

Competition, Productivity, and Trade, Reconsidered

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Tomohiro Ara

Fukushima Univ

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Motivation

- Country size has a critical impact on domestic/export shares:
 - A large (small) country tends to have a large (small) domestic share of expenditure
 - Most firms provide their products for the domestic market in a large country, while a large fraction of firms export in a small country
- ⇒ **Country size seems to have selection effects that are opposite to trade liberalization in a country of origin**

Motivation (cont.)

Country	World GDP share (%) in 2006	Home share of spending		Implied gains from trade	
		Level in 2006 (%)	Change since 1996 (percentage points)	Level in 2006 (%)	Change since 1996 (percentage points)
Austria	0.66	31.4	-16.2	21.3	8.1
Canada	2.60	49.1	-1.5	12.6	0.6
Czech Republic	0.29	42.6	-14.7	15.3	5.5
Denmark	0.56	25.6	-18.1	25.5	10.7
Estonia	0.03	2.5	-19.6	85.4	56.7
Finland	0.42	58.2	-7.3	9.4	2.1
France	4.60	56.9	-10.3	9.9	3.0
Germany	5.94	53.7	-16.4	10.9	4.8
Greece	0.54	52.7	-11.6	11.3	3.6
Hungary	0.23	26.0	-34.5	25.1	16.4
Iceland	0.03	27.9	-10.0	23.7	6.2
Ireland	0.46	39.6	9.9	16.7	-5.7
Italy	3.80	68.9	-7.1	6.4	1.7
Japan	8.88	84.9	-5.6	2.8	1.1
Korea	1.94	77.2	-0.7	4.4	0.1
Mexico	1.94	58.3	-7.9	9.4	2.3
New Zealand	0.22	53.6	-8.2	11.0	2.6
Norway	0.68	51.9	-2.5	11.6	0.9
Poland	0.69	53.4	-15.8	11.0	4.7
Portugal	0.41	50.8	-10.2	12.0	3.4
Slovenia	0.08	27.2	-15.5	24.3	9.0
Spain	2.51	62.8	-10.2	8.1	2.7
Sweden	0.81	49.2	-10.0	12.5	3.4
Switzerland	0.80	35.3	-20.0	18.9	8.6
United States	27.26	73.5	-8.3	5.3	1.9
All others	33.62				

Source: Eaton and Kortum (2011)

Motivation (cont.)

- Crucial drawbacks under C.E.S. preferences and monopolistic competition:
 - Firms' markups are constant and exogenously fixed
 - Country size has no selection effects

- This paper explores the role of **endogenous wages** to fix the problem, while retaining the preference assumption:
 - Country size has selection effects that are consistent with empirical evidence above even under the C.E.S. preferences

Motivation (cont.)

■ Why does country size matter in endogenous wages?:

- $\frac{p(\varphi)}{c(\varphi)} = \frac{\sigma}{\sigma-1}$ (markups)
- $p(\varphi) - c(\varphi) = \frac{1}{\sigma-1} \frac{w}{\varphi}$ (price-cost margins)
- $L \uparrow \Rightarrow w \uparrow \Rightarrow p(\varphi) - c(\varphi) \uparrow \Rightarrow \varphi_d^* \downarrow, \varphi_x^* \uparrow$

■ Caveats:

- Channel is not operative if wages are exogenously fixed by a freely tradable “outside” good
- The result does *not* depend on the above two specifications, but depends on endogenous wages

Motivation (cont.)

- Why should we care about the country size effect?:
 - The model predicts a large country accommodates relatively inefficient firms in the domestic market
 - While a larger country can enjoy terms-of-trade gains by setting higher tariffs, this also accelerates welfare losses from protecting inefficient firms
- ⇒ **A larger country does not always benefit from higher tariffs**

Related literature

- Demidova and Rodríguez-Clare (2013):
 - Endogenous wages can reverse the impact of trade liberalization on welfare in a unilaterally liberalizing country
 - Country size is used to obtain the equilibrium outcome for a small economy

- Melitz and Ottaviano (2008):
 - A country with larger size entails higher productivity and welfare, reducing firms' average markups
 - Due to an outside good, trade liberalization can result in a welfare loss

Roadmap

- Model setup
- Impact of trade liberalization:
 - Welfare gains in a unilaterally liberalizing country
- Impact of country size:
 - Higher price-cost margins in a larger country
 - Entry that is not proportional to country size
- Summary

