

# Econ 422 - Problem Set 1

January 21, 2019

- You have 3 weeks to solve the problem set. It must be sent by email to Manos before the class of Monday, February 11th
- You can work in groups of up to 4 people
- NOTE:
  - Part 1 is key to practice for the midterm. It is highly encouraged that work through part 1 before the midterm (on February 6). You will go through similar analytic questions in the TA sessions of January 30th and February 6th.
  - Part 2 involves implementing regressions. Manos will guide you through specific aspects of the implementation during the TA session of January 23rd.
- The maximum number of points that you can get is 100.
- There are also 10 “bonus points”. These points are not necessary to reach 100, but are counted towards the total. These points will be used in your favor if your final grade in the class lies marginally below a cutoff.

## 1 Analytic Questions (50 points+5 Bonus)

### 1.1 Short Questions (20 Points)

1. (5 points) Suppose that, starting from the current situation in the world economy, all the factors of production and technologies became perfectly mobile across all the countries of the world (while goods trade remained somewhat costly)
  - (a) What would you expect to see in terms of factor prices?
  - (b) What would you expect to see in terms of goods prices?
  - (c) Would you expect to see more or less trade than what is currently observed?
2. (8 points) Determine whether each statement is TRUE or FALSE and justify your answer in a few sentences. In the Ricardian model with 2 goods and 2 countries:

- (a) [ TRUE / FALSE ] If a country has absolute advantages in both goods then it must be incompletely specialized under trade.
- (b) [ TRUE / FALSE ] If a country gains from trade, then it must be completely specialized under trade.
- (c) [ TRUE / FALSE ] If both countries are incompletely specialized under free trade, they must have the same total number of workers.
- (d) [ TRUE / FALSE ] It is not possible that growth in the foreign country makes the home country worse off.
3. (7 points) There are 100 workers at Home and 100 workers at Foreign. Each worker can spend all year working in one of two activities: making left shoes or making right shoes. Over the course of a year, each worker at Foreign can produce 4 left shoes or  $\frac{4}{3}$  right shoes, while a worker at Home can produce 4 right shoes or  $\frac{4}{3}$  left shoes. The preferences of consumers in both countries are  $U = \min[C_L, C_H]$ , where  $C_L$  and  $C_H$  are the consumption of left and right shoes. (These preferences are called Leontieff preferences, and they mean that consumers only derive utility from buying pairs of shoes. There is no utility gain from buying an extra left shoe or an extra right shoe only). How many pairs of shoes does each worker consume under autarky and under free trade?

## 1.2 Ricardian Model (20 Points)

Consider a Ricardian model with 2 countries, Home and Foreign, and 2 goods,  $C$  and  $W$ . Unit labor requirements are  $(a_{LC}, a_{LW}) = (5, 1)$  at Home and  $(a_{LC}^*, a_{LW}^*) = (20, 2)$  at Foreign. Both countries are endowed with 100 units of labor. In both countries, relative demand of  $C$  is  $\frac{C_C}{C_W} = \frac{1}{P_C/P_W}$ . Justify all your answers.

- Which country has absolute advantages in each good? Which country has comparative advantages in each good?
- Graph the world supply and the world demand curves for  $C$  relative to  $W$ . What is the relative price under trade?
- What good does each country export under free trade?
- Do both countries gain from trade? How large or small would the labor force in the foreign country have to be for your answer to be different?
- Suppose that the unit labor requirement in  $W$  decreases at Home from  $a_{LW} = 1$  to  $a_{LW} = \frac{5}{8}$ . Is this good or bad news for the Foreign country, in terms of the consumption possibilities and the level of utility of the representative consumer?

### 1.3 Endowment Economy (10 Points)

As we discussed in class, there are two sources of gains from trade: consumption gains and production gains. This question is designed to make you think about the consumption gains from trade. For that, we will consider an “endowment economy”, in which the total quantity supplied of each good is fixed and the same under autarky and trade.

In particular, consider an economy with 2 goods (Cheese and Wine) and 3 countries ( $X, Y, Z$ ). Let  $Q_C^j$  and  $Q_W^j$  be the production of cheese and wine in country  $j$ , respectively. Suppose, moreover, that the number of workers allocated to Cheese and to Wine is fixed. I.e., workers cannot be reallocated between producing Cheese or Wine, either under autarky or trade, so that production in each country  $j$  is always  $Q_C^j$  and  $Q_W^j$ . The quantities produced are as follows:  $(Q_C^X, Q_W^X) = (2, 1)$ ,  $(Q_C^Y, Q_W^Y) = (1, 1)$ ,  $(Q_C^Z, Q_W^Z) = (1, 2)$ . The relative demand for Cheese is  $\frac{C_C}{C_W} = \frac{1}{P_C/P_W}$  in every country. Justify all your answers.

