Foreign direct investment and environmental policy: have location factors been neglected?

Francesca Sanna-Randaccio
University of Rome “La Sapienza”

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Presentation

- The issue
- Literature on FDI and Environmental Policy
- Neglected location factors
- A simple illustration with a monopoly
- Implications for empirical research
- Future research agenda

Taylor (in Fullerton, 2006, The Economics of Pollution Havens)

The “Pollution Heaven Hypothesis” is one of the most contentious and hotly debated predictions in all of international economics... (p.3)

Taylor (2006) distinguish between:

- **Pollution Heaven Effect**: tightening of environmental regulation deters exports (or stimulates imports) of dirty goods

- **Pollution Haven Hypothesis:** relocation of pollution-intensive industries from high income and stringent environmental regulation countries to low income and lax environmental regulation countries.

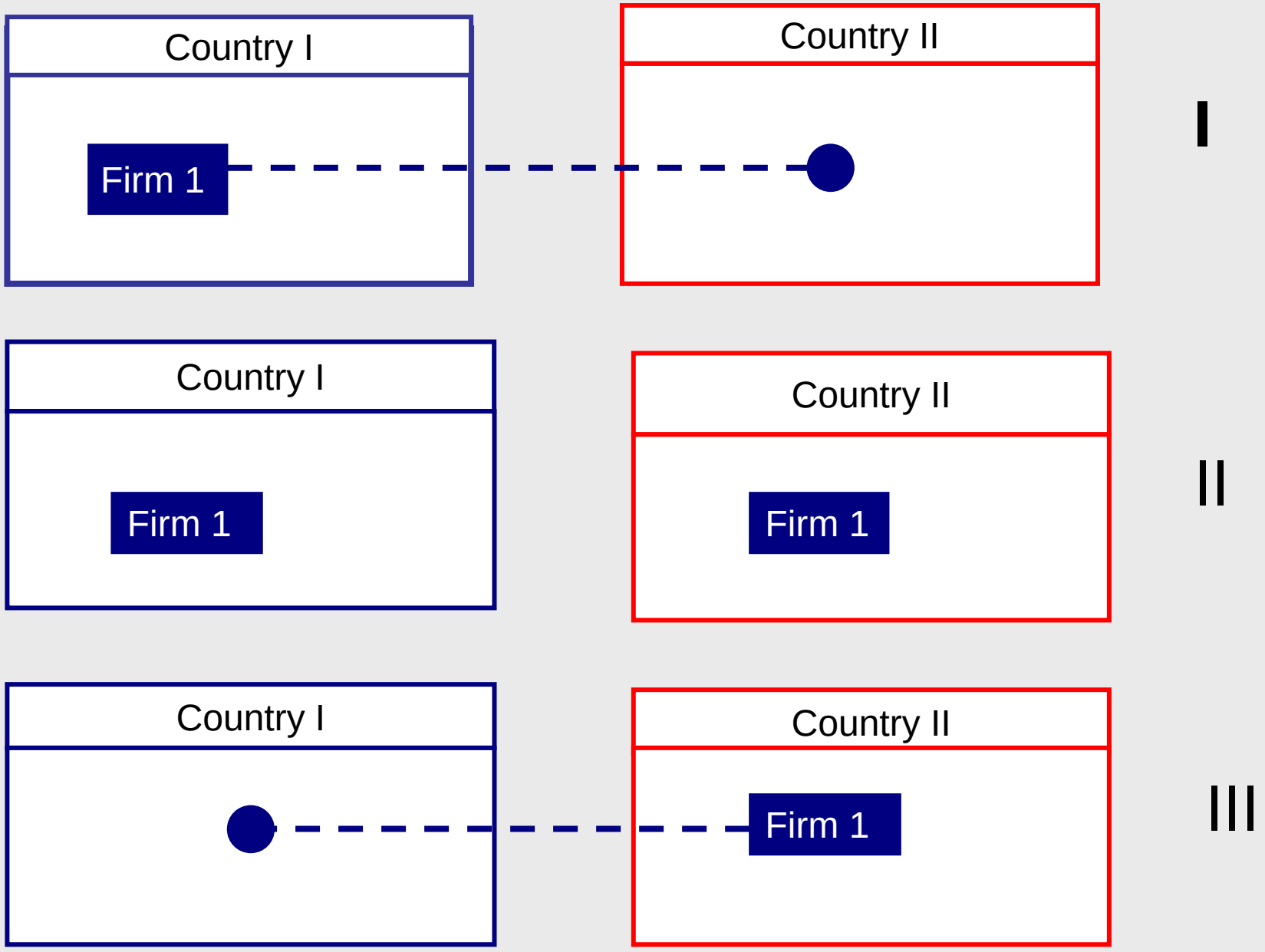
The PHH is built on the supposition that regulation affects industries differently

