle-income countries relative to low income countries.

Provisions of trade agreements associated with large reductions in price-cost markups include:

- Simplified self-certification of complex rules of origin vs. government certification,
- Commitments to domestic anti-trust and competition policy enforcement.

Results Summary

Quantitative GE model (in-progress)

- Simulate a model of 5 countries with 4000 products
- SMM: vary parameters to match empirical estimates

Tariff elasticity estimates	Data	Model
Markup (μ_{fiodt})	0.41	0.47
Firm's mkt share in dest. (ω_{fiodt})	-0.79	-0.85
Firm's within-origin mkt share (ms_{fiodt})	2.87	2.60
Origin's mkt share in dest. (ms_{iodt})	-3.67	-3.45

Key estimated parameters	Value
Within-origin elasticity of substitution σ	3.30
Cross-origin elasticity of substitution ρ	2.33
Cross-product elasticity of substitution η	1.52
Productivity dispersion (inverse)	11.83

Counterfactual analysis: Bilateral tariff reduction

Simulate the model for two years:

1st year: Model reaches its competitive equilibrium where there is a 10% tariff for all products among all trade partners

2nd year: Countries 1 & 2 sign a trade agreement, which reduces the bilateral tariff to zero for all products

$\Rightarrow$ Investigate changes in distributions of market shares and markups

Summary of results

10% bilateral tariff cut between 1 & 2

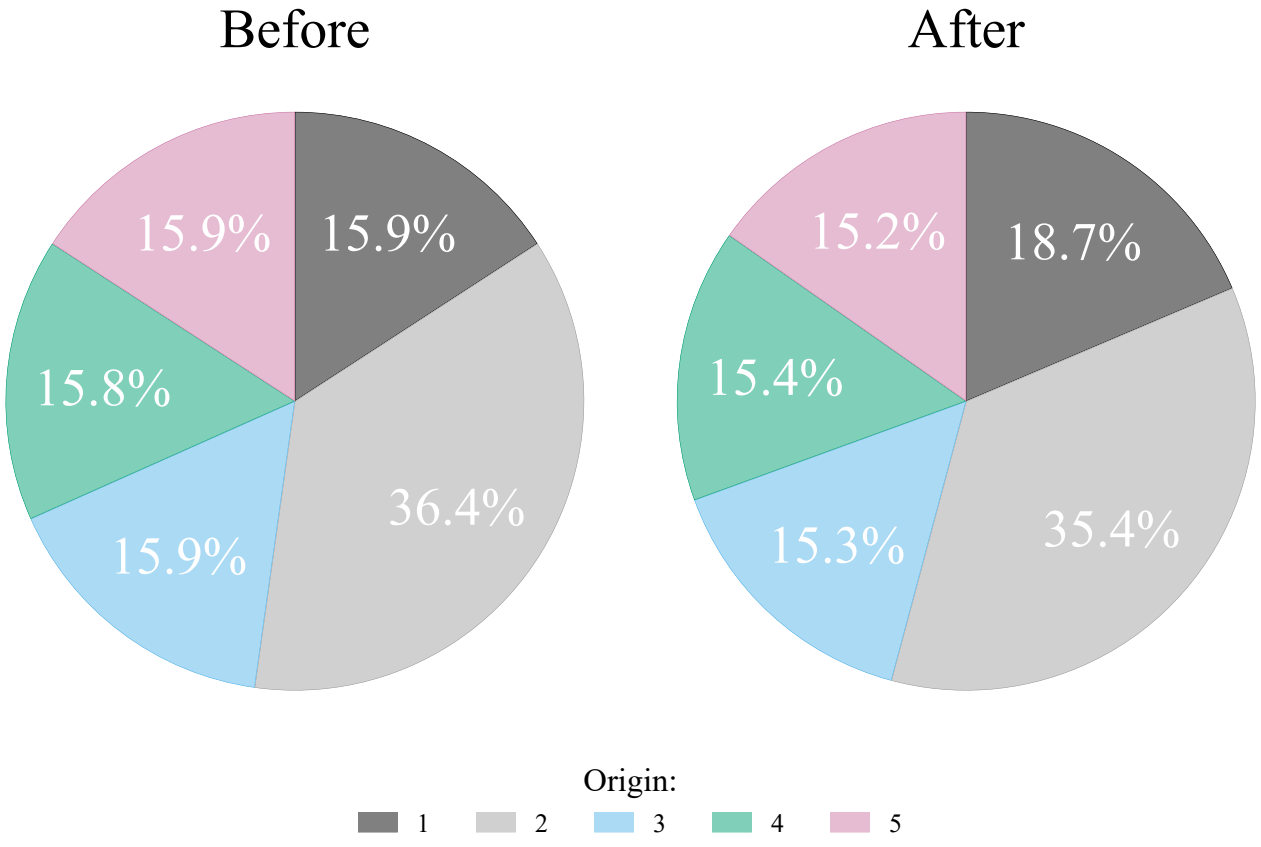
Focus on mkt shares and markups in country 2:
(symmetric responses in country 1)

