ECON 664: Issues in International Trade
Problem Set 2
Due: October 29, 2023 at 11:59 pm

Instructions: *You may work with up to one other student on this assignment.* If you do work in a pair, please make sure both names are listed on the assignment, and only turn in one copy. **Make sure to explain your results — answers with no explanation will be given little to no credit. Please mark your answers to each question clearly.**

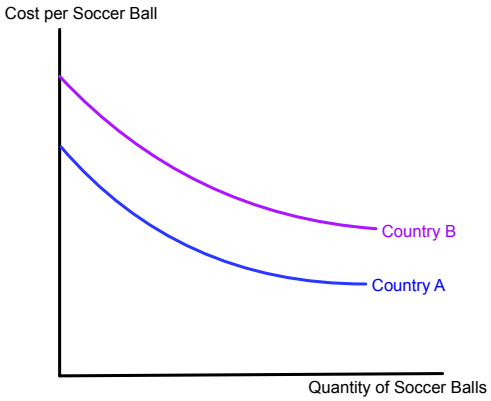
There are two **optional extra credit subquestions in this assignment. These sub-questions are not required, but can be used to earn an additional 10 points toward your problem set grade.

True/False/Uncertain

Determine whether the following statements are TRUE, FALSE, or UNCERTAIN, and **justify your answer** in one paragraph. Please be concise. *You must explain your answers to recieve credit. A "TRUE/-FALSE/UNCERTAIN" answer that is not accompanied by an explanation will recieve 0 points.*

1. (5 points) The graph below shows average cost curves for production of soccer balls in two countries. If the two countries open up to trade and there are no trade costs, Country A will export soccer balls because it can produce them at lower cost.

Figure 1: Average Cost of Producing Soccer Balls



2. (5 points) With external economies of scale and common technologies across all countries, prices of goods after opening up to trade have to lie within the range of autarky prices across countries so that all countries are weakly better off.

3. (5 points) Specialized equipment, labor pooling, and knowledge spillovers are examples of phenomena that generate internal economies of scale.

4. (5 points) In a model with increasing returns to scale and monopolistic competition, the free entry condition requires that firm profits are zero in equilibrium. This means firms must set prices equal to marginal cost.

Question 2

Consider the Krugman (1979) model discussed in class. By assumption, the elasticity of demand, ε_i, which is given by:

$$\varepsilon_i = -\frac{dc_i}{dp_i}\frac{p_i}{c_i}$$

is falling in c_i. Firms produce differentiated products using labor as the only factor of production. The labor used in production of each good is:

$$\ell_i = \alpha + \beta x_i$$

where x_i denotes the firm's output, and α is the fixed cost. Firms are price-setters, but take wages as given.

1. (5 points) Write down the profit maximization problem of the firm.

2. (5 points) Obtain and draw the average and marginal cost.

3. (5 points) Derive the firm's optimal price.

For the rest of this exercise, assume that ε_i is fixed (does not vary with c_i). Specifically, assume $\varepsilon_i = 6$.

4. (5 points) How large is the firm's markup (the percentage increase of price over costs)?

5. (5 points) Suppose $\alpha = 4$, $\beta = 5$, and $L = 1200$. Find p/w, c, and the number of products, n. Since all i's are symmetric, feel free to drop the i subscript from c_i and p_i.

6. (5 points) Suppose the country starts trading with another country of identical size. Since there are no trade costs between countries, you can analyze this as if L increases to 2400. How would p/w, c, and n change? How would welfare be affected?

7. (5 points) How do the predictions for the effects of an increase in L differ from the predictions described in class (when ε_i was falling with c_i)?

Question 3

(5 points) Describe the Home-Market effect. Specifically, state the proposition and describe the basic intuition for why it occurs.

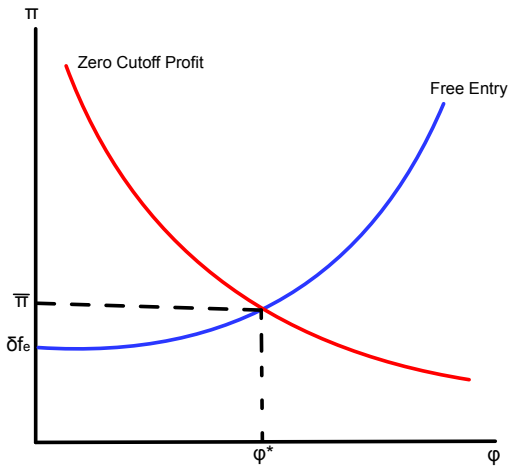
Question 4

1. (5 points) What empirical facts does the Melitz (2003) model help us explain?

2. (10 points) Figure 2, below (next page), shows the closed economy equilibrium for the Melitz (2003) model discussed in class. The upward sloping curve is the free entry condition, and the downward sloping curve is the zero cutoff profit condition. On the graph, show what happens when the economy opens up to trade. Describe what will happen to entry/exit, profits, and aggregate productivity.

3. EXTRA CREDIT (5 points): Again starting with the autarky equilibrium (Figure 2), what would happen if there were a decline in the *cost of exporting*?

Figure 2: Autarky Equilibrium in Melitz (2003)



Question 5

This question requires you to do some data analysis. Load the `ps2_data.dta` file into STATA (or R). This file contains data on bilateral trade flows between countries in the year 2019 and several characteristics of the origin and destination countries. A list of the variable names and their descriptions is provided on the next page.

***Note, the slides and sample code for the gravity exercise we did in class should give you a lot of hints on how to execute this part of the assignment. As usual, if you are having trouble with the coding portion, please ask for help.*

1. (5 points) What is the "gravity equation" in trade.

2. (10 points) Run a gravity regression, as we did in class, in which you allow the coefficients on log origin GDP, log destination GDP, and log distance to differ. Report **and interpret** the coefficients.

3. (10 points) From the dataset, pick an additional covariate and add it to the specification from part 2. **Report which variable you chose, the coefficients you estimate, and interpret the results.** In your discussion, be sure to explain whether the coefficients on distance and economic size change from your esitmates in part 2, and hypothesize as to why they did or did not.

4. EXTRA CREDIT (5 points):
   (a) Repeat part 3, above, but for another covariate of your choice.
   (b) Can you think of a variable that is **not included** in this dataset that would be interesting to add to the gravity regression? Do you believe it would have a positive or negative coefficient? Why?

Variable Names and Descriptions

The variables contained in the `ps2_data.dta` file and their descriptions are listed below:

- `year`: year (all 2019 in this case).
- `iso_o`: country code for origin.
- `iso_d`: country code for destination.
- `contig`: indicator for if origin and destination are contiguious.
- `distw`: population-weighted distance between origin and destination.
- `comlang_ethno`: indicator for if countries share a common language.
- `comrelig`: common religion index (higher if religion is more common).
- `comleg`: indicator for if countries share common legal origins.
- `pop_o`: origin population.
- `pop_d`: destination population.
- `gdp_o`: origin GDP (current thousand USD).
- `gdp_d`: destination GDP (current thousand USD).
- `wto_o`: indicator for origin WTO membership.
- `wto_d`: indicator for destination WTO membership.
- `rta`: indicator for if origin and destination are part of a regional trade agreement (RTA).
- `entry_tp_o`: origin Days + procedures to start a business.
- `entry_tp_d`: destination days + procedures to start a business.
- `value`: trade flows as reported by destination (1000 current USD).