

Government Policies in a Granular Global Economy

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Exports are Granular

- Freund and Pierola (2015): “Export Superstars”

Across 32 developing countries, the largest exporting firm accounts on average for 17% of total manufacturing exports

- French manufacturing data:

Average export share of the largest firm

Manufacturing	1 industry	7%
— 2-digit	23 sectors	18%
— 3-digit	117 sectors	26%
— 4-digit	316 sectors	37%

This paper

- We use an estimated granular model of trade (Gaubert and Itskhoki 2020) to study a number of government policies:
 - ① M&A and antitrust
 - ② Import tariffs
 - ③ Industrial policy
- Should governments target their policies at individual firms rather than sectors?
- Do such incentives vary with openness and comparative advantage?
- Are there important international spillovers and need for international coordination?

Modeling Framework

Model Structure

- 1 Two countries: Home and Foreign (ROW)
 - inelastically-supplied labor L and L^*
- 2 Sector-level comparative advantage (like in **DFS**):
 - Continuum of sectors $z \in [0, 1]$:

$$Q = \exp \left\{ \int_0^1 \alpha_z \log Q_z dz \right\}$$

- Sectors vary in comparative advantage: $\log \frac{T_z}{T_z^*} \sim \mathcal{N}(\mu_T, \sigma_T)$
- 3 Firm heterogeneity within sectors (like in **Melitz**)
 - 4 Granular firms (following **EKS**)
 - Within a sector, a finite number of firms (varieties) K_z :

$$Q_z = \left[\sum_{i=1}^{K_z} q_{z,i}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

- Each sector has an EKS market structure

EKS Sectors

- Productivity draws in a given sector z :
 - Number of (shadow) entrants: $\text{Poisson}(M_z)$
 - Entrants' productivity draws: $\text{Pareto}(\theta; \underline{\varphi}_z)$
- Expected sectoral productivity is summarized by

$$T_z \equiv M_z \underline{\varphi}_z^\theta$$

- Marginal cost: $c = w/\varphi$ at home and $\tau w/\varphi$ abroad
- Fixed cost of production and exports: F in local labor
- Oligopolistic competition and variable markups
 - Atkeson-Burstein (2008): $\{c_i\}_{i=1}^{K_z} \mapsto \{s_i, \mu_i, p_i\}_{i=1}^{K_z}$

▶ show

Market Entry and GE

- Assumption: sequential entry in increasing order of unit cost

$$c_1 < c_2 < \dots < c_K < \dots, \quad \text{where} \quad c_i = \begin{cases} w/\varphi_i, & \text{if Home,} \\ \tau w^*/\varphi_i^*, & \text{if Foreign} \end{cases}$$

→ unique equilibrium

- Profits: $\Pi_i = \frac{s_i}{\varepsilon(s_i)} \alpha_z Y - wF$, where $\mu_i = \frac{\varepsilon(s_i)}{\varepsilon(s_i)-1}$
- Entry: $\Pi_K^K \geq 0$ and $\Pi_{K+1}^{K+1} < 0 \mapsto$ determines K_z
- General equilibrium:
 - GE vector $X = (Y, Y^*, w, w^*)$
 - Within-sector allocations $Z = \{K_z, \{s_{z,i}\}_{i=1}^{K_z}\}_{z \in [0,1]}$
 - Labor market clearing and trade balance (linear in X)
 - Fast iterative algorithm

Properties of the Granular Model

- Foreign share — realized comparative advantage:

$$\Lambda_z \equiv \frac{X_z^*}{\alpha_z Y} = \sum_{i=1}^{K_z} (1 - \iota_{z,i}) s_{z,i}$$

- Expected foreign share:

$$\mathbb{E}\{\Lambda_z\} = \frac{1}{1 + (\tau w^*/w)^\theta \cdot T_z/T_z^*}$$

- Granular component (residual):

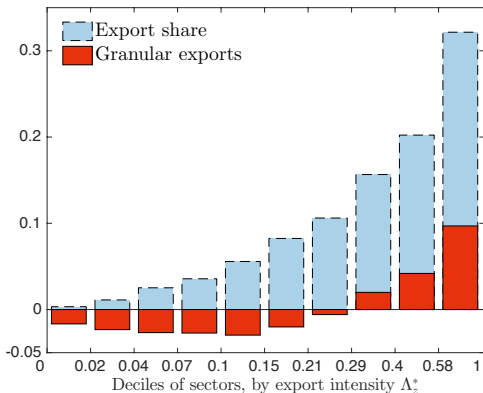
$$\Gamma_z \equiv \Lambda_z - \mathbb{E}\{\Lambda_z\}$$