- Origin 1's mkt share $\Uparrow$
  (positive cross-origin realloc. effect for origin 1 firms)
- Within-origin mkt share of origin 1 firms $\Downarrow$
  (negative within-origin realloc. effect)
- Markups of origin 1 firms $\Downarrow$
  (within-origin realloc. effect dominates)
- Mean markup of firms from non-PTA countries $\Uparrow$
  (due to exits of small and less competitive firms)

Aggregate productivity $\Uparrow$ globally; bigger gains in PTA countries

Aggregate market share in country 2

Before and after a 10% bilateral tariff cut between 1 & 2



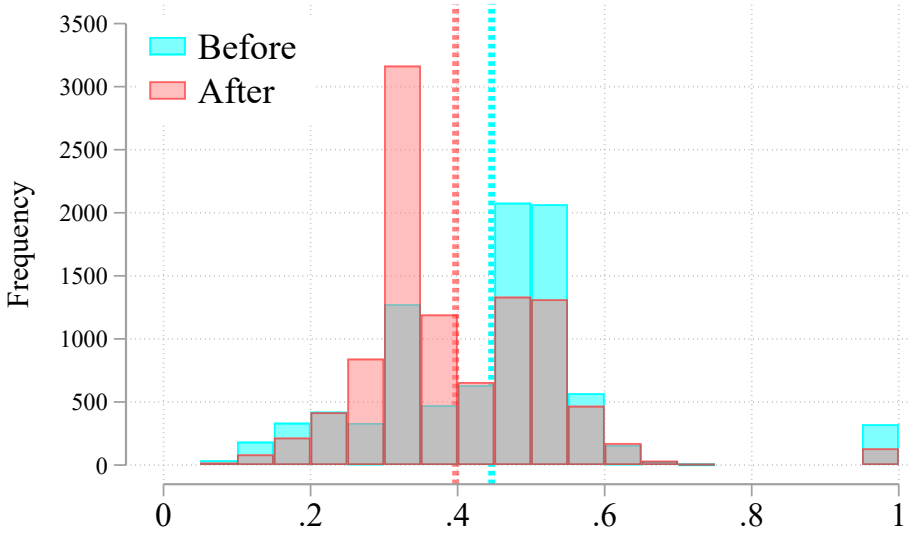
- Firms from origin 1 gain market share
- Firms from other origins lose market share