Model

- Melitz (2003) model with N countries and $S + 1$ sectors:

$$U_i = \sum_{s=0}^S \mu_s \ln Q_{is}, \quad 0 < \mu_s < 1$$

- Equilibrium conditions in *levels*:

$$B_{js}(\tau_{ijs} w_i)^{1-\sigma_s} (\varphi_{ijs}^*)^{\sigma_s-1} = w_i f_{ijs} \quad (\text{ZCP})$$

$$\sum_{n=1}^N f_{ins} J_{is}(\varphi_{ins}^*) = f_{is}^e \quad (\text{FE})$$

$$w_i \bar{L}_i = \sum_{n=1}^N \sum_{s=1}^S \lambda_{ins} \mu_s w_n \bar{L}_n \quad (\text{TB})$$

Model (cont.)

- Welfare per worker:

$$W_i = \begin{cases} \prod_{s=1}^S \left(\frac{w_i}{P_{is}} \right)^{\mu_s} & \text{if } \mu_0 = 0 \\ \prod_{s=0}^S \left(\frac{1}{P_{is}} \right)^{\mu_s} & \text{if } \mu_0 \neq 0 \end{cases}$$

where

$$\frac{w_i}{P_{is}} = \frac{\sigma_s - 1}{\sigma_s} \left(\frac{\mu_s \bar{L}_i}{\sigma_s f_{iis}} \right)^{\frac{1}{\sigma_s - 1}} \varphi_{iis}^*$$

- Welfare effects:
 - Trade liberalization (τ_{ijs}) $\Rightarrow \varphi_{iis}^*$
 - Country size (\bar{L}_i) $\Rightarrow \varphi_{iis}^*$ and \bar{L}_i

Trade liberalization

- Suppose that country j unilaterally reduces variable trade costs on importing τ_{ijs} from country i in sector s
- Equilibrium conditions in *changes*:

$$\hat{B}_{js} + (\sigma_s - 1)\hat{\varphi}_{ijs}^* = \sigma_s \hat{w}_i + (\sigma_s - 1)\hat{\tau}_{ijs} \quad (\text{ZCP})$$

$$\sum_{n=1}^N f_{ins} J'_{is}(\varphi_{ins}^*) \varphi_{ins}^* \hat{\varphi}_{ins}^* = 0 \quad (\text{FE})$$

$$\hat{w}_i = \sum_{n=1}^N \sum_{s=1}^S \delta_{ins} (\hat{\lambda}_{ins} + \hat{w}_n) \quad (\text{TB})$$

where $\hat{x} = dx/x$

Trade liberalization (cont.)

- Special case by Demidova and Rodríguez-Clare (2013):
 - Two countries ($N = 2$) and one differentiated-good sector ($S = 1$)
 - Country 1 reduces variable trade costs on importing τ_{21} from country 2
- If $\mu_0 \neq 0$, wages are exogenously fixed by an outside good:

$$\hat{\varphi}_{11}^* = -\frac{\sigma(1 + \alpha_2)}{(\sigma - 1)(\alpha_1\alpha_2 - 1)} \hat{w}_1 + \frac{1}{\alpha_1\alpha_2 - 1} \hat{\tau}_{21}$$
$$\hat{\varphi}_{22}^* = \frac{\sigma(1 + \alpha_1)}{(\sigma - 1)(\alpha_1\alpha_2 - 1)} \hat{w}_1 - \frac{\alpha_2}{\alpha_1\alpha_2 - 1} \hat{\tau}_{21}$$

where $\alpha_1\alpha_2 - 1 > 0$

Trade liberalization (cont.)

- If $\mu_0 = 0$, wages are endogenously determined by the TB condition:

$$\hat{\varphi}_{11}^* = -\frac{(\sigma - 1)[(\sigma - 1) + \sigma\beta_2]}{\Xi} \hat{\tau}_{21}$$
$$\hat{\varphi}_{22}^* = -\frac{(\sigma - 1)[\sigma\beta_1 - (\sigma - 1)\alpha_1]}{\Xi} \hat{\tau}_{21}$$
$$\hat{w}_1 = \frac{(\sigma - 1)^2(\beta_1 + \alpha_1\beta_2)}{\Xi} \hat{\tau}_{21}$$

where $\Xi > 0$ and $\sigma\beta_1 - (\sigma - 1)\alpha_1 > 0$

Trade liberalization (cont.)

