

Exam June 2019 - International Economics

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Problem 1

1.1. Consider a country which trades costlessly with the rest of the world and is described by the two-factor model with capital and labor. Keep the world price fixed. Suppose there is a positive immigration inflow but that these immigrants are wealthy and bring with them more capital per person than the native population. This will increase production of the capital-intensive good but keep the wage and return on capital constant.

True: This is the Rybczynski theorem, but due to the fact that immigrants are bringing in a lot of capital the capital / labor ratio will increase. This will increase the production of the capital-intensive good as stated but factor price equalization will keep wages and return on capital constant. (Students can make a comment about how this shift might push us out of the cone-of-diversification, but that is not required for full points)

1.2. Suppose the EU is struggling, a new sovereign debt crisis is emerging in Southern Europe and there are concerns about whether Southern European governments can pay their debt back. All else equal, this increases the US current account deficit.

True: This increases the risk premium on EU sovereign debt and consequently increases the capital inflow into the US. This must correspondingly imply a larger current account deficit.

1.3 Consider a small open economy which imposes an import tariff of t . The distortions are likely to be higher if demand is elastic.

True: A more elastic demand curve means a flatter demand curve which increases the size of the "triangle" distortion.

1.4 Within the Ricardian trade model, an absolute advantage in the production of a given good is neither necessary nor sufficient for a country to have a comparative advantage in producing the same good.

True. It is not a sufficient condition because a country might have a small absolute advantage in the given good but a large one for another good. Furthermore, it is not necessary because a country with a lack of an absolute advantage in everything will still have a comparative advantage in at least one good.

1.5. An import quota and an import tax that lead to the same total imports will be welfare equivalent if the home government sells the quota in an auction.

False: The market also need to be competitive. Otherwise we bestow monopoly power to the local producer(s).

1.6. Brexit is expected to disproportionately affect low-wage workers

False: The consumption patterns of low-wage workers are equally import-dependent as high-wage workers. Further, low-wage workers do not disproportionately work in export / import-competing industries so wages are not expected to be disproportionately affected either.

Problem 2

Consider a market in home country where the utility function is:

$$U = aq - \frac{1}{2}bq^2 + z,$$

where q is production in the market we focus on and z is an “outside” good and $a, b > 0$. Let the price of good q be p and the price of good z be 1. Let income of a representative agent, I , be high enough that demand is active both for good q and z .

Q1. Show that the inverse demand function is given by

$$p(q) = a - bq.$$

Answer:

The representative agent maximizes:

$$\max_{q,z} \left(aq - \frac{1}{2}bq^2 + z \right) \text{ s.t. } pq + z = I.$$

Substitute for z to get:

$$\max_q \left(aq - \frac{1}{2}bq^2 + I - pq \right),$$

which has first order condition of:

$$a - bq = p$$

Only two firms can potentially produce in this market. A home firm and a foreign firm. x is the production of the firm in the home country and y is the production of a firm in the foreign country such that $q = x + y$. The home firm has costs of production c where $a > c$. The foreign country has cheaper cost of production, but needs to pay an iceberg cost for transportation for a total cost of τc^* , with $c > c^* > 0$ and $\tau \geq 1$.

Q2. Find the best response function for the home and foreign firm, respectively. That is, find a function, $R_x(y)$ which gives the optimal production of

home firm given foreign production (and equivalently for foreign). Show that they are:

$$x^* = R_x(y) = \frac{a - by - c}{2b}.$$

$$y^* = R_y(x) = \frac{a - bx - \tau c^*}{2b}.$$

Answer:

Home firm solves:

$$\max_x (a - b(x + y) - c)x,$$

to get:

$$a - by - c = 2bx \Leftrightarrow$$

$$x^* = R_x(y) = \frac{a - by - c}{2b}.$$

And correspondingly by symmetry:

$$y^* = R_y(x) = \frac{a - bx - \tau c^*}{2b}.$$

Q3. Find the equilibrium when the two firms make moves. Call these x^* and y^*

Answer: We solve for the equilibrium:

$$2bx^* = a - \frac{a - bx^* - \tau c^*}{2} - c \Leftrightarrow$$

$$3bx^* = a + \tau c^* - 2c \Leftrightarrow$$

$$x^* = \frac{a + \tau c^* - 2c}{3b}.$$

and:

$$y^* = \frac{a - \frac{a + \tau c^* - 2c}{3} - \tau c^*}{2b} = \frac{a + c - 2\tau c^*}{3b}.$$

Q4. Find the condition on τ (other than $\tau \geq 1$) that ensures that both firms are active in this market:

Answer: We need a positive solution for foreign production

$$y^* \geq 0 \Leftrightarrow$$

$$\frac{a + c - 2\tau c^*}{3b} \geq 0 \Leftrightarrow$$

$$\frac{a + c}{2c^*} \geq \tau$$

But we also need positive production for home:

$$\begin{aligned} x^* &\geq 0 \Leftrightarrow \\ \frac{a + \tau c^* - 2c}{3b} &\geq 0 \Leftrightarrow \\ \tau &\geq \frac{2c - a}{c^*}, \end{aligned}$$

such that

$$\tau \in \left[\frac{2c - a}{c^*}, \frac{a + c}{2c^*} \right]$$

is the requirement.