Distribution of firms' within-origin market shares over 4000 products

Before and after a 10% bilateral tariff cut between 1 & 2

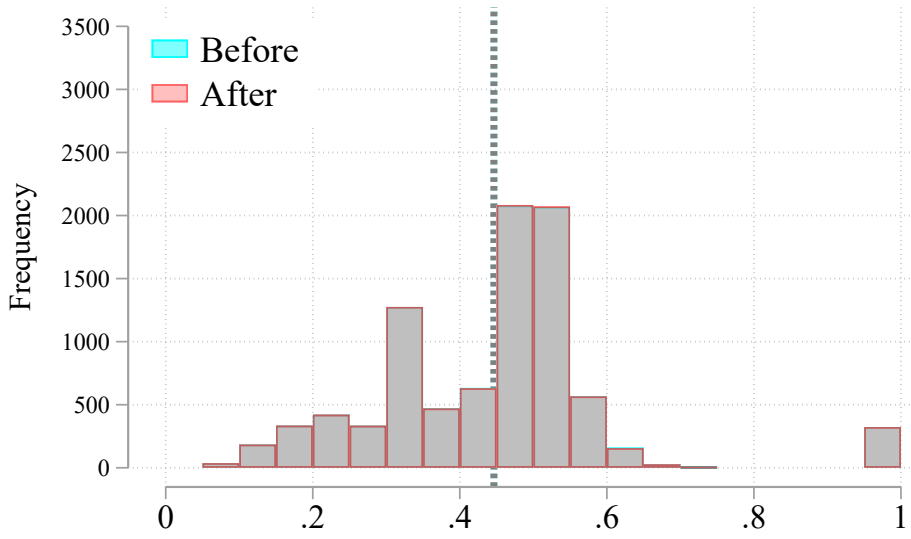
Within-origin market share ms_{fiodt}

(for origin 1 firms selling to country 2)



Counterfactual within-origin market share without entry/exit

(for origin 1 firms selling to country 2)



- Within-origin market share of origin 1 firms ⇓ (left)

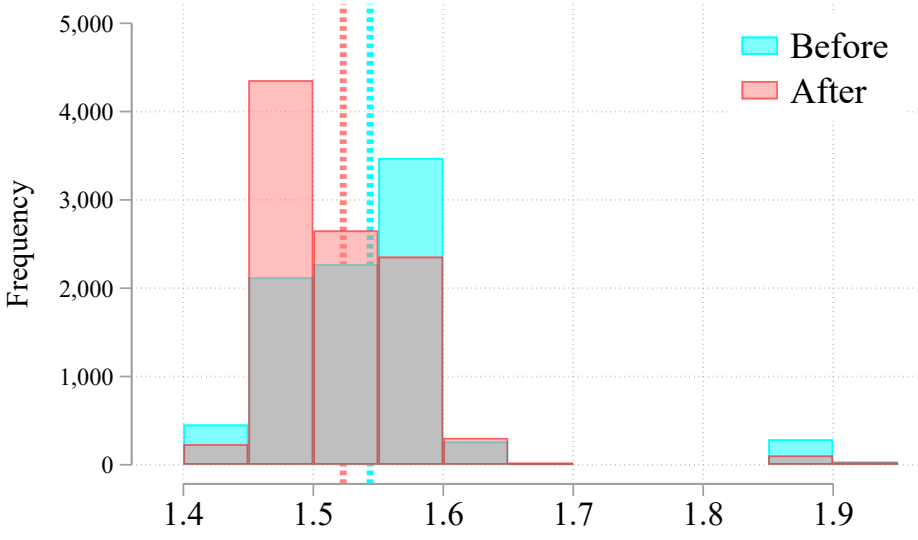
  ⇒ Mainly driven by entry: no. of firms increases from 8,921 to 10,061

- Virtually no within-origin reallocation if no entry & exits (right)

