Who Pays for Markups in a Global Economy?

The Unequal Impacts of International Rent-Shifting

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Background and Motivation

Two notable economic trends of recent decades

1. increased globalization
2. rise of markup distortions

Natural Questions

- has trade exacerbated or alleviated the cost of markup distortions?
- Are the effects uniform or has the cost shifted from some countries to others?

Background and Motivation

- The existing literature on trade and markup distortions emphasizes two channels:
  1. inter-firm reallocation effects of trade
  2. pro-competitive effects of trade

- Less attention paid to international rent-shifting effects

Background and Motivation

What is ***international rent-shifting***?

- Markups generate rents (or profits) that are rebated to consumers
- In open economies, the distortionary cost of markups is often borne by households in one country, while the resulting rents accrue to households elsewhere.

Background and Motivation

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- Markups generate rents (or profits) that are rebated to consumers
- In open economies, the distortionary cost of markups is often borne by households in one country, while the resulting rents accrue to households elsewhere.
- *decoupling* between cost bearing and rent rebates $\Longrightarrow$ the burden of markups falls primarily on nations who specialize in low-markup industries and pay net markup rents to the rest of world. Suggestive Evidence

Research Question and Design

Research Objective

- Measuring the welfare cost associated with international rent shifting.

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Research Design

Step 1: we derive semi-parametric formulas for the welfare cost of markups in open economies $\Longrightarrow$ help us isolate the cost of international rent shifting.

Step 2: we estimate firm-level markups using *demand* and *cost-based* techniques

Step 3: we plug estimated markups into our simple formula to estimate the cost of international rent-shifting for 65 major economies.

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We estimate systematic *rent-shifting* from low-income to high-income countries:

- Trade has raised the cost of markups by 21% for *low-income* countries.
- Trade has lowered the cost of markups by 10% for *high-income* countries.

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Policy Implication: two ways to neutralize international rent-shifting:

1. correct markup distortions via domestic policies (prohibited by the WTO).
2. rent-shifting is akin to a hidden tariff $\Longrightarrow$ can be neutralized if high-income countries unilaterally lower their tariffs on low-income countries by **7%**.

Baseline Theoritical Model

The Economic Environment

- Many countries: $i, j = 1,...,N$
- Many industries (or sectors): $k = 1,..., K$
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- Supply: firms have heterogeneous productivity levels and use labor for production
- Industries admit different degrees of firm-level market power $\longrightarrow$ markup heterogeneity $\longrightarrow$ sectoral misallocation

Preferences and Demand

Three-tier utility structure:

1. ***Cross Industry***: Cobb-Douglas with weight $e_{i,k}$ on industry k
2. ***Within industry***: CES with Armington elasticity of substitution σ_k
3. ***Within industry-origin***: CES with firm-level elasticity of substitution γ_k

Demand facing *firm-level variety* ω selling from *origin* i to *destination* j in *industry* k:

[firm-level demand] $$q_{ji,k}(\omega) = \overbrace{\xi_{ji,k}(\omega)}^{\text{exogenous shifter}} \left(\frac{p_{ji,k}(\omega)}{P_{ji,k}}\right)^{-\gamma_k} Q_{ji,k}$$

[national-level demand] $$Q_{ji,k} = \left(\frac{P_{ji,k}}{P_{i,k}}\right)^{-\sigma_k} Q_{i,k}$$

[industry-level demand] $$Q_{i,k} = e_{i,k}\, Y_i \,/\, P_{i,k}$$

Supply and Firms

- Industry k in origin i is populated by a fixed number of firms.
- Firms employ labor for production + compete under monopolistic competition
- The price of *firm-level variety* ω selling from *origin* i to *destination* j in *industry* k:

$$p_{ij,k}(\omega) = \underbrace{\mu_k}_{\text{markup}} \times \underbrace{\tau_{ij,k}}_{\text{iceberg cost}} \times \underbrace{w_i}_{\text{wage rate}} / \underbrace{\varphi(\omega)}_{\text{productivity}} \qquad \text{where} \qquad \mu_k = \frac{\gamma_k}{\gamma_k - 1}$$

- The CES price index of the good sold by origin i to destination j in industry k:

$$P_{ij,k} = \frac{\mu_k \times \tau_{ij,k} \times w_i}{\underbrace{\overline{\varphi}_{i,k}}_{\text{variety-adjusted productivity}}}$$

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General Equilibrium and Welfare

