

Economic Integration and Agglomeration of Multinational Production with Transfer Pricing

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- Corporate tax rates are a major determinant of multinational enterprises' (MNEs') location choice.

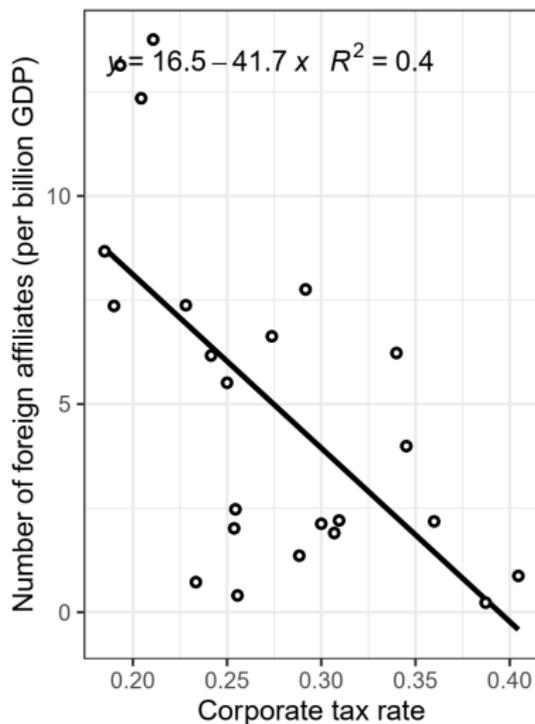


Fig. Corporate taxes and foreign affiliates in OECD countries in 2008-16.

Source: OECD Stat.

- However, foreign affiliates in low-tax countries do not necessarily engage in manufacturing activities, contradicting with policymakers' expectation.

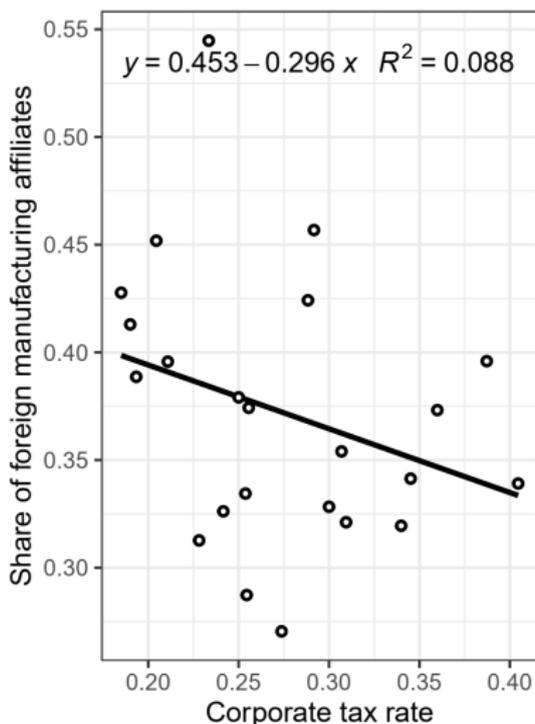
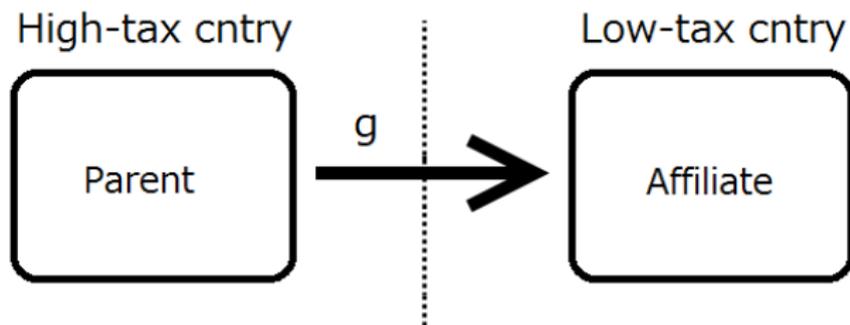


Fig. Corporate taxes and the share of manufacturing affiliates.

Source: OECD Stat.