Markups of country 1 firms selling in country 2

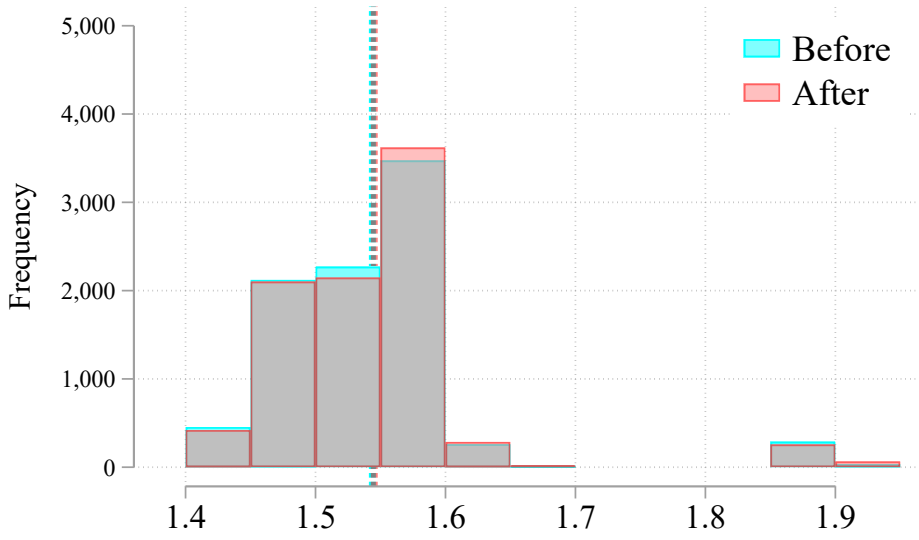
Before and after a 10% bilateral tariff cut between 1 & 2

Markups



Mean markup: Before = 54.4%; After = 52.3%

Counterfactual markups without entry/exit



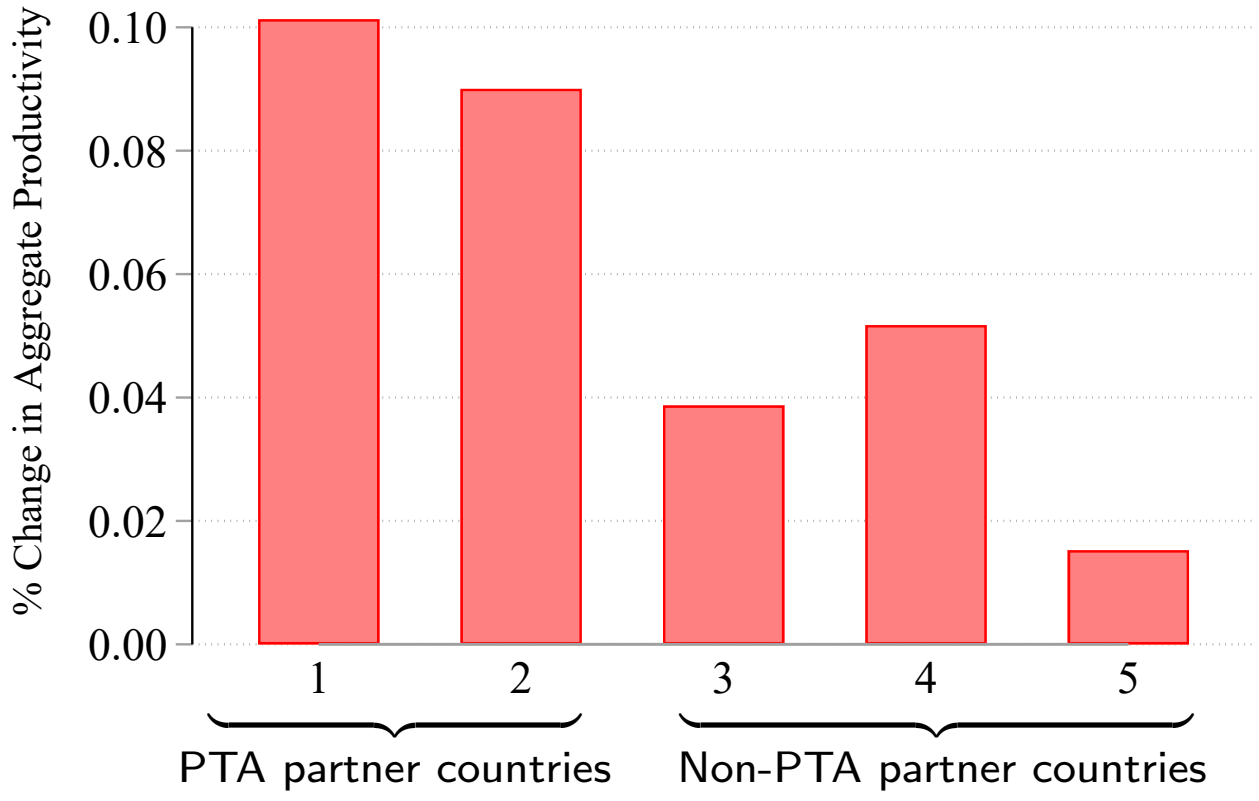
Mean markup: Before = 54.4%; After = 54.5%