- Defined similarly are home export share Λ_z^* and its granular component Γ_z^*

Export Intensity and Granularity

- Granularity does not create additional trade on average, but introduces skewness across sectors in export outcomes
 - most export-intensive sectors are partly of granular origin

Figure: Granular contribution to trade



Policy Analysis

Three Granular Policies

- ① **Merger** of two large home firms
- ② **Granular import tariff** on individual large foreign exporter
- ③ **Industrial policy** of promoting 'national champions'

Three Granular Policies

- 1 **Merger** of two large home firms
 - 2 **Granular import tariff** on individual large foreign exporter
 - 3 **Industrial policy** of promoting 'national champions'
- Welfare analysis:

$$\begin{aligned}\hat{W} &\equiv d \log \frac{Y}{P} \\ &= \frac{d\text{GovRev}}{Y} + \overbrace{\int_0^1 \alpha_z \frac{d\Pi_z}{\alpha_z Y} dz}^{\text{Producer surplus}} \quad \overbrace{- \int_0^1 \alpha_z d \log P_z dz}^{\text{Consumer surplus}}\end{aligned}$$

which decomposes across sectors

$$\hat{W} = \int_0^1 \alpha_z \hat{W}_z dz$$

- In partial equilibrium: $\hat{W}_z = \frac{dGR_z + d\Pi_z}{\alpha_z Y} - d \log P_z$
- In general equilibrium: spillovers to other sectors via (w, Y)

M&A and Antitrust

Merger

- Consider a merger of the two largest domestic firms in a sector
- Merger leads to a productivity spillover:

$$\varphi'_{z,2} = \varphi_{z,2} + \varrho(\varphi_{z,1} - \varphi_{z,2})$$

- The combined firm produces both products and sets a common markup:

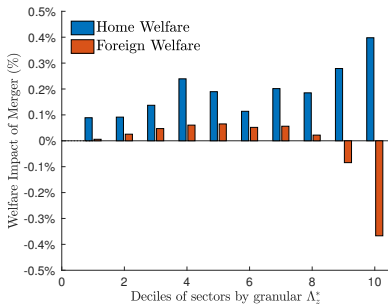
$$\mu'_{z,1} = \mu'_{z,2} = \frac{\varepsilon(s'_{z,1} + s'_{z,2})}{\varepsilon(s'_{z,1} + s'_{z,2}) - 1}$$

- Merger leads to a tradeoff between increased productivity and market power (markups)
- In an open economy, there is also foreign consumer surplus stealing (“beggar-thy-neighbor”)

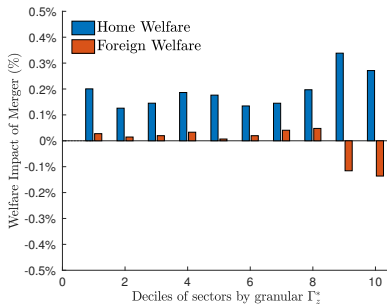
Welfare effects of mergers

- Home and Foreign welfare effect from mergers in sectors sorted by home comparative advantage and its granular component
- Part of Foreign consumer surplus is captured by Home firms

(a) Welfare effects by Λ_z^*



(b) Welfare effects by Γ_z^*



Partial Equilibrium Intuition

- 1 Hold constant (w, Y)
 - 2 No entry or exit
- Then welfare effects can be characterized analytically by calculating consumer and producer surplus:

$$\hat{W}_z = \frac{d\Pi_z}{\alpha_z Y} - \hat{P}_z = -\frac{\bar{\mu}_z - 1}{\bar{\mu}_z} \hat{P}_z + \frac{s_{z,1}}{\mu_{z,1}} \hat{\varphi}_{z,1},$$