- The location patterns of MNEs may be quite different from those of single-plant firms because their location choices depend on **profit shifting** between their multiple affiliates.
- Using a two-country spatial model, we investigate which country, the low-tax or the high-tax one, attracts multinational production.
- Our special focus is on the role of trade costs, which crucially affects the effectiveness of **transfer pricing**.

Transfer pricing



Low transfer price: $g \downarrow$

→ Parent's pre-tax profit \downarrow ; Affiliate's pre-tax profit \uparrow

→ Global **post-tax** profit \uparrow

- Revenue losses from tax evasions of MNEs are estimated at 4-10% of global corporate income tax revenues.

Relation to the literature

- ▷ Our model: new economic geography model with profit shifting, highlighting **trade costs** and **agglomeration**.

 - ▷ Multinationals and taxes
 - Haulfer and Wooton (1999); Baldwin and Krugman (2004); Shen (2018); Wang (2020)

 - ▷ Transfer pricing with location/organization choice.
 - Haufler and Schjelderup (2000); Stöwhase (2005, 2013); Bauer and Langenmayr (2013); Keuschnigg and Devereux (2013); Egger and Seidel (2013); Behrens et al. (2014); Kato and Okoshi (2019)
- Transfer pricing, location choice and trade costs have been studied separately.
- Our framework unifies these elements.

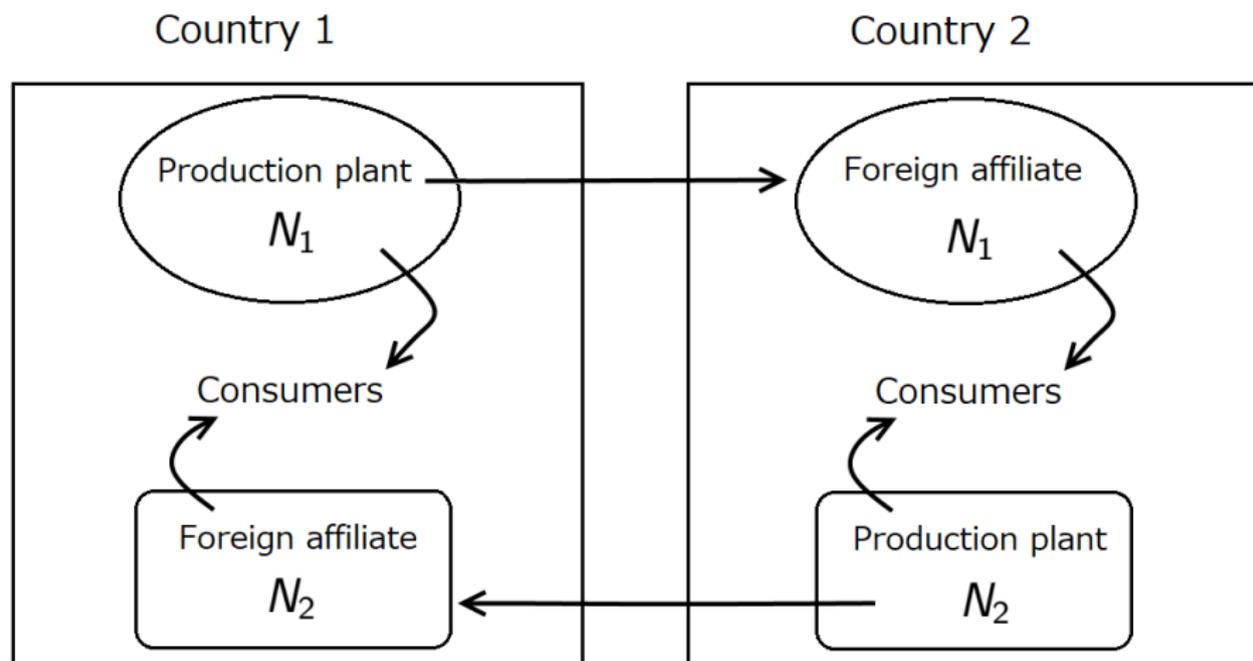
- The model
- Location choice of MNEs
- Suggestive evidence
- Robustness and extensions

Model

Model

- Footloose capital model (Martin and Rogers, 1995; Pflüger, 2004).
- Two countries.
 - High-tax country 1 and low-tax country 2: $t_1 > t_2$.
- Two sectors.
 - Differentiated manufacturing goods are traded with **trade costs**.
 - Homogeneous agricultural good is costlessly traded.
- Two factors.
 - Internationally mobile capital.
 - Immobile labor.
 - The amount of factors is the same between countries.