Recall: $\widehat{\mu}_{fiodt} = \underbrace{A(.) \cdot \widehat{ms}_{fiodt} \Downarrow}_{\text{Within-origin reallocation effect}} + \underbrace{B(.) \cdot \widehat{ms}_{iodt} \Uparrow}_{\text{Cross-origin reallocation effect}}$

- Within-origin reallocation effect dominates and markup drops
- Without entry/exit, much weaker within-origin reallocation and no markup adj.

Changes in aggregate productivity

After a 10% bilateral tariff cut between 1 & 2



- The signing countries gain efficiency from a bilateral trade agreement, while other countries also benefit due to the increase in competitive pressure.

Summary: trade policy and market structure

Evidence from international macro has long emphasized the importance of market power and persistent price differences across markets.

This research shows that trade policy liberalizations and reductions in border barriers impact market structure.

Trade agreements facilitate more intense market competition by lowering barriers to entry for exporters.

The result is bigger reductions in prices for consumers and larger welfare gains from trade than what is obtained in standard models of monopolistic competition.

Additional Empirical Studies

Additional literature

Price and Markup Responses to ...

- **Trade policy:** De Loecker, Goldberg, Khandelwal & Pavcnik 2016; Fitzgerald & Haller 2018; Amiti, Redding & Weinstein 2019; Fajgelbaum, Goldberg, Kennedy & Khandelwal 2019; Kikkawa, Mei, Santamarina 2019

- **Exchange rates:** Fitzgerald & Haller 2014; Amiti, Itskhoki, and Konings 2014, 2019; Corsetti, Crowley, Han & Song 2023; Corsetti, Crowley & Han 2022

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Variation in Markup Impact by Type of Good

Product variation

	Markups all goods	Markups high diff goods	Markups HD cons. goods
PTA_{odt}	**-0.02****	-0.02	-0.03***
	(0.008)	(0.014)	(0.015)
$Tariff_{iodt}$	**0.41*****	0.88***	1.02***
	(0.073)	(0.106)	(0.129)
Observations	15,712,501	5,759,013	4,045,879
Fixed Effects			
Firm-prod-origin-year	✓	✓	✓
Product-destin-year	✓	✓	✓
Origin-destination	✓	✓	✓

The first column displays the results for the entire sample of HS products:

- join PTA $\Rightarrow$ markup $\downarrow$
- tariff cut $\Rightarrow$ markup $\downarrow$

We examine two more refined sets of goods:

- CCHS highly differentiated goods – discrete items
- CCHS highly differentiated goods that are UN BEC consumption goods

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Origin-destination	✓	✓	✓

For more differentiated goods:

- highly differentiated goods
  PTA $\Rightarrow$ no markup change
  10% tariff $\downarrow \Rightarrow$ markup $\downarrow$ 8.8%
- highly diff'd consumer goods
  PTA$\Rightarrow$ markup $\downarrow$ 3%
  10% tariff $\downarrow \Rightarrow$ markup $\downarrow$ 10.2%

Markup changes are consistent with changes in firms' within-origin market shares:

- For highly differentiated goods, a 10% cut in tariffs $\Rightarrow$ average within-origin market share $\downarrow$ 28%
- For highly differentiated consumption goods, a 10% cut in tariffs $\Rightarrow$ average within-origin market share $\downarrow$ 50%

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