

Comments/Questions on
“Changes in Infrastructure and Tariff Barriers:
Local vs Global Impacts”

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Model

- Short-run equilibrium (*ie. labor in each country is immobile*), *M-country* version of the *Krugman's CP model* (FKV Ch.5).
- Wages in all sectors/countries are fixed to one rather than being endogenous variables.
- The mass, n_i , of differentiated firms in each country i is adjusted to satisfy the equilibrium condition (non-positive profit in each country)

- *Question 1:*

*Why should wage of the differentiated sector be fixed ?
Labor mobility between homogeneous sector (under perfect competition) & differentiated sector is assumed ?*

The Key Equations

- The interior equilibrium conditions for industry shares $\{\lambda_i \equiv n_i / N\}$ reduce to the System of **Linear Equations**:

$$\boxed{\sum_{k=1}^M \phi_{ik} \lambda_k = e_i \quad (i = 1, 2, \dots, M)} \iff \boxed{\Phi \lambda = \mathbf{e}}$$

where $e_i \equiv \theta_i / \varphi_i$, $\theta_i \equiv L_i / L = E_j / E$, $\varphi_i \equiv \sum_j f_{ij} / |\Phi|$,
and f_{ij} is the cofactor of ϕ_{ij}

- Question 2:** *The firm distribution, λ , can be obtained by*

$$\lambda = \Phi^{-1} \mathbf{e} = \underline{\underline{[I + A + A^2 + \dots]}} \underline{\underline{\mathbf{e}}} \quad \text{where } \Phi \equiv I - A.$$

Competition effects *Market Size effects*

Is this (intuitive) interpretation correct?

Sensitivity Analysis of the Model

- All properties of the equilibrium industry shares λ are governed by the trade-freeness matrix Φ and expenditure e

Sensitivity analysis of the LEQs: $\Phi \lambda = e$

w.r.t. θ (*expenditures*) and Φ (*tariffs / transportation costs*)

- **Changes in Expenditures:**

Home Market Effect does not necessarily hold when $M > 2$ and there are changes in multiple expenditures (although HME holds for the single change in E_i)

Changes in Φ : Tariff Barriers

- Changes in tariffs (assuming symmetric transportation cost):

$$\phi_{ij} = (1 + t_{ij}) \bar{\delta}$$

- A decrease in tariff t_{ij} causes

- 1) **Market size effect** [*Free reciprocal access to each other's consumers (markets i & j) may **increase** n_i & n_j]*
- 2) **Competition effect** [*Tougher competition from each other's firms may **decrease** n_i & n_j]*

Changing tariff barriers do not allow for any clear predictions on the international firm distribution for $M > 2$

Changes in Φ : Transportation Costs (1)

- Changes in transp. costs (assuming symmetric tariffs):

$$\phi_{ij} = (1 + \bar{t}) \delta_{ij}$$

- **Lemma:** If the transp. ntwk is locally a tree at (i, j) , then

$$\frac{\partial \lambda_{\lambda}^*}{\partial r_{ij}} > 0 \text{ for } \lambda \in M'(i, j), \quad \frac{\partial \lambda_k^*}{\partial r_{ij}} = 0 \text{ for } k \notin M'(i, j)$$

Trade integration through improvements in infrastructure matters most for nearby countries.

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- *Question 3:*

What is the essential logic/mechanism by which this lemma holds ?

Changes in Φ : Transportation Costs (2)

- Reducing a tariff barrier t_{ij} (PTA) is just a *local* change in Φ , but it causes a *global* change in the international firm distribution λ because of the “*higher order effects*”:

$$\lambda = \Phi^{-1} \mathbf{e} = \underline{\underline{[I + A + A^2 + A^3 + \dots]}} \mathbf{e}$$

- Improving a single link r_{ij} in a transportation network causes a *global* change in transportation costs between countries (*ie. multiple elements of Φ are changed simultaneously*), but the resultant change in the firm distribution is limited in the *local* area (i, j and the neighborhood).

*A neat mechanism should be behind the lemma
... Question 3*

Changes in Φ : Transportation Costs (3)

- **Proposition 4:** $\partial(\lambda_i^* + \lambda_j^*) / \partial r_{ij} < 0$
Infrastructure improvements increase the total share of the integrated countries.
 - **Proposition 5:** *A decrease in r_{ij} raises the welfare of both i and j , keeping the welfare of the remaining country.*
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- *Question 4 (Comments): The Pareto improvement result (that Proposition 5 holds despite the straw effect) seems to heavily rely on the strong assumption of wage equalization (ie. perfect labor mobility between sectors). Should we be careful about the use of the welfare results in this study?*

On the distribution of the number of firms

- The distribution of the number of firms in cities/regions/countries follows “*power law*” (as in *Zip’s law* for city size).
- The equilibrium distribution of the # of firms in the model is totally governed by the trade-freeness matrix Φ :

$$\underbrace{\Phi \text{ and } \mathbf{e}}_{\text{what structure?}} \rightarrow \boxed{\Phi \boldsymbol{\lambda} = \mathbf{e}} \rightarrow \underbrace{\boldsymbol{\lambda}}_{\text{observed distribution (“power-law”)}}$$

● Question 5:

What sort of “network structure” (or properties) should the trade-freeness matrix Φ have in order for the model to replicate the power-law distribution ?