- MNEs in the manufacturing sector has a production plant and a foreign affiliate (distribution center).



- N_i : #MNEs with their production plants in country i .
- $N_1 + N_2 = (\text{constant})$: the total # of MNEs is fixed.

- Utility function of an individual consumer in country 1:

$$u_1 = \mu \log Q_1 + q_1^O,$$

$$Q_1 \equiv \left[\sum_{i=1}^2 \int_{\omega \in \Omega_i} \tilde{q}_{i1}(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}}.$$

ω : variety; $\sigma > 1$: the elasticity of substitution.

- The utility maximization gives the aggregate demand for a manufacturing variety:

$$q_{i1}(\omega) \equiv L_1 \tilde{q}_{i1}(\omega) = \left(\frac{p_{i1}(\omega)}{P_1} \right)^{-\sigma} \frac{\mu L_1}{P_1}$$

- The post-tax profit of an MNE with production in country 1:

$$\Pi_1 = (1 - t_1)\pi_{11} + (1 - t_2)\pi_{12} - 2R_1,$$

R_1 : rental rate of capital.

- Profit of production plant:

$$\pi_{11} \equiv \underbrace{(p_{11} - a)q_{11}}_{\text{from domestic market}} + \underbrace{(g_1 - \tau a)q_{12}}_{\text{from intra-firm trade}} .$$

- g_1 : transfer price, $\tau > 1$: trade costs, a : unit labor requirement.

- Profit of foreign affiliate:

$$\pi_{12} \equiv \underbrace{(p_{12} - g_1)q_{12}}_{\text{from foreign market}} .$$

- Timing of decisions:
 1. MNEs' location decision.
 2. MNEs set a transfer price for intra-firm transaction.
 3. Foreign affiliates set a final good's price for foreign market.

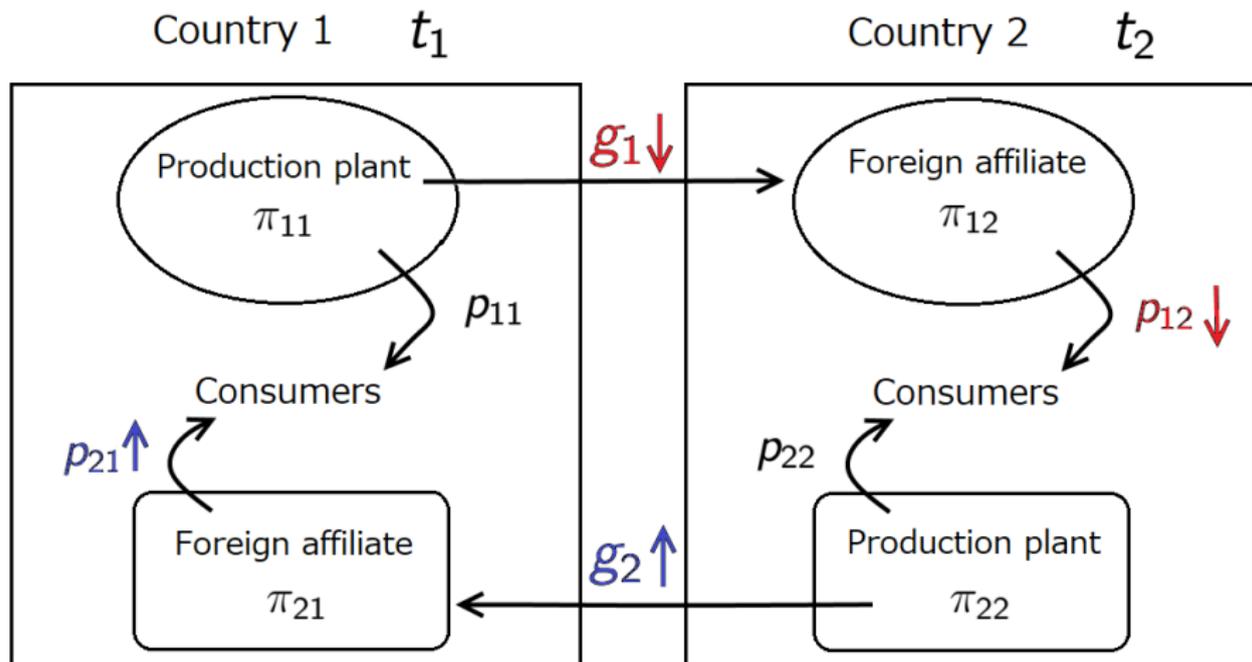
- Solve the problem backward.