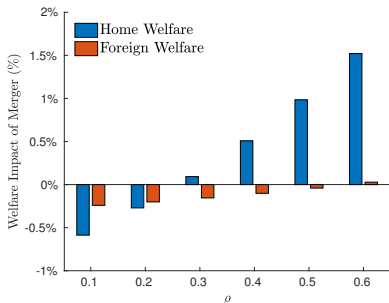
$$\hat{P}_z = s_{z,1} [\hat{\varepsilon}_{z,1} - \hat{\varphi}_{z,1}],$$

$$\frac{d\Pi_z}{\alpha_z Y} \approx \frac{\gamma_z}{\bar{\mu}_z} \hat{P}_z + \frac{s_{z,1}}{\mu_{z,1}} [(1 - \gamma_z) \hat{\varepsilon}_{z,1} + \gamma_z \hat{\varphi}_{z,1}]$$

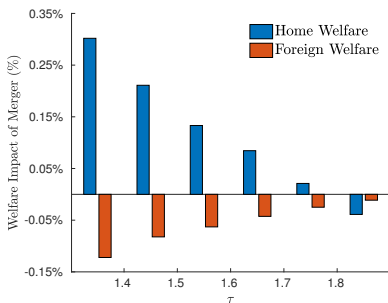
Comparative statics

- The impact of productivity spillover ϱ and trade costs τ
- In top-20% of sectors by home comparative advantage Λ_Z^*

(a) Impact of productivity spillover ϱ



(b) Impact of trade openness τ



Optimal M&A policy

- Policy function $m_\lambda(z) : [0, 1] \rightarrow \{0, 1\}$
 - indicates whether a measure is allowed in sector z

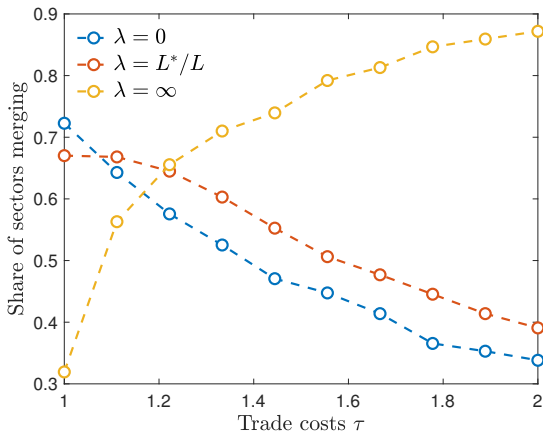
- Formally:

$$m_\lambda(z) \equiv 1\{\hat{W}_z + \lambda\hat{W}_z^* > 0\}.$$

- Three case:
 - ① $\lambda = 0$, unilateral home decision
 - ② $\lambda = \infty$, foreign decision whether to block a merger
 - ③ $\lambda = L^*/L$, utilitarian global planner

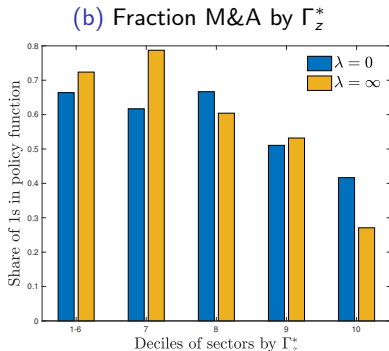
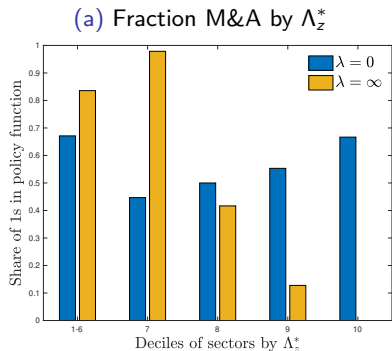
Merger policy as function of τ

- Share of sectors where the merger is allowed, $\int_0^1 m_\lambda(z) dz$
- Foreign is lenient to domestic mergers when τ is high



Cross-section disagreement

- While Home likes mergers in comparative advantage sectors, Foreign wants to block virtually all of them
- Mergers in the granular sectors are costlier, but more so from the point of view of Foreign



Granular Tariff

Granular Tariff

- A general import tariff profile $\{\varsigma_{z,i}\}$ on foreign exporters:

$$\Pi_{z,i} = \max_{p_{z,i}} [(1 - \varsigma_{z,i})p_{z,i} - c_{z,i}] s_{z,i} \alpha_z Y - wF$$

