# Problem Set #2: Due end of class September 22, 2016

*You may discuss this problem set with your classmates, but everything you turn in must be your own work. Please read the "problem set guidelines" on the course web page before beginning.*

1. Use the two-country model of identical firms we developed in class to answer the following questions. These parameters are common to each question: $\epsilon_1 = \epsilon_2 = 3$, $w_1 = w_2 = 2$, $\rho = 0.95$, $f^h = 0.5$, $f^p = 0.2$.

   a. Currently, there are $n_1 = 10$, $n_2 = 8$, $m_1 = 2$ and $m_2 = 1$ firms in the the two countries. If $E_1 = 1000$ and $E_2 = 100$, Should a domestic firm in country 1 become a multinational firm? Show your work.

   b. Explain the intuition behind your answer in part a. in the context of the proximity-concentration tradeoff.

   c. How large does the market in country two need to be to make it worthwhile for a country-1 domestic firm to become a multinational? Show your work.

2. In the two-country model of identical firms we developed in class, $\rho$ captures the effect of the costs associated with exporting.

   a. Suppose country 2 imposes a new tariff — a tax on imports — on imports from country 1. Would this increase or decrease $\rho$? Explain your reasoning.

   b. Compared to exporting, how would the change in $\rho$ you described in part a. change the incentive for firms in country 1 to serve country 2 using a foreign affiliate?

3. Use the heterogenous firm model that we developed in class (and in note HFDI III) to answer the following questions. This question deals only with non-exporting and non-multinational firms.

   a. How does the price charged by a non-exporting (and non-multinational) firm change as $\epsilon$ increases? What is the intuition for this result?

   b. Let $\epsilon = 3$, $w_1 = 2$, $E_1 = 50$, $f^h = 0.2$, and $f^p = 1.4$. What is the profit of a country 1, non-exporting (and non-multinational) firm with productivity $\varphi = 1.5$?

   c. Create a plot in Excel (or some other program) of the profit a firm with $\varphi = 1.5$ earns as $\epsilon$ changes. The x-axis is $\epsilon$, and the range should be from 2 to 10. The y-axis is firm profit evaluated at the different $\epsilon$. Let $w_1 = 2$, $E_1 = 50$, $f^h = 0.2$, and $f^p = 1.4$. Clearly label and submit the plot.

      [Hint: Create a column of $\epsilon$ values that range from 2 to 10, maybe in increments of 0.5. Create a second column that computes the firm profits for each corresponding value of $\epsilon$. Plot the columns.]

   d. What is the relationship between the price elasticity of demand and firm profits? In no more than a paragraph, discuss the economic intuition for this result.

4. Download PS2_Data.xlsx from the course webpage. Columns C-F of sheet "Q4 Data" hold the sales of U.S. multinational foreign affiliates, grouped by their host country.[1]

   - Column C is the total sales of U.S. foreign affiliates located in that country.
   - Column D is the sales of those affiliates to parties in the United States.
   - Column E is the sales of those affiliates to parties in the affiliate's own country.
   - Column F is the sales of those affiliates to parties in countries besides the United States or the affiliate's host country — *third countries*.

   a. We have been studying horizontal FDI. For each country, compute the share of total sales that is "horizontal:" divide sales to the host country by total affiliate sales.

      Plot this variable against the logarithm of GDP. Put ln(GDP) on the x-axis. [Do not take the log of the horizontal share variable.] Add the linear trend line and display the trend line equation on the chart.

   b. What is the relationship between ln(GDP) and the horizontal sales share? Interpret the slope coefficient of the trend line.

   c. Is the relationship you found consistent with the proximity-concentration tradeoff? Explain your answer.

   d. In the figure in part a., Ireland and Switzerland are both outliers relative to the line of best fit. For the countries' sizes, the affiliates in these markets sell too little in their host countries. In no more than two paragraphs, discuss reasons why affiliates in Ireland and Switzerland are more outward oriented than predicted.

      [We have not discussed this in class (yet), so you will have to do some research. Try Google for things like "FDI in Switzerland."]

[1] Some data have been suppressed for disclosure reasons (D). In these cases, there are so few firms in that country, that it could be possible to figure out a particular firm's sales from the aggregate data. When the (D) keep us from making a calculation, we have to drop that observation from our work.