Optimal prices

- An MNE with production in country 1 sets prices as:

$$g_1 = \frac{\sigma \tau a}{\sigma - \Delta t_1}, \quad p_{12} = \frac{\sigma g_1}{\sigma - 1}, \quad \text{where } \Delta t_1 \equiv \frac{t_2 - t_1}{1 - t_1}.$$

- g_i is always positive.
- The direction of profit shifting:
 - $t_1 > t_2 \rightarrow \Delta t_1 < 0 \rightarrow g_1, p_{12} \Downarrow$
 - Larger tax difference \rightarrow lower transfer price.
- cf. Empirically supported by Calusing (2003).
- Intra-firm trade profit in the high tax country \Downarrow :
 $(g_1 - \tau a)q_{12} \Downarrow$ (and thus $\pi_{11} \Downarrow$).
- Foreign affiliate's profit in the low tax country \Uparrow :
 $\pi_{12} = (p_{12} - g_1)q_{12} \Uparrow$.



Under $t_1 > t_2$.

Location choice of MNEs

Location decision

- Zero-profit conditions determine the capital return, R_i .
- An MNE locates production in country 1 if $R_1 > R_2$.

- $N_1 = n_1 L$: #MNEs with production in country 1.
- $N_2 = (1 - n_1)L$: #MNEs with production in country 2.

- Interior equilibrium:
 $R_1 = R_2 \rightarrow n_1 \in (0, 1)$.
- Otherwise, corner equilibrium:
e.g., $R_1 > R_2 \rightarrow n_1 = 1$.

- If transfer pricing **cannot be used**, the profit of an MNE with production in country 1 becomes

$$\Pi_1 = (1 - t_1)(p_{11} - a)q_{11} + (1 - t_2)(p_{12} - \tau a)q_{12} - 2R_1.$$

- The transfer price g does not show up.

- **No profit-shifting case:** (transfer price = true marginal cost)
- As trade costs decline, production plants relocate to the low-tax country.