Table 1 Formal Literature on FDI and Environmental Policy

	Exogenous Env Policy One Country	**Exogenous Env Policy** Two Countries	**Endogenous Env Policy** One Country	**Endogenous Env Policy** Two Countries
Exogenous Location One Firm				
Exogenous Location Two Firms			Cole et al (2006)	Bayindir-Upmann (2003)** Kayalica & Lahiri (2005)+
Endogenous Location One Firm		Motta & Thisse (1994)		Markusen et al (1995) Rauscher (1995)- Hoel (1997)**
Endogenous Location Two Firms		Markusen et al.(1993) Markusen (1997)		Ulph & Valentini (2001)+

Notes: ** Integrated markets, no transport costs
+ Third country model, no transport costs
- No transport costs

Pollution tax introduced by country I



Taylor (2006): Unbundling the Pollution Heaven Hypothesis: the FDI story

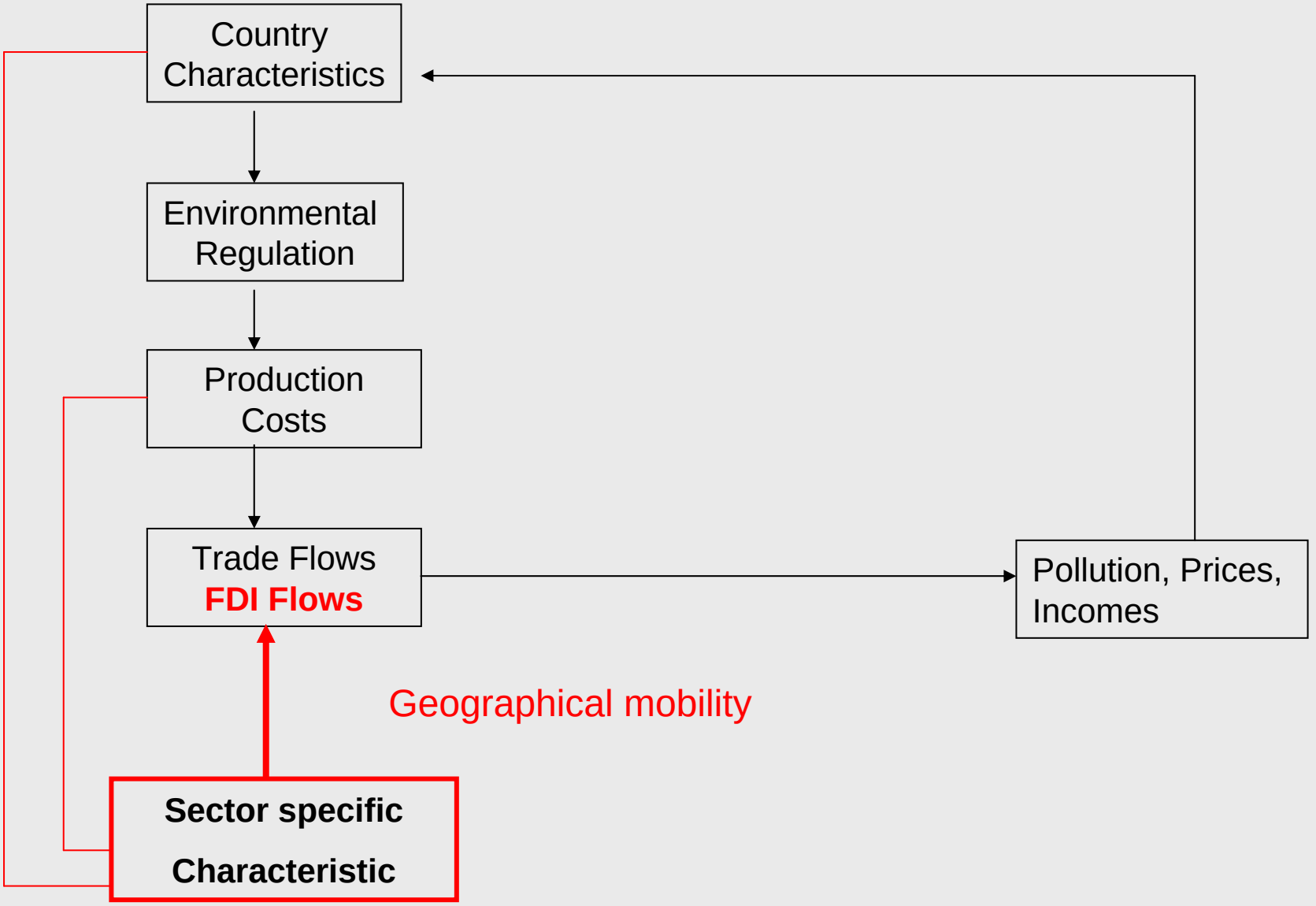


Table 1. Ranking of Pollution-Intensive Industries

Rank	Air	Water	Metals	Overall
1	371 Iron and Steel	371 Iron and Steel	372 Non-Ferrous Metals	371 Iron and Steel
2	372 Non-Ferrous Metals	372 Non-Ferrous Metals	371 Iron and Steel	372 Non-Ferrous Metals
3	369 Non-Metallic Min. Prd.	341 Pulp and Paper	351 Industrial Chemicals	351 Industrial Chemicals
4	354 Misc. Petroleum, Coal Prd.	390 Miscellaneous Manufacturing	323 Leather Products	353 Petroleum Refineries
5	341 Pulp and Paper	351 Industrial Chemicals	361 Pottery	369 Non-Metallic Min Prd.
6	353 Petroleum Refineries	352 Other Chemicals	381 Metal Products	341 Pulp and Paper
7	351 Industrial Chemicals	313 Beverages	355 Rubber Products	352 Other Chemicals
8	352 Other Chemicals	311 Food Products	383 Electrical Products	355 Rubber Products
9	331 Wood Products	355 Rubber Products	382 Machinery	323 Leather Products
10	362 Glass Products	353 Petroleum Refineries	369 Non-Metallic Min. Prd.	381 Metal Products

Mani and Wheeler, 1997

Stylized Facts

- Fixed Plant Costs

Mani and Wheeler (1997) Dirty Industry in the World Economy, 1960-1995

- Transport Costs

Mc Kinsey (2006) EU ETS Review

- Asymmetries in Market Size

Vercaemst (2007) Sectoral Costs Of Environmental Policy

Two country and one firm, with endogenous location

I: Only export

$$\pi_1^{1,0} = (a_I - bq_{1,I})q_{1,I} + (a_{II} - bq_{1,II})q_{1,II} - mq_{1,I} - (m+s)q_{1,II} - t_I(q_{1,I} + q_{1,II}) - F - G_h$$

II: Partial delocalisation

$$\pi_1^{1,1} = (a_I - bq_{1,I})q_{1,I} + (a_{II} - bq_{1,II})q_{1,II} - m(q_{1,I} + q_{1,II}) - t_I q_{1,I} - F - G_h - G_f$$

III: Total delocalisation

$$\pi_1^{0,1} = (a_I - bq_{1,I})q_{1,I} + (a_{II} - bq_{1,II})q_{1,II} - (m+s)q_{1,I} - mq_{1,II} - F - G_f$$

Three scenarios

The full symmetry scenario