1. What is the autarky price of cheese (in terms of wine) in each country?
2. What is the price of cheese (in terms of wine) under free trade?
3. What good is exported by each country, under free trade?
4. Do all countries gain from trade?
5. Suppose now that, starting from a position of free trade, country  $Z$  decides to shut itself off to international trade. Therefore,  $X$  and  $Y$  engage in free trade with one another, but neither of them trades with country  $Z$ . Is this good news for  $X$  and  $Y$ , in terms of the consumption possibilities and the level of utility of the representative consumer of each country?

### 1.4 Bonus Question: Gains From Distorted Trade (Bonus: + 5 points)

When a large economy restricts trade, it affect international prices. Suppose that, under distorted trade, the vector of domestic prices in a large economy is  $q^B = p^B + t^B$ , while the vector of international prices is  $p^B$  and  $t^B$  is the tariff imposed by the government. Therefore, tariff revenue is  $t^B m^B$ , where  $m^B$  is the vector of net imports under distorted trade. Show that distorted trade is preferable to autarky if  $t^B m^B > 0$ , where  $m^B$  is the vector of net imports under trade. What is the interpretation of this result?

## 2 Replication of Frankel and Romer (50 Points+5 Bonus)

You should think of this problem as a small research paper. The idea is to implement steps that replicate the results in the paper by Frankel & Romer, “Does Trade Cause Growth?” (published in AER in 1999) using a different dataset (different years and set of countries). This paper is one of the most cited paper in empirical international economics literature. The questions are written to guide you through the steps needed to complete this small research paper. It is important that your results are clearly presented and displayed.

1. Go to the Penn World Table database (found here: <https://www.rug.nl/ggdc/productivity/pwt/>), and the Trade Gravity database (here: <https://sites.google.com/site/hiegravity/>) and download the data. The data should contain the relevant variables used by Frankel and Romer for the construction of Tables 1-4: bilateral trade flows, bilateral distance measures, geographical areas, country dummies, population, income, and its determinants. Pick a year (the same from both datasets), or a subset of years which you want to study, and create a single dataset that contains all the variables. Each unit of observation should be a different origin-destination-year combination. Describe the broad aspects of your data in 1-2 paragraphs maximum (you can include some summary statistics).
2. Replicate equation (6) and Table 1 in Frankel and Romer using your own data. The regression shows how the geographic determinants of trade impact on the trade share of GDP between  $i$  and  $j$ . You should include at least the same determinants as in Table 1 of Frankel and Romer. Show a table with your regression results and explain them briefly.
3. Construct your country-level instrument, as described in Section I.D. of the paper:
  - (a) For each country, construct a variable that shows the total amount of trade predicted by geographic determinants (equation (8) in the paper). Name this variable so that you remember its your IV.
  - (b) Which countries are those that are predicted to trade more? Use the tools you learned on how to create maps in QGIS to show your results. Describe what you observe about the map and if there are any evidence against the use of the IV.
  - (c) Replicate Figure 1 in the paper, showing actual versus predicted trade.
  - (d) Discuss whether this variable is a good IV. You cannot test the exclusion restriction, but you can shortly explain why it is satisfied.
4. Replicate the main results of the paper, i.e. equation (9) and Table 3 in the paper, showing how income per worker is impacted by the trade share. First run your OLS regression using the cross section of countries you have in the dataset, and then run the IV specification with the instrument that you constructed. Include area as an additional control in this regression. Show your main results and discuss them briefly.
5. Assess the robustness of your results, i.e., include as additional explanatory variables other important (and **exogenous**) variables you think affect the income level independently of trade. Feel free also to use a different set of variables (i.e. other than Frankel and Romer), but make sure you explain that these are plausibly exogenous variables. Is the impact of trade substantially different qualitatively and in magnitude? Show your main results and discuss them briefly.
6. Write a small introduction (1 paragraph) discussing the main question being studied and the method to answer it, and a small conclusion summarizing your results and things you would

think would be useful to study in the future,. If your results are different from Frankel and Romer, explain briefly why think so.

7. (Bonus: +5 points) Do you think that trade matters for aggregate country outcomes other than GDP? Explain, and potentially provide evidence for the relationship using the same regressors as before (always making sure exogeneity assumptions are satisfied). Make sure you use the correct specification, depending on whether your dependent variable is in levels, in logs or represents a probabilistic outcome.

**Assignment Project Exam Help**

**<https://tutorcs.com>**

**WeChat: cstutorcs**