- Markup rents are rebated to workers to supplement wage income.
- **General equilibrium:** For a given vector of parameters, equilibrium is a vector of national-level wages and rents such that goods' and labor markets clear.
- **National welfare** is nominal income divided by the Cobb-Douglas-CES price index:

$$W_i = \frac{\overbrace{w_i L_i}^{\text{wage income}} + \overbrace{\Pi_i}^{\text{rents}}}{P_i}$$

The Welfare Cost of Markups

Notation: *Mean, Covariance, & Coefficient of Variation*

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[Coefficient of variation] $\mathrm{CV}_\omega(X, Z) \equiv \frac{\sqrt{\mathrm{Var}_\omega(X)}}{\mathbb{E}_\omega[X]}$

[Covariance] $\mathrm{Cov}_\omega(X, Z) \equiv \mathbb{E}_\omega[XZ] - \mathbb{E}_\omega[X]\,\mathbb{E}_\omega[Z]$

The Welfare Cost of Markups

- The *efficient allocation* ($\star$) $\sim$ uniform markups or marginal cost pricing

$$P_{ij,k} = \mu_k \times \frac{\tau_{ij,k} w_i}{\overline{\varphi}_{i,k}}; \qquad P^{\star}_{ij,k} = \frac{\tau_{ij,k} w_i}{\overline{\varphi}_{i,k}}$$

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- The cost of markups is defined as distance to the efficient frontier:

$$\mathcal{D}^A_i \equiv \underbrace{\log\left(W^{\star}_i\right)}_{\text{efficient allocation}} - \underbrace{\log\left(W_i\right)}_{\text{status quo}} > 0$$

Welfare Cost of Markups

Lemma: The welfare cost of markups for country i can be inferred from observable shares and firm-level markups, $\mathbf{X} = \{e_{i,k}, r_{i,k}, \mu_k\}_{i,k}$, as

$$[\text{Trade}] \qquad \mathcal{D}_i(\mathbf{X}) = \log \mathbb{E}_{r_i}\left[\frac{1}{\mu}\right] - \mathbb{E}_{e_i}\left[\log \frac{1}{\mu}\right].$$

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$$[\text{Autarky}] \qquad \mathcal{D}_i^A(\mathbf{X}) = \log \mathbb{E}_{e_i}\left[\frac{1}{\mu}\right] - \mathbb{E}_{e_i}\left[\log \frac{1}{\mu}\right].$$

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- Trade-induced change in the cost of markups is $\Delta\mathcal{D}_i(\mathbf{X}) = \mathcal{D}_i(\mathbf{X}) - \mathcal{D}_i^A(\mathbf{X})$

How Does Trade Affect the Cost of Markups?

Proposition: The trade-induced change in the cost of markups can be inferred from observable shares and firm-level markups, $\mathbf{X} = \{e_{i,k}, r_{i,k}, \mu_k\}_{i,k}$, as

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Balassa's index of revealed comparative advantage

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Two Possible Outcomes:

(a) Specialize in low-markup industries $\longrightarrow$ trade raises the cost of markups ($\Delta\mathcal{D} > 0$)

(b) Specialize in high-markup industries $\longrightarrow$ trade lowers the cost of markups ($\Delta\mathcal{D} < 0$)

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Intuition: trade induces inter-national rent-shifting

(a) Specialize in high-markup industries $\longrightarrow$ country i receives net rents from the RoW

(b) Specialize in low-markup industries $\longrightarrow$ country i pays net rents to the RoW

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The gains from trade are the sum of efficiency gains from specialization and the trade-induced change in markup distortions:

$$GT_i = \underbrace{\mathbb{E}_{e_i}\left[\frac{1}{1-\sigma}\log \lambda_{ii}\right]}_{\text{efficiency gains (ACR)}} + \Delta \mathcal{D}_i$$

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Dissecting the Cost of Markups in Open Economies

$$\mathcal{D}_i \approx \underbrace{\frac{1}{2}\left[\mathrm{CV}_{e_i}\left(\frac{1}{\mu}\right)\right]^2}_{\text{markup dispersion}} + \underbrace{\mathrm{Cov}_{e_i}\left(\frac{r_i}{e_i}, \frac{1}{\mu}\right)\mathbb{E}_{e_i}\left[\frac{1}{\mu}\right]^{-1}}_{\text{international rent-shifting}}$$

- Markup dispersion is invariant to trade in our baseline model.
  - no longer true if IO linkages or CES preferences across industries are introduced.
- What does international rent-shifting account for?
  - The cost of markups is partially mitigated by rent rebates to consumers
  - Under trade, markup rents grow in countries that specialize in low-markup industries and shrink in others $\Longrightarrow$ the incidence of markups shifts inter-nationally.

