

Granular Comparative Advantage: Evidence from Chinese Firms

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Granular Exports

Large firms play a crucial role in international trade

- 1 **Granular exporters:** few large firms account for sizeable share of exports
 - Freund and Pierola *ReStat* (2015)
 - *Largest exporting firm accounts for on average 17% of total manufacturing exports (Sample of 32 developing countries)*

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 - *7% of total manufacturing exports for French firms (28% with 4-digit industries)*

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 - *7% of total manufacturing exports for French firms (28% with 4-digit industries)*
- 2 **Granular comparative advantage:** few large firms shape industry specialization and export patterns
 - *GI find approximately 20% of French trade flows are of granular origin*
 - Anecdotes:
 - *Intel in Costa Rica - 27% of total exports until 2013*
 - *Nokia in Finland - 25% of total exports, 39% of global market in mid-2000s*
 - *Texas Instrument in India*

Granular Exports

Our focus: Manufacturing firms in China

Average Export Share of the Largest Firm (2003-2007)

Manufacturing	1 industry	2%
– 2-digits	30 sectors	8%
– 3-digits	169 sectors	15%
– 4-digits	482 sectors	25%

Objective:

- 1 Explore empirical patterns of granularity for manufacturing firms in China
- 2 Quantify its importance for trade flows
- 3 Conduct policy experiments

Features of Granularity

- The distribution of firm-size is:
 - 1 Fat-tailed (Zipf's law)
 - 2 Discrete
- A single draw can shape the average
- Deviation from the LLN – average can be different from expectation
- A few firms can potentially shape a country's comparative advantage

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- The distribution of firm-size is:
 - 1 **Fat-tailed** (Zipf's law)
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 - A single draw can shape the average
 - Deviation from the LLN - average can be different from expectation
 - A few firms can potentially shape a country's **comparative advantage**
- **Trade models** typically account for **1** but not **2**
- LLN applies (measure zero firms) → individual firms cannot shape the aggregate
- **Exceptions:**
- 1 Eaton, Kortum and Sotelo (2013) - one sector
 - 2 **Gaubert and Itskhoki (2021) - mutli-sector**
 - 3 Literature on competition and markups

Conceptualizing Granularity

- Industry k export share:

$$\Lambda_k \equiv X_k/Y_k = \sum_{i=1}^{N_k} \frac{d_{k,i}}{Y_k} \frac{x_{k,i}}{d_{k,i}} = \sum_{i=1}^{N_k} s_{k,i} \lambda_{k,i} = \mathbf{s}'_k \boldsymbol{\lambda}_k$$

- X_k is exports and Y_k is domestic expenditure
- $s_{k,i} \equiv d_{k,i}/Y_k$ - firm-level domestic market share
- $\lambda_{k,i} \equiv x_{k,i}/d_{k,i}$ - firm-level export share

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- $(\mathbf{s}_k, \lambda_k) \sim F_k(\cdot)$ - stochastic data generating process

$$\Lambda_k = \Omega_k + \Delta_k$$

→ **Fundamental CA:** $\Omega_k \equiv \mathbb{E}_k\{\Lambda_k\} = \int (\mathbf{s}'_k \lambda_k) dF_k(\mathbf{s}_k, \lambda_k)$

→ **Granular CA:** $\Delta_k = \Lambda_k - \Omega_k$

Granular Exports with Chinese characteristics

The Role of State Owned Enterprises (SOEs) and Private Chinese firms

Gaubert and Itskhoki (2021) specification (k =sector, i =firm):

$$\Lambda_k = \alpha + \beta \sum_{i=1}^3 s_{k,i} + \delta \log Y_k + \epsilon_k,$$

→ $\Lambda_k = X_k/Y_k$ - sector export share

→ X_k - sector exports

→ Y_k - sum of domestic sales and imports

→ $\sum_{i=1}^3 s_{k,i}$ - top three firms' domestic sales share

Granular Exports with Chinese characteristics

Granular (Anti-) Comparative Advantage

Panel 2003-2007

	(1)	(2)	(3)
$\log X_k$			
$\log D_k$	0.778*** (0.027)		
$\sum_{i=1}^3 \tilde{S}_{k,(i)}$	-0.709*** (0.235)		
2-digit sector FE	YES		
Observations	1719		
R^2_{adj}	0.614		

*Standard errors are in parentheses.

Granular Exports with Chinese characteristics

The Role of State Owned Enterprises (SOEs) and Private Chinese firms

Granular (Anti-) Comparative Advantage, Panel 2003-2007

$\log X_k$	(1)	(2)	(3)
$\log D_k$	0.778*** (0.027)	0.779*** (0.03)	
$\sum_{i=1}^3 \tilde{S}_{k,(i)}$	-0.709*** (0.235)		
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{SOE}$		-2.444*** (0.308)	
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{FE}$		1.016*** (0.381)	
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{CPR}$		-0.948*** (0.33)	
2-digit sector FE	YES	YES	
Observations	1719	1504	
R^2_{adj}	0.614	0.641	

*Standard errors are in parentheses.

