A SIMPLE MODEL OF HORIZONTAL FDI

Economics of European Integration, Marius Brülhart

Assume a firm with an international monopoly for the good it produces (e.g. through patent protection). There are two countries, H and P, and demand in each country can be described with the same isoelastic demand function:

$$P_i = L_i^{\varepsilon} Q_i^{-\varepsilon}; \; 0 < \varepsilon < 1;$$

$$Q_i = L_i P_i^{-\frac{1}{\varepsilon}}. \qquad (1)$$

where $i \in \{H, P\}$, L is population size and Q is the quantity sold. We assume that country H is bigger than country P, i.e. $L_H > L_P$.

The firm can produce with a per-plant fixed cost of f (hence with increasing returns to plant scale) and a marginal cost c_i. We assume that the marginal production cost is higher in country H than in country P, i.e. $c_H > c_P$, while the fixed cost is the same in both countries. We also assume that the overall cost-revenue configuration is such that the firm finds it profitable to produce.

(Note the analogy between the EU's centre and periphery and countries H and P, given that H has a bigger market and P has lower production costs.)

Trade between the two countries is costly. Specifically, the cost of sending one unit of the good from one country to the other is t.

The firm has three strategies:

A: produce in H and P for the local markets

B: produce in H and export to P

C: produce in P and export to H

Given the demand function (1), marginal revenue is given by:

$$MR_i = P_i(1 - \varepsilon).$$

The firm maximises profits in each market by choosing output levels such that $MR_i = c_i$. Marginal costs for the three strategies are:

A: $\{c_H, c_P\}$

B: $\{c_H, (c_H + t)\}$

C: $\{(c_P + t), c_P\}$

As an example, compute the firm's profit if it decides to serve market H from a production plant in H (i.e. it adopts strategy A or B). We then have:

$$P_H(1 - \varepsilon) = c_H,$$

$$P_H = c_H(1 - \varepsilon)^{-1}.$$

Substituting in (1), we obtain:

$$Q_H = L_H c_H^{-\frac{1}{\varepsilon}}(1 - \varepsilon)^{\frac{1}{\varepsilon}}.$$

Variable profit (not considering fixed costs) is given by:

$$\pi_H = (P_H - c_H)Q_H = c_H \varepsilon (1 - \varepsilon)^{-1} Q_H,$$

$$\pi_H = \varepsilon(1 - \varepsilon)^{\left(\frac{1}{\varepsilon} - 1\right)} L_H c_H^{\left(1 - \frac{1}{\varepsilon}\right)},$$

$$\pi_H = \lambda \left(L_H c_H^{\left(1 - \frac{1}{\varepsilon}\right)} \right), \quad \lambda = \varepsilon(1 - \varepsilon)^{\left(\frac{1}{\varepsilon} - 1\right)}.$$

Hence, total profits for the three strategies are as follows:

A: $\pi^A = \lambda \left(L_H c_H^{\left(1 - \frac{1}{\varepsilon}\right)} + L_P c_P^{\left(1 - \frac{1}{\varepsilon}\right)} \right) - 2f$

B: $\pi^B = \lambda \left(L_H c_H^{\left(1 - \frac{1}{\varepsilon}\right)} + L_P (c_H + t)^{\left(1 - \frac{1}{\varepsilon}\right)} \right) - f$

C: $\pi^C = \lambda \left(L_H (c_P + t)^{\left(1 - \frac{1}{\varepsilon}\right)} + L_P c_P^{\left(1 - \frac{1}{\varepsilon}\right)} \right) - f$

The location decision of this (potential) multinational firm is thus a function of market size, location-specific costs plant-specific fixed costs and trade costs. As trade costs t are lowered, the dominant strategy is likely to move from A to B to C.