Scope and Extensions

- Our formula for $\Delta \mathcal{D}_i$ readily applies to more general settings with
  1. variable markups if preferences and the productivity distribution satisfy mild conditions.
  2. non-markup distortions that generate quasi-rents (e.g., financial frictions).

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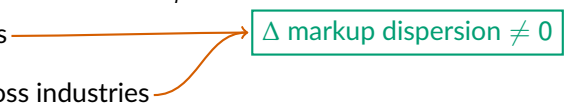

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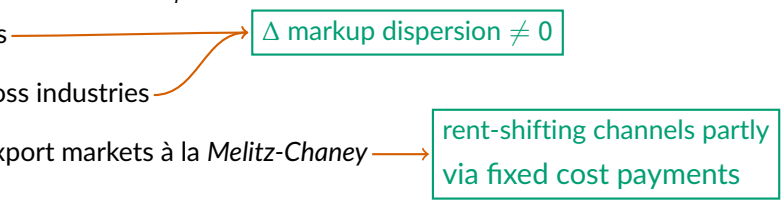

Quantitative Implimentation

Data Requirements

- With our sufficient statics formulas, we can measure the cost of markups with information on:

$$\mathbf{X} = \left\{ \underbrace{\mu_k}_{\text{markups}} , \underbrace{e_{i,k}}_{\text{exp. shares}} , \underbrace{r_{i,k}}_{\text{rev. shares}} , \underbrace{\nu_{i,k} , \alpha_{i,kg}}_{\text{VA and IO shares}} \right\} .$$

- We take data on observable shares from the OECD Inter-Country Input-Output (ICIO) Tables, covering 64 major countries and 36 industries during 2005-2015.

- We estimate markups using both cost-based and demand-based techniques.
  - This is one of the first attempts to estimate markups at scale using both techniques.

Estimating Markups

Cost-Based Markup Estimation

- We apply De loecker and Warzynski's (2012) technique to estimate the (sales-weighted average) markup in industry k and year t as

$$\mu_{kt} = \sum_{\omega \in \Omega_{kt}} \left[\frac{\text{Output Elasticity}_{kt}}{\text{Input Cost Share}_{kt}(\omega)} \times \text{Sales Share}_{kt}(\omega) \right]$$

- The output elasticity for each *industry-year* pair is estimated by applying Ackerberg et al's (2015) production function estimation technique to COMPUSTAT.[1]
- Firm-level data on input cost shares and sales shares are from WORLDSCOPE covering 71,546 firms in 134 countries during 2005-2015.

Demand-Based Markup Estimation

- Log-linear CES demand for firm-level variety ω

$$\ln q_{ji,kt}(\omega) = -\gamma_{kt} \ln p_{ji,kt}(\omega) + \mathcal{X}_{jikt} + \xi_{ji,kt}(\omega),$$

- Problem: if individual-level demand functions have different slopes $\longrightarrow$ the aggregate demand function is misspecified $\longrightarrow$ biased estimates for markups $\mu_{kt} = \frac{\gamma_{kt}}{\gamma_{kt}-1}$
- Standard solution: Estimate a random coefficient model à la Berry–Levinsohn–Pakes.
  - This solution is data and time-intensive $\longrightarrow$ difficult to implement at scale.

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  - This solution is data and time-intensive $\longrightarrow$ difficult to implement at scale.
- Alternative solution: estimate a linear approximation of the random coefficient demand system (Salanié–Wolak, 2019)

Demand-Based Markup Estimation

- First-order approximation of random-coefficient CES demand system

$$\ln q_{jikt}(\omega) \approx -\gamma_{kt} \ln p_{jikt}(\omega) + \sigma^2_{\gamma,kt} \mathcal{K}_{jikt}(\omega) + \mathcal{X}_{jikt} + \xi_{jikt}(\omega),$$

where $\mathcal{K}_{ji,k}(\omega) \equiv \left(\frac{1}{2} \ln p_{ji,k}(\omega) - \ln \overline{p}_{i,k}\right) \ln p_{ji,k}(\omega)$.