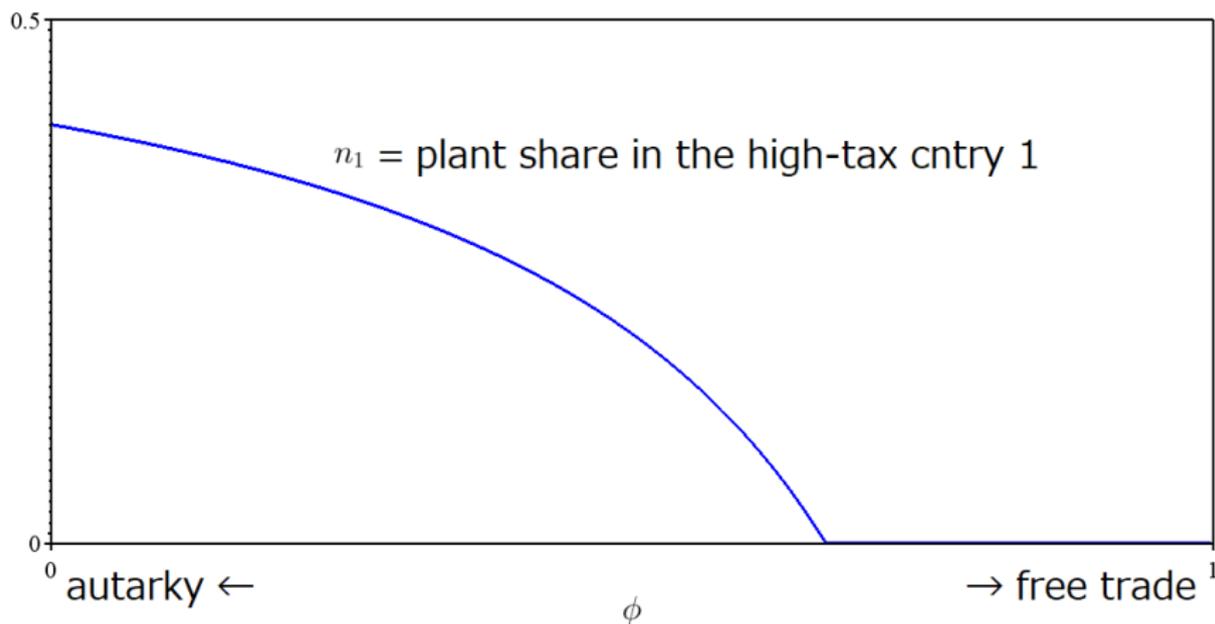


Fig. Plant share under $t_1 > t_2$.

$\phi \equiv \tau^{1-\sigma} \in [0, 1]$: an inverse of trade costs = the **trade openness**.

- If transfer pricing **can be used**, the profit of an MNE with production in country 1 becomes

$$\begin{aligned}\Pi_1 = & (1 - t_1)[(p_{11} - a)q_{11} + (g_1 - \tau a)q_{12}] \\ & + (1 - t_2)(p_{12} - g_1)q_{12} - 2R_1.\end{aligned}$$

- The transfer price g shows up.

- **Profit-shifting case:**

- As trade costs decline, production plants first relocate to the low-tax country and then **move to the high-tax country 1**.

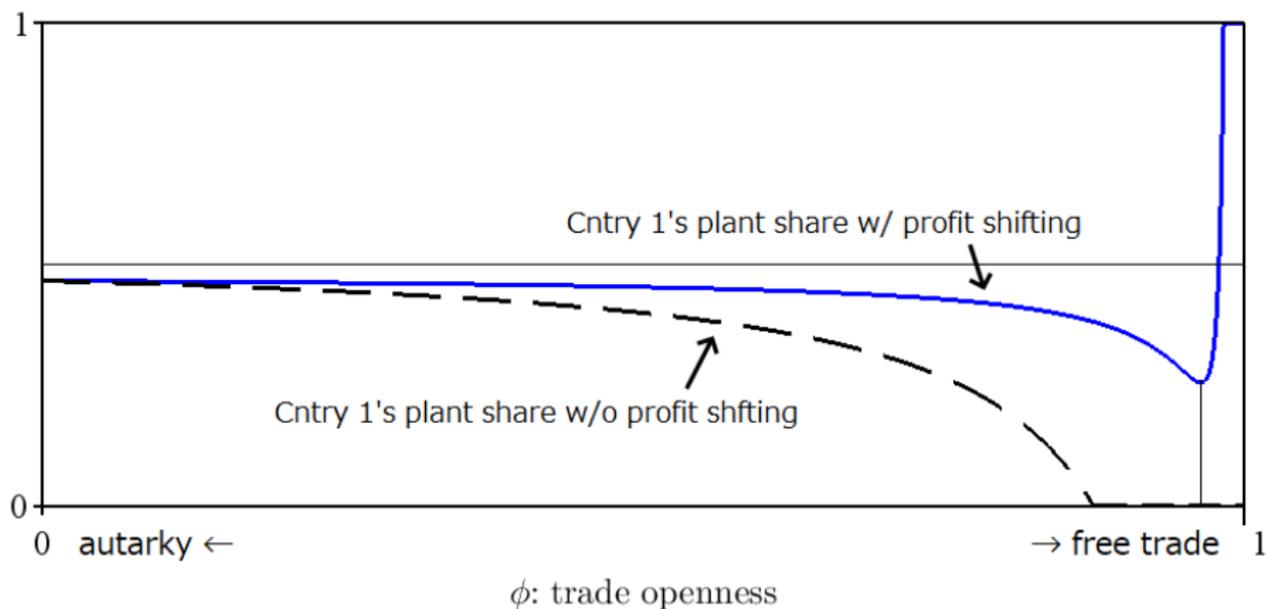


Fig. Plant share under $t_1 > t_2$.