■ Exogenous wages:

- Reductions affect only foreign market accessibility in a non-liberalizing country
- Change in trade patterns results in welfare loss in a liberalizing country (Venables, 1987)

■ Endogenous wages:

- Reductions also affect competitiveness in a liberalizing country
- Firms find it more difficult to earn domestic/export revenue there

$$p(\varphi) - c(\varphi) = \frac{1}{\sigma - 1} \frac{w}{\varphi}$$

Country size

- Suppose that country i unilaterally increases country size \bar{L}_i
- Equilibrium conditions in *changes*:

$$\hat{B}_{js} + (\sigma_s - 1)\hat{\varphi}_{ijs}^* = \sigma_s \hat{w}_i \quad (\text{ZCP})$$

$$\sum_{n=1}^N f_{ins} J'_{is}(\varphi_{ins}^*) \varphi_{ins}^* \hat{\varphi}_{ins}^* = 0 \quad (\text{FE})$$

$$\hat{w}_i + \hat{L}_i = \sum_{n=1}^N \sum_{s=1}^S \delta_{ins} (\hat{\lambda}_{ins} + \hat{w}_n) + \sum_{s=1}^S \delta_{iis} \hat{L}_i \quad (\text{TB})$$

Country size (cont.)

- Reconsider a special case of DRC (2013), but country 1 increases its size \bar{L}_1 where changes in the real wage in this case are

$$\hat{w}_i - \hat{P}_i = \hat{\varphi}_{ii}^* + \frac{\hat{L}_i}{\sigma - 1}$$

- If $\mu_0 \neq 0$, wages are exogenously fixed by an outside good:

$$\hat{\varphi}_{11}^* = -\frac{\sigma(1 + \alpha_2)}{(\sigma - 1)(\alpha_1\alpha_2 - 1)} \hat{w}_1$$

$$\hat{\varphi}_{22}^* = \frac{\sigma(1 + \alpha_1)}{(\sigma - 1)(\alpha_1\alpha_2 - 1)} \hat{w}_1$$

Country size (cont.)

- If $\mu_0 = 0$, wages are endogenously determined by the TB condition:

$$\hat{\varphi}_{11}^* = -\frac{\sigma(\sigma-1)(1+\alpha_2)}{\Xi} \hat{L}_1$$

$$\hat{\varphi}_{22}^* = \frac{\sigma(\sigma-1)(1+\alpha_1)}{\Xi} \hat{L}_1$$

$$\hat{w}_1 = \frac{(\sigma-1)^2(\alpha_1\alpha_2-1)}{\Xi} \hat{L}_1$$

- Notes:

- Negative impact on φ_{11}^* comes from the home market effect on w_1
- A large country has opposing welfare effects (i.e., fall in φ_{11}^* /rise in \bar{L}_1)

Country size (cont.)

■ Exogenous wages:

- Mass of firms increases proportionately to mass of entrants (e.g.,
 $M_{ii} = [1 - G_i(\varphi_{ii}^*)]M_i^e$)
- Population growth has no impact on firm entry

$$\frac{M_1^e}{M_2^e} = \frac{M_{11}}{M_{22}} = \frac{M_{12}}{M_{21}}$$

■ Endogenous wages:

- Mass of domestic (exporting) firms increases more (less) than proportionately to mass of entrants
- A larger country has relatively more (less) domestic (exporting) firms

$$\frac{M_{12}}{M_{21}} < \frac{M_1^e}{M_2^e} < \frac{M_{11}}{M_{22}}$$

Country size (cont.)

- Changes in the real wage:

$$\hat{w}_i - \hat{P}_i = \hat{\varphi}_{ii}^* + \frac{\hat{L}_i}{\sigma - 1}$$

- The variety effect ($\frac{\hat{L}_i}{\sigma-1}$) always dominates the selection effect ($\hat{\varphi}_{ii}^*$)
- Even though productivity is negatively affected by increased wages, our model features the welfare gains highlighted by Krugman (1980)

Summary

■ Main findings:

- Endogenous wages can fix the problem under C.E.S. preferences, helping to account for empirical facts on the domestic/export shares
- While trade liberalization and country size are always welfare enhancing, they have an opposite impact on productivity in a country of origin

■ Important applications:

- Impact of country size on optimal tariffs
- A larger country can set lower optimal tariffs (Naito, 2019)