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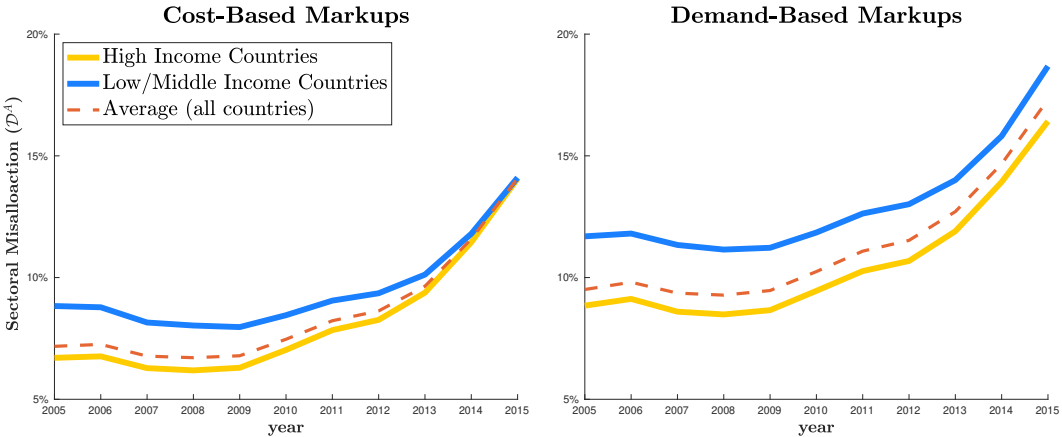
- We estimate the above equation using the universe of transaction-level import data from Colombia, which covers 226,288 firms from 251 countries during 2014-2016.
- We employ the identification strategy in Lashkaripour and Lugovskyy (2021):
  - Take first-differences to eliminate *firm*$\times$*origin*$\times$*product* fixed effects.
  - **2SLS estimation:** construct a shift-share IV for $\Delta p_{ji,k}(\omega)$ that interacts concurrent monthly exchange rate movements with prior monthly export activity.