- Introducing profit shifting reduces tax revenues in country 1.

- At low trade costs, exporting is easy and profit shifting is effective.
 - MNEs with production in the low-tax country become **less competitive in both countries**. ∴ Strategic location choice.
- Locate production in the high-tax country.

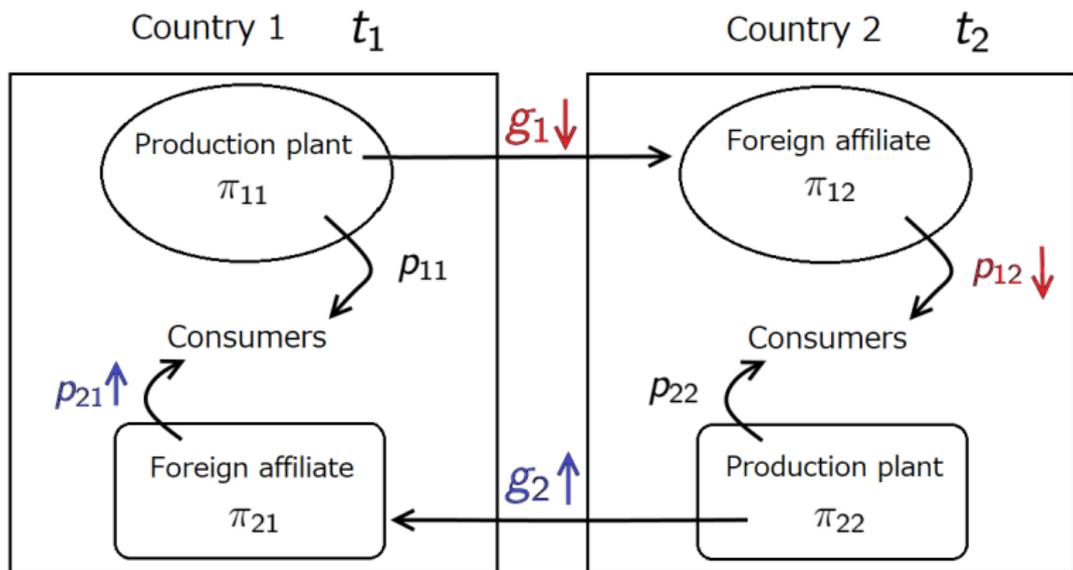


Fig. Under $t_1 > t_2$.

