

Distorted Gravity: The Intensive and Extensive Margins of International Trade

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Overview

- Per Krugman (1980) export from i to j satisfies:

$$Export_{AB} = Constant \times \frac{GDP_A \times GPD_A}{(Trade\ Barriers_{AB})^\sigma}$$

- Chaney's version of Melitz (2003) export from i to j satisfies:

$$Export_{AB} = Constant \times \frac{GDP_A \times GPD_A}{(Trade\ Barriers_{AB})^{\varepsilon(\sigma)}} \text{ with } \varepsilon' \sigma < 0$$

Related Literature and Contribution

- Inspired by Melitz (2003), Chaney (2008) extends Krugman (1980)
- Peri and Requena (2009)- Trade and migration
- Persson (2010)- Trade costs impact extensive margin more
- Crozet and Koenig (2010)- Industry differences inform impact of trade policies

Main Ideas and Results

Assumptions

□ Heterogenous countries with same technology

□ Population of country N is L_n

□ Consumers' Utility, $U \equiv q_0^{\mu_0} \prod_{h=1}^H \left(\int_{\Omega_h} q_h(\omega)^{(\sigma_h-1)/\sigma_h} d\omega \right)^{\sigma_h/(\sigma_h-1)\mu_h}$

□ Wages in country n is w_n .

Main Ideas and Results

□ Trade Barriers between country i and j constitute:

“iceberg” transportation costs, $\tau_{ij} \geq 1$

fixed costs, $f_{ij} \geq 0$

□ Firms face Increasing-returns-to scale

□ Productivity is from a Pareto Distribution

Main Ideas and Results

- Criteria for market entry:
 - Firm's productivity
 - Aggregate demand
 - Existing Trade Barriers
 - Prices set by existing competitors

Main Ideas and Results

- Firms draw random unit productivity, φ
- Pareto distribution of productivity shocks over $[1, +\infty]$
- $P(\widetilde{\varphi}_h < \varphi) = G_h(\varphi) = 1 - \varphi^{-\gamma_h}$
- $\gamma_h > \sigma_h - 1$
- γ_h is an inverse measure of heterogeneity

Main Ideas and Results

- Firms incur cost of $C_{ij}^h = \frac{w_i \tau_{ij}^h}{\varphi} q + f_{ij}$
- Price by firm φ in country j : $P_{ij}^h = \frac{\sigma_h}{\sigma_h - 1} \frac{w_i \tau_{ij}^h}{\varphi}$
- Mass of potential entrants, $M_e^{h,e} = w_n L_n$

Main Ideas and Results

- Exports from country i to j is, $X_{ij}^h(\varphi) = P_{ij}^h(\varphi)q_{ij}^h(\varphi) = \mu_h Y_j \left(\frac{P_{ij}^h(\varphi)}{P_j^h} \right)^{1-\sigma_h}$
- P_j^h is CES price index for good h in country j
- Y_j is total expenditure in j

Main Ideas and Results

- Profits from exporting is $\pi_{ij}(\varphi) = \frac{\mu}{\sigma} Y_j \left(\frac{\sigma}{\sigma-1} \frac{w_i \tau_{ij}}{\varphi P_j} \right)^{1-\sigma} - f_{ij}$
- From $\pi_{ij}(\bar{\varphi}_{ij}) = 0$, productivity threshold is $\bar{\varphi}_{ij}$

Main Ideas and Results

- In equilibrium, only productive firms export
- Hence, extensive margin selection occurs
- $\sigma - 1$ is standard for the intensive margin.

Main Ideas and Results

- Proposition 1: $X_{ij}^h = \mu_h \times \frac{Y_i \times Y_j}{Y} \times \left(\frac{w_i \tau_{ij}^h}{\theta_j^h} \right)^{-\gamma_h} \times f_{ij}^{-[\gamma_h / (\sigma_h - 1) - 1]}$
- Firm heterogeneity distorts gravity structure.
- Without firm heterogeneity, γ is larger
- Variable costs \downarrow size of exports \uparrow
- σ has counter impacts on margins

Main Ideas and Results

- Proposition 2: If $\zeta \equiv \frac{d \ln X_{ij}}{d \ln \tau_{ij}}$ and $\xi \equiv \frac{d \ln X_{ij}}{d \ln f_{ij}}$, then $\frac{\partial \zeta}{\partial \sigma} = 0$ and $\frac{\partial \xi}{\partial \sigma} < 0$
- Impact of σ on margins balance off $\frac{\partial \zeta}{\partial \sigma} = 0$
- In terms of fixed cost, $\xi \equiv -\frac{d \ln X_{ij}}{d \ln f_{ij}} + 0 + \frac{\gamma}{\sigma-1} - 1 = \frac{\gamma}{\sigma-1} - 1$

Critical Discussion

- σ dampens impact of trade barriers on trade
- Trade costs \downarrow intensive margin \uparrow
- Determination of intensive and extensive margins

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