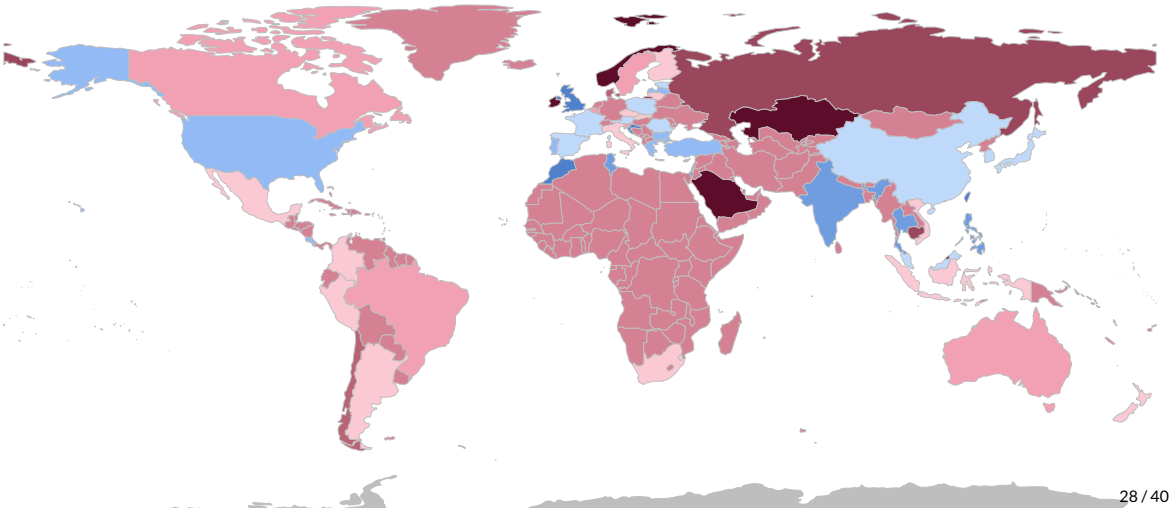
Markup Estimation Results

Quantitative Results

The Global Rise in Markup Distortions



Trade-Induced Change in the Welfare Cost of Markups



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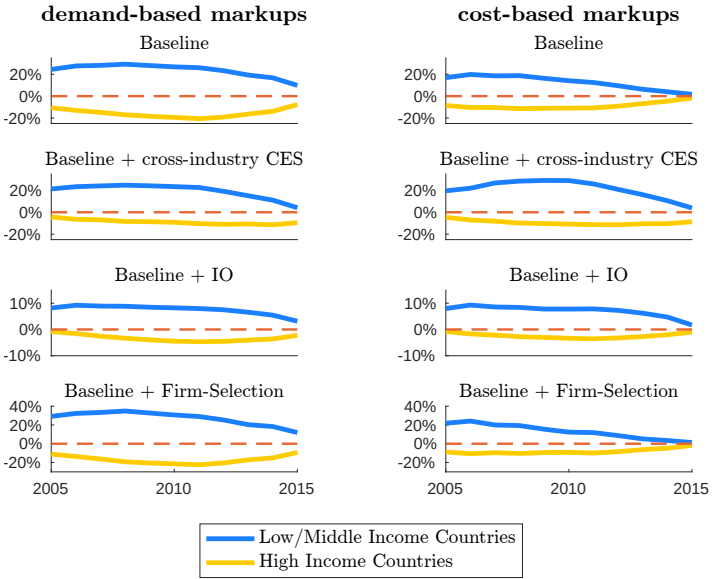

Two Crucial Takeaways

(a) Trade-induced specialization has lead to systematic rent-shifting from low-income to high-income countries $\longrightarrow$ shifted the incidence of markups to low-income nations.

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- Factors other than income level are also important. details

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- Factors other than income level are also important. details

(b) *Demand-* and *cost-based* markup estimates yield starkly similar aggregate predictions

- This is encouraging news for the methodological debate regarding markup estimation.

Implications for International Policy

Duality between Rent-Shifting and Tariffs

- Profit-shifting redistributes surplus from low- to -high-income countries $\longrightarrow$ is akin to a hidden tariff collected by high-income countries

- To see this, express welfare as an explicit function of tariffs ($\mathbf{t}$) and markups ($\boldsymbol{\mu}$):

$$W_i = \mathcal{W}_i\left(\mathbf{t}\,,\,\boldsymbol{\mu}\right), \qquad \text{where} \qquad \begin{cases} \mathbf{t} = \{t_1, ..., t_N\} \\ \boldsymbol{\mu} = \{\mu_1, ..., \mu_K\} \end{cases}$$

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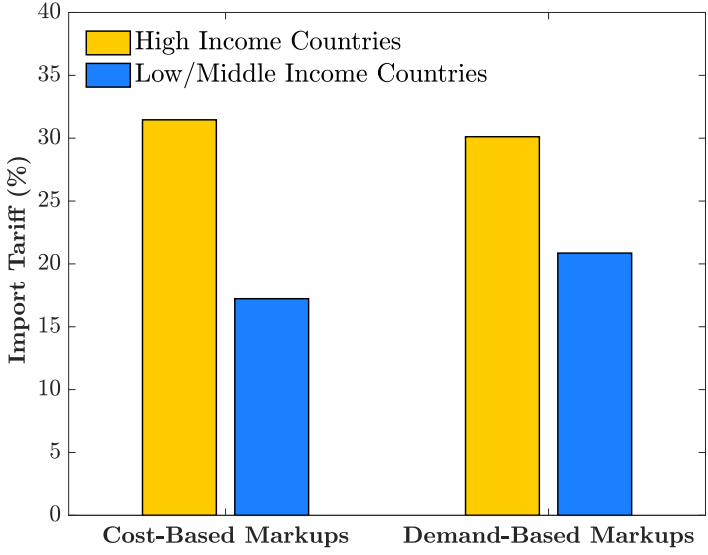
Proposition: A markup vector, $\boldsymbol{\mu}$, is observationally equivalent to a hidden tariff, $\mathbf{t}^*$:

$$\mathcal{W}_i(\mathbf{t} + \mathbf{t}^*\,,\,\mathbf{1}) \;=\; \underbrace{\mathcal{W}_i(\mathbf{t}\,,\,\boldsymbol{\mu})}_{\text{status quo}}$$

The Hidden Tariff Equivalent of Rent-Shifting



Neutralizing Rent-Sifting to Level the Playing Field

Two policy reforms can neutralize international rent-shifting and ensure 1st-best gains from trade for low-income countries:

1. Governments use domestic policies to correct markups, which is challenging:
   - domestic policies are generally prohibited under the WTO
   - unilateral markup correction can trigger *immiserizing growth* (Lashkaripour-Lugosvkyy, 2021) $\Longrightarrow$ international coordination is crucial

Neutralizing Rent-Sifting to Level the Playing Field

Two policy reforms can neutralize international rent-shifting and ensure 1st-best gains from trade for low-income countries:

1. Governments use domestic policies to correct markups, which is challenging:
   - domestic policies are generally prohibited under the WTO
   - unilateral markup correction can trigger *immiserizing growth* (Lashkaripour-Lugosvkyy, 2021) $\Longrightarrow$ international coordination is crucial

2. High-income countries unilaterally lower their tariffs on low-income partners by **7%** to balance tariff concessions

Conclusions

Main Finding: systematic *rent-shifting* from low-income to high-income countries:

- Trade has raised the cost of markups by 21% for *low-income* countries.
- Trade has lowered the cost of markups by 10% for *high-income* countries.
- Finding is robust across different models and markup estimation techniques.

