

4th Homework Assignment
Economics 507A: International Trade

1. Consider a world with two identical countries, Home and Foreign. Let goods in each country be horizontally differentiated, with demand for a representative good in country i given by:

$$x^i(p) = A^i p^{-\varepsilon}, \quad i = H, F$$

Also, assume that production of a unit of any variety requires one unit of labor, which costs w . Also, setting up a firm involves a fixed headquarters cost, f_E , as well as a fixed plant overhead cost, f_D , for each plant that the firm operates. Finally, let the iceberg transport costs per unit exported be $\tau > 1$.

- a) Derive an expression in terms of A 's, w , τ , ε , f_E and f_D for the profits of a firm that chooses to service the foreign market through exports.
- b) Derive a similar expression for the profits of a firm that chooses to service the foreign market through a foreign plant (i.e., through foreign direct investment).
- c) Show that firms will choose foreign direct investment over exporting whenever:

$$\frac{A^F}{\varepsilon} \left(\frac{w\varepsilon}{\varepsilon - 1} \right)^{1-\varepsilon} (1 - \tau^{1-\varepsilon}) > wf_D$$

Interpret this expression in terms of its implications for the role of transport costs, scale economies and market size in determining FDI.

- d) Now assume that free entry ensures that the firms make zero profit, and that the A 's adjust to ensure this. (What, precisely, will cause A 's to change?) Further assume that all firms are exporters and write down two equations that give the free entry condition for home and foreign firms, and solve them to determine A 's in terms of w , τ , ε , f_E and f_D .
- e) Using the A expressions you found in part (d) above, show that no one will wish to deviate from a pure exporting equilibrium so long as multinational profits are negative:

$$\pi_I = \left(\frac{2w(f_E + f_D)}{1 + \tau^{1-\varepsilon}} \right) - wf_E - 2wf_D < 0$$

Do scale economies and transport costs play the same role as in part c, when market sizes were taken as exogenous? Why is market size no longer a determinant of the decision concerning whether to switch to multinational production?

2. Suppose car production involves two activities: R&D (activity x) and production (activity y). When General Motors (GM) does both stages of production itself, the resulting revenue is $R(x,y)$, and profits are $\pi^I = R(x, y) - a\alpha y - cx$ ($a, c > 0$; $\alpha > 1$). When, alternatively, GM outsources production to a Mexican firm, it earns profits $\pi^O = \theta[R(x, y) - r_a y - r_c x] + xr_c - cx$. Here θ is the share of the surplus that GM will take away from a Nash bargaining game with the Mexican firm, and r_c is the reservation value of GM's investment in R&D if the bargaining breaks down. For its part, the Mexican firm that supplies GM earns $\pi^L = (1 - \theta) \cdot [R(x, y) - r_a y - r_c x] + yr_a - ay$, where r_a is the reservation value of the Mexican firm's investment in production. (Both GM and the Mexican firm must invest in their activities before the bargaining over profits begins.) Critically assess each of the following assertions:

- a) Whenever there is a complementary relation between the two activities (i.e., $\frac{\partial^2 R}{\partial x \partial y} > 0$), overall surplus ($\pi^O + \pi^L$) in the outsourcing equilibrium is maximized for intermediate values of the bargaining power parameter, θ .
- b) If the reservation price for the Mexican firm's activity matches the total cost of that activity (i.e., $r_a = a$), GM will definitely want to do both stages of production itself. (That is, it will never want to outsource.)