Q5. How does equilibrium home production, x^* , depend on transportation costs, τ ? Interpret

Answer: positively. Because higher transportation costs reduce y and consequently the optimal production in home.

Q6. Show that home and foreign firm have profits of, respectively:

$$\begin{aligned} \pi^x &= (p - c) x^* = \frac{(a + \tau c^* - 2c)^2}{9b} \\ \pi^y &= (p - \tau c) y^* = \frac{(a + c - 2\tau c^*)^2}{9b} \end{aligned}$$

Answer: First, the price is:

$$\begin{aligned} p &= a - b(x^* + y^*) = a - b \left(\frac{a + c - 2\tau c^*}{3b} + \frac{a + \tau c^* - 2c}{3b} \right) \\ &= \frac{a + \tau c^* + c}{3}. \end{aligned}$$

and consequently profits:

$$\begin{aligned} \pi^x &= (p - c) x^* = \frac{(a + \tau c^* - 2c)^2}{9b} \\ \pi^y &= (p - \tau c) y^* = \frac{(a + c - 2\tau c^*)^2}{9b} \end{aligned}$$

Q7. Show that if the home government values the sum of the utility of the home representative agent and the firm's profits the welfare function for the home government will be:

$$W = \frac{1}{2} \frac{(2a - c - \tau c^*)^2}{9b} + I + \frac{(a + \tau c^* - 2c)^2}{9b}$$

Answer: Home representative agent utility in equilibrium is given by:

$$U = aq - \frac{1}{2} b q^2 + I - pq$$

$$\begin{aligned}
&= aq - \frac{1}{2}bq^2 + I - (a - bq)q \\
&= \frac{1}{2}bq^2 + I
\end{aligned}$$

such that substituting for $q = x^* + y^*$ in equilibrium gives:

$$U = \frac{1}{2}b \left(\frac{2a - c - \tau c^*}{3b} \right)^2 + I$$

and then the total welfare function is:

$$W = \frac{1}{2}b \left(\frac{2a - c - \tau c^*}{3b} \right)^2 + I + \frac{(a + \tau c^* - 2c)^2}{9b}$$

Q8. Show that this function is *not* monotone in τ , that is for some values of τ it is increasing in τ and for some values it is decreasing. Interpret

Answer:

$$W = \frac{1}{2} \frac{(2a - c - \tau c^*)^2}{9b} + I + \frac{(a + \tau c^* - 2c)^2}{9b}$$

differentiate

$$\begin{aligned}
\frac{\partial W}{\partial \tau} &= \frac{-(2a - c - \tau c^*)c^* + 2(a + \tau c^* - 2c)c^*}{9b} \\
&= \frac{c^*}{9b} ((c + \tau c^*) + 2(\tau c^* - 2c)) \\
&= \frac{c^*}{9b} (-3c + 3\tau c^*) \\
&= \frac{c^*}{3b} (\tau c^* - c).
\end{aligned}$$

This is negative if $c > \tau c^*$, which is true when $\tau = 1$ since $c^* < c$. Consequently, lower transportation costs are good when $\tau \approx 1$. This is positive when $\tau \rightarrow (a + c)/2c^*$ since then

$$\tau c^* - c = \frac{(a + c)}{2} - c = \frac{a - c}{2} > 0.$$

Consequently lower transportation costs are bad when τ is high. The reason is that there are two balancing effects. On the one hand lower transportation costs for the foreign firm allows it to produce more and lower home firm profits, and on the other hand it creates a more competitive environment which benefits consumers. When $\tau = 1$ the role of the foreign firm is back and the positive effect of lower transportation costs dominate.

Q9. How would total welfare in home depend on a foreign export subsidy, i.e. if the foreign government subsidized exports from foreign to home in this sector? An explanation without math is sufficient.

Answer: The crucial thing is to realize that from the perspective of home there is no difference between the cost for a foreign producer being lower because of low transportation costs, production costs or because it is subsidized. Consequently, the conclusion is exactly the same as for Q8: It is ambiguous and depends on how dominating the foreign firm is.