$a_I = a_{II}$ $G_h = G_f$ G_h not sunk

The market size asymmetry scenario

$a_I > a_{II}$ $G_h = G_f$ G_h not sunk

The market size and plant costs asymmetry scenario

$a_I > a_{II}$ $G_h < G_f$ or G_h sunk

The full symmetry scenario

$t_I > t_{II}$ will always lead to some form of delocalisation (total or partial)

$$\pi_1^{0,1} > \pi_1^{1,0} \qquad \forall s \qquad \text{(I)}$$

if $s < t_I$ (low transport costs) delocalisation is total

if $s > t_I$ (high transport costs) delocalisation may be total or partial

$$\pi_1^{1,1} > \pi_1^{0,1} \quad \text{iff} \quad \frac{1}{4b}(s - t_I)\left[2(a_I - m) - (s + t_I)\right] > G_h \qquad \text{(II)}$$

The market size asymmetry scenario

with $t_I > t_{II}$ and $a_I > a_{II}$ delocalisation is not anymore inevitable

if $s < t_I$ (low transport costs) delocalisation is total, market asymmetry does not play a role.

if $s > t_I$ (high transport costs) an unaltered market structure is possible

$\pi_1^{1,0} > \pi_1^{0,1}$ iff $\frac{2}{4b}\left[a_I(s - t_I) - a_{II}(s + t_I) + t_I(t_I + s + 2m)\right] > 0$ (III)

$\pi_1^{1,0} > \pi_1^{1,1}$ iff $G_f > \frac{1}{4b}\left[2(a_{II} - m)(s + t_I) - (s^2 + t_I^2)\right]$ (IV)

Implications

Total delocalisation (case III) is an unlikely outcome in sectors characterized by high transport costs (as several pollution intensive ones), when environmental policy is enacted by the large country.

We may conclude that, even if G_h is not sunk, market asymmetry associated to high transport costs may explain why a unilateral increase in the stringency of environmental policy by the large country does not result in a pollution heaven hypothesis, that is why local firms in several dirty sectors do not move abroad.

Implications for empirical research

Necessary to control for the interaction of relative market size, transport costs and plant economies of scale

Trade data:
Ederington, J., A. Levinson and J. Minier, 2005, Footloose and Pollution-Free,
The Review of Economic and Statistics, 87(1): 92-99.

FDI data
Smarzynska Javorcik, B. and S-J. Wei, 2004, Pollution Havens and Foreign Direct Investment: Dirty Secret or Popular Myth? Contributions to Economic Analysis & Policy, vol. 3 (2), 1-32.

Spatareanu, M. (2007) Searching for Pollution Heavens, The Journal of Environment and Development, 16(2), 161-182.

Future research agenda

- FDI and environmental policy in asymmetric international oligopolies

- FDI and environmental policy in international oligopolies with endogenous R&D

This file is part
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