Suggestive evidence

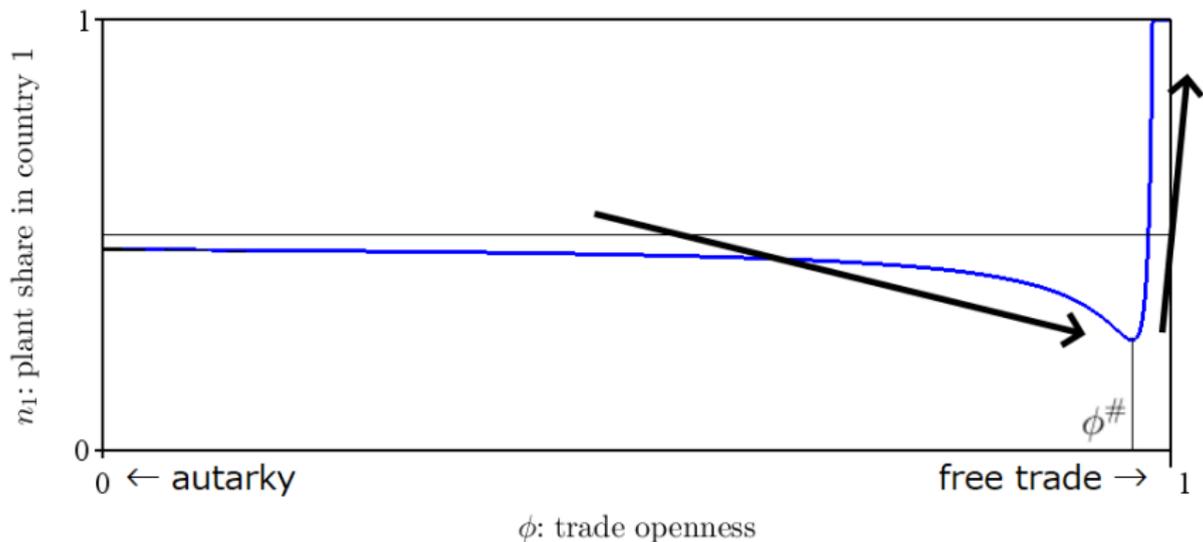


Fig. Plant share under $t_1 > t_2$.

- Supposing host country h has a higher tax rate than source country s , i.e., $TAX_h > TAX_s$,

$$\frac{\partial(\text{Manufacturing affiliates from } s \text{ to } h)}{\partial \phi} \begin{cases} < 0 & \text{if } \phi < \phi^\# \\ > 0 & \text{if } \phi > \phi^\# \end{cases} .$$

Estimation equation

- According to our theory, bilateral trade openness matters!

$$\left(\frac{\text{Manufacturing affiliates}}{\text{Affiliates in all sectors}} \right)_{h,s,t} = \beta_1 (TAX_{h,t} - TAX_{s,t}) \times \phi_{h,s} + \beta_2 (TAX_{h,t} - TAX_{s,t}) \times \phi_{h,s}^2 + X\beta + e_{h,s,t}.$$

- $\phi_{h,s}$: bilateral trade openness between h and s .
In empirics, we use $1/\log(\text{bilateral distance between } h \text{ and } s)$.
- Expected signs: $\beta_1 < 0$, $\beta_2 > 0$.
- Data
 - Number of affiliates: OECD stat.
 - $\phi_{h,s} = 1/\log(\text{bilateral distance between } h \text{ and } s)$: Mayer and Zignago (2011).

Endogeneity issues

- Tax policies in the host country may be influenced by affiliates there.
- We use a difference in political stability for an IV of the cross-country tax difference.
- Our identification assumption is that political stability affects the location choice of affiliates only through corporate taxes, once other policies affecting business conditions are appropriately controlled for.
- Data
 - IV. Political stability: World Government Indicators.
 - Controls. Index of Economic Freedom: Heritage Foundation.
Unit-labor costs, Labor productivity: OECD stat.

Non-monotonic effect of economic integration on multinational production
 Dependent variable: $(\text{foreign manufacturing affiliates})/(\text{foreign affiliates in all sectors})$

	Statutory tax rate		Effective average tax rate	
	Panel OLS	Panel IV	Panel OLS	Panel IV
	(1)	(2)	(3)	(4)
$\Delta TAX_{h,s,t} \cdot \phi_{h,s}$	-0.713*** (0.219)	-3.096*** (0.690)	-0.837*** (0.235)	-3.840*** (0.913)
$\Delta TAX_{h,s,t} \cdot \phi_{h,s}^2$	2.628*** (0.794)	10.834*** (2.419)	3.116*** (0.859)	13.225*** (3.265)
Host-year dummy	✓	✓	✓	✓
Source-year dummy	✓	✓	✓	✓
Year dummy	✓	✓	✓	✓
Control variables	✓	✓	✓	✓
Cragg-Donald F -statistics		29.647		28.596
Observations	1,833	1,833	1,845	1,596
R^2	0.510	0.471	0.511	0.460

Notes: The dependent variable is the share of foreign manufacturing affiliates out of those in all sectors in a host country. Robust-standard errors in parentheses are clustered at the host country-year level. Control variables are a simple tax difference, a difference in the index of economic freedom, a difference in unit-labor cost, a difference in labor productivity, and a common language dummy. In columns (2) and (4), $\Delta TAX_{h,s,t}$ is instrumented by a difference in political stability.