Granular Exports with Chinese characteristics

The Role of Foreign Owned Enterprises and Chinese firms

Granular (Anti-) Comparative Advantage, Panel 2003-2007

$\log X_k$	(1)	(2)	(3)
$\log D_k$	0.778*** (0.027)	0.779*** (0.03)	0.762*** (0.027)
$\sum_{i=1}^3 \tilde{S}_{k,(i)}$	-0.709*** (0.235)		
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{SOE}$		-2.444*** (0.308)	
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{FE}$		1.016*** (0.381)	0.909*** (0.342)
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{CPR}$		-0.948*** (0.33)	
$\sum_{i=1}^3 \tilde{S}_{k,(i)}^{CF}$			-1.662*** (0.244)
2-digit sector FE	YES	YES	YES
Observations	1719	1504	1656
R_{adj}^2	0.614	0.641	0.641

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Granular Exports with Chinese characteristics

Key Take-Aways for modelling and quantification

- 1 Foreign Enterprises display expected Granular CA

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→ productivity differences

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 - 2 Have preferential access to the domestic market
 - trade costs of domestic and foreign market

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 - productivity differences
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 - trade costs of domestic and foreign market
- Results are consistent with that fact and Anti-Granular CA
- 3 Chinese private firms also has similar Anti-Granular effects as SOE's?

Granular Exports with Chinese characteristics

Chinese private firms like SOEs?

CHINA ECONOMY

China's second-in-command: We're building an even playing field for foreign firms

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KEY POINTS

- Chinese Premier Li Keqiang tells global business leaders and government officials that [Beijing is seeking to create an equal playing field for all companies](#), including, foreign-owned ones.
- Companies from the United States and other countries have long complained that [China gives preferential treatment to home-grown businesses](#).
- Li claims [China is opening or plans to open its economy to more foreign participation](#) in a host of ways, but the extent to which Beijing acts on its promises remains the important question.

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Why th

Granular Trade Model with

DFS (1977) model with EKS (2013) sectors

- 1 Two countries Home and Foreign (*)
- 2 Labor is the only factor of production
→ L and L^* inelastically supplied with wages w and w^*
- 3 Continuum of sectors $k \in [0, 1]$
→ vary by **comparative advantage** Z_k/Z_k^*

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 - two types of firms in Home: **foreign enterprises and Chinese-owned firms**

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 - CES over sector-varieties, with EoS: $\sigma > 1$

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- 6 Each sector as in EKS

Granular Trade Model with different Types of Firms

Production technology

Marginal cost of a firm's sector-variety (k, g) in the Home market:

$$c_{k,g} = \begin{cases} w/z_{k,g} & \text{if } g \text{ is a Home Foreign enterprise variety} \\ \delta w/z_{k,g} & \text{if } g \text{ is a Home Chinese-owned variety} \\ \tau w^*/z_{k,g}^* & \text{if } g \text{ is a Foreign variety} \end{cases}$$

- $z_{k,g}$ ← firm-level productivity
- $\delta < 1$ ← Chinese-owned firms' preferential access to the domestic market
 - licensing and government contracts
- τ ← trade costs
- Common fixed cost (in local labor) of entering a market: f
- Firms engage in price competition

Granular Trade Model with different Types of Firms

Entry and general equilibrium

- Equilibrium section criteria:

→ sequential entry in order of increasing marginal cost $c_{k,g}$ with

$$c_{k,1} < c_{k,2} < \dots < c_{k,N_k}$$

- Profits:

$$\pi_{k,g} \equiv \max_{p_{k,g}} \left\{ (p_{k,g} - c_{k,g}) \frac{p_{k,g}^{-\sigma}}{\sum_g p_{k,g}^{1-\sigma}} \beta_k Y - wf \right\} = \frac{1}{\epsilon_{k,g}} s_{k,g} \beta_k Y - wf$$

$$\rightarrow \epsilon_{k,g} \equiv \sigma (1 - s_{k,g}) + s_{k,g}$$

$$\rightarrow s_{k,g} \equiv \left(\frac{p_{k,g}}{P_{k,g}} \right)^{1-\sigma} - \text{market share of firm } g$$

$$\rightarrow \text{markup } \frac{\epsilon_{s,g}}{\epsilon_{s,g}-1} \rightarrow \frac{\sigma}{\sigma-1} \text{ as } s_{k,g} \rightarrow 0$$

Granular Trade Model with different Types of Firms

Home Potential Entrants and productivity distribution

- Number of (shadow) entrants in sector k :
 - Foreign enterprise: Poisson (\bar{N}_k^{FE})
 - Chinese-owned firm: Poisson (\bar{N}_k^{CF})
- Firms' productivity:
 - Foreign enterprises: Pareto ($\vartheta; \underline{z}_k^{FE}$)
 - Chinese-owned firms: Pareto ($\vartheta; \underline{z}_k^{CF}$)
 - $\underline{z}_k^{CF} \equiv \mu \underline{z}_k^{FE}$, with $\mu < 1$ - inefficiencies of SOEs

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→ $\underline{z}_k^{CF} \equiv \mu \underline{z}_k^{FE}$, with $\mu < 1$ - inefficiencies of SOEs

→ *expected sector productivity*:

1 Foreign enterprises: $Z_k^{FE} \equiv \bar{N}_k \left(\underline{z}_k^{FE} \right)^\vartheta$

2 Chinese-owned firms: $Z_k^{CF} \equiv \bar{N}_k^{CF} \mu^{CF} \left(\underline{z}_k^{FE} \right)^\vartheta$

3 **Comparative advantage**

$$\left(Z_k^{FE} + Z_k^{CF} \right) / Z_k^*$$