- ① Uniform tariff: $\varsigma_{z,i} \equiv \bar{\varsigma}_z = 0.01$
- ② Granular tariff: $\varsigma_{z,1}$ s.t. it generates the same tariff revenue:

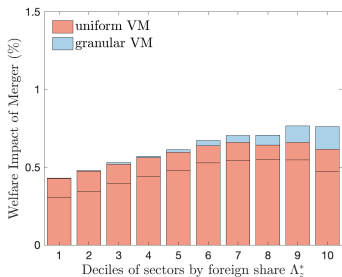
$$\varsigma_{z,1} s'_{z,1} = \bar{\varsigma}_z \Lambda'_z$$

- Key new ingredient: variable markups and incomplete pass-through in addition to GE terms of trade effects
- Is there an economic argument for a granular tariff:
 - a more effective policy tool to extract surplus?

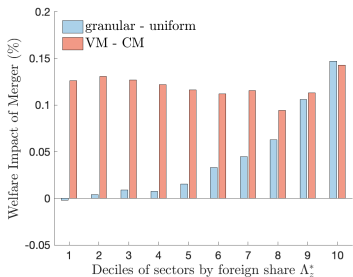
Welfare effects of a granular tariff

- Compare uniform vs granular tariffs across sectors by the extent of foreign comparative advantage

(a) Change in home welfare



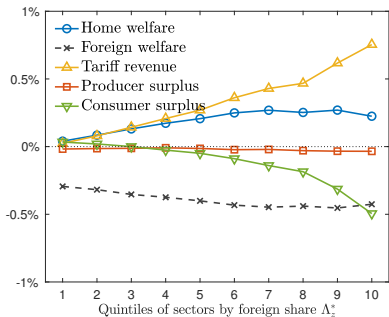
(b) Differential welfare effect



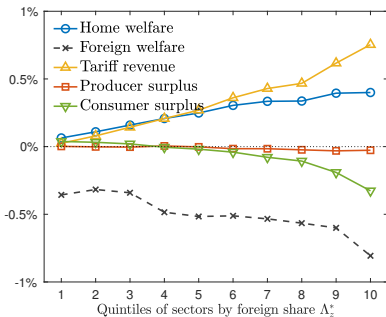
Welfare Decomposition

- Tariff revenue is the same; producer surplus barely affected
- The key: differential loss of consumer surplus
- Intuition: **low pass-through of granular tariff**, as the largest foreign firm attempts to maintain market share

(a) Uniform Tariff



(b) Granular Tariff



Industrial Policy

Industrial Policy

- When a planner favors 'national champions' (sectors/firms)?
- Consider a subsidy policy $\{x_{z,i}\}$ to enhance productivity:

$$\max_{\{x_i\}} \left[\sum_{i=1}^{K_z} \varphi_{z,i}^{\sigma-1} (1 + x_{z,i})^{\sigma-1} \right]^{\frac{1}{\sigma-1}} \quad \text{s.t.} \quad V_z = \sum_{i=1}^{K_z} \kappa \varphi_{z,i}^{\delta} x_i^{\zeta}$$

- **Result 1:** If $\delta = \sigma - 1$, then a planner is indifferent how to allocate $\{x_{z,i}\}$ in a closed economy with constant markups
- **Result 2:** With variable markups, the planner favors small firms in a closed economy
- **Result 3:** In an open economy, the planner may favor large firms, especially in the comparative advantage sectors

Conclusion

Conclusion

- Granular firms play a central role in the global economy (at least at the sectoral level)
- Should the government policy, including trade and industrial policy, be designed at the firm level?
- Governments prefer granular over conventional tariffs to raise tariff revenue with a smaller consumer surplus loss
- Beggar-thy-neighbor considerations may lead to quest for 'national champions'
- M&A policy has important international spillovers, which need to be coordinated by a WTO-style arrangement

APPENDIX

Sectoral equilibrium

- Sectoral equilibrium system:

$$p_i = \mu_i c_i,$$

$$\mu_i = \frac{\varepsilon_i}{\varepsilon_i - 1} \quad \text{where} \quad \varepsilon_i = \sigma(1 - s_i) + s_i,$$

$$s_i = \left(\frac{p_i}{P} \right)^{1-\sigma} \quad \text{where} \quad P = \left(\sum_{i=1}^K p_i^{1-\sigma} \right)^{1/(1-\sigma)}.$$

◀ back to slides