Conclusions

Main Finding: systematic *rent-shifting* from low-income to high-income countries:

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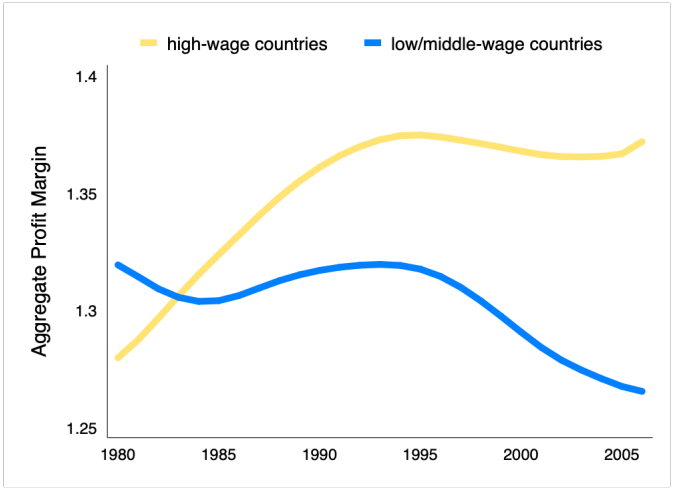
- Finding is robust across different models and markup estimation techniques.

Policy Implication:

1. Neutralizing international rent-shifting via markup correction is challenging.
2. Unilateral tariff liberalization by high-income countries is a possible solution.

Thank you.

International Divergence in Accounting Profit Margins



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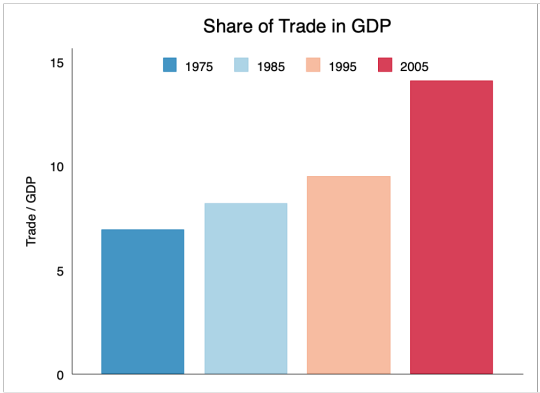
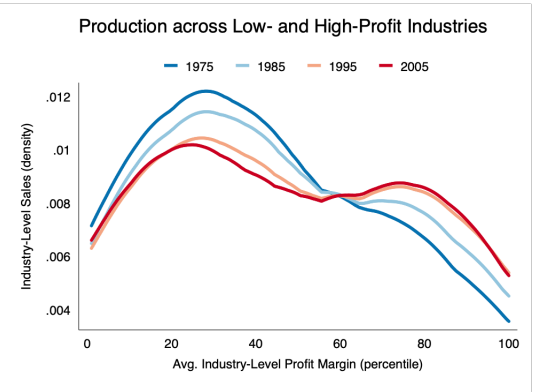
Trade Openness Coincides w/ Specialization in High-Profit Industries

The United States





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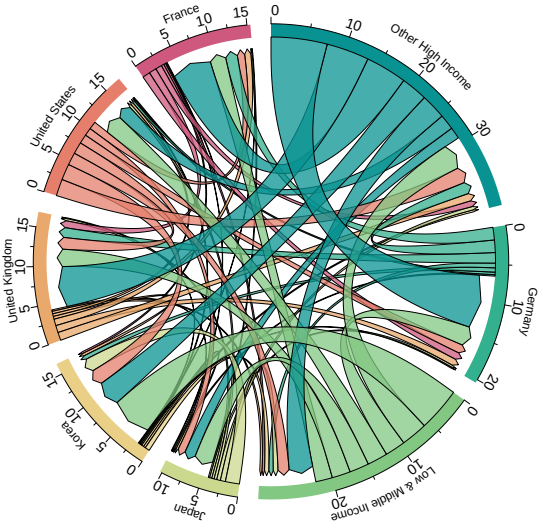
The Anatomy of Inter-national Profit Shifting



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Determinants of Comparative Advantage in High-Markup Industries