***Significant at the 1% level; **Significant at the 5% level; *Significant at the 10% level.

Turning point: $\phi^\# = 3.09/(2 \times 10.83) \simeq 0.142$ or $\exp(1/\phi^\#) \simeq 1144\text{km}$.

Robustness and extensions

Transfer-pricing regulation

- The plant incurs an additional cost of concealing profit-shifting activities:

$$\pi_{11} = \underbrace{(p_{11} - a)q_{11}}_{\text{Domestic profits}} + \underbrace{(g_1 - \tau a)q_{12}}_{\text{Shifted profits}} - \underbrace{\delta|g_1 - \tau a|q_{12}}_{\text{Concealment cost}}.$$

- Higher δ means a tougher regulation.

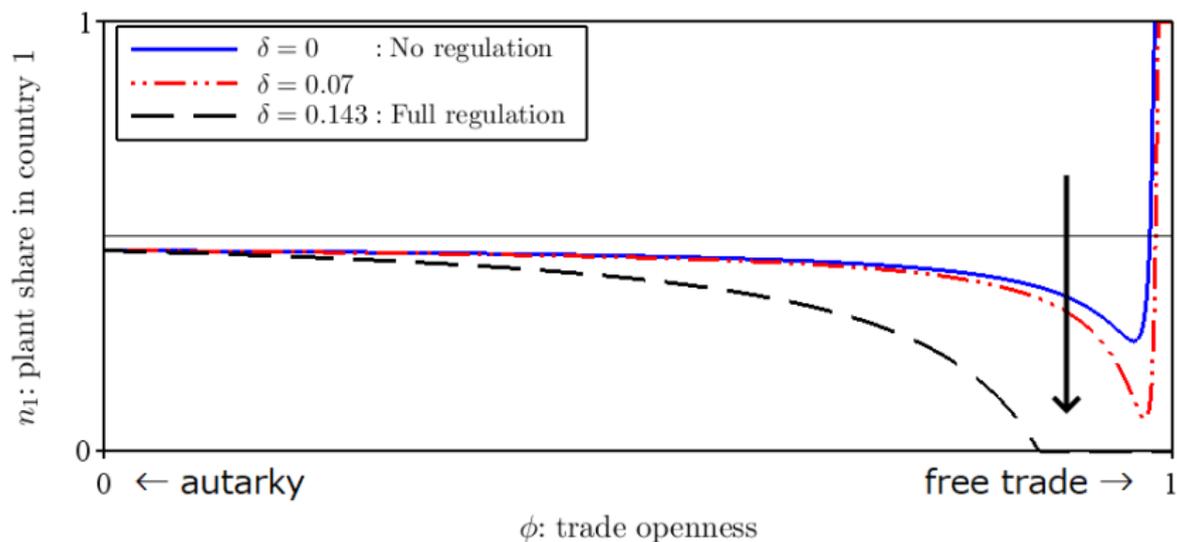


Fig. Impact of transfer-pricing regulation.

- As regulation δ is tougher, agglomeration in high-tax country 1 is less likely.

Tax competition

- Consider tax competition in the situation where ϕ is very high.
- Two countries are now assumed to be asymmetric in terms of the efficiency level in tax administration.
- As a result of tax competition with profit shifting,
 - (i) the country with more efficient tax administration sets a higher tax rate than the other country, while hosting all production plants.
 - ⇐ Consistent with previous analysis.
 - (ii) compared with no-profit-shifting case, tax competition becomes fierce.
 - ⇐ Room for international coordination on regulation.

Conclusion

- We presented a spatial model with transfer pricing.
- Q. Which country attract production activities?
- A. High trade costs → the low-tax country.
Low trade costs → the high-tax country.
- A naive view that lower taxes favor multinational production may be challenged.

- The results are robust against a number of extensions such as transfer-pricing regulation, tax competition and pure export option.

- Implications for empirics:
The impact of tax difference on FDI may differ depending on trade openness.

Thank you for your attention!