ECON 442: Quantitative Trade Models   Professor Jack Rossbach

Due Date: Sunday, April 16 at 11:59PM EST   Spring 2017

Problem Set 2 Instructions

Complete the questions for each problem. Answers must be typed and uploaded to canvas as either a word document or PDF. You are encouraged to discuss the problems with each other, however, everybody needs to submit their own assignment and type up their own answers. *Late assignments will have 10 points deducted, plus an additional 5 points per day late.*

Problem 1. Gravity Regressions

Download the CEPII Gravity dataset from my website (also available directly from CEPII; we are using the "lighter dataset").

1.i) Estimate the following gravity regression for the year 2000:

$$\log \text{Trade}_{ij} = \text{Constant} + \beta_{\exp} \log \text{GDP}_i + \beta_{\text{imp}} \log \text{GDP}_j + \beta_{\text{dist}} \log D_{ij} + \beta_{\text{FTA}} FTA_{ij} + \epsilon_{ij}$$

Where Trade_{ij} is exports from country i to j, GDP_i and GDP_j are, respectively, the GDPs of countries i (the exporter) and j (the importer), D_{ij} is the distance between the countries, and FTA_{ij} is an indicator function equal to 1 if the countries had a free trade agreement in the year 2000. Exclude country pairs with zero trade from the regression.

Copy the regression output and paste it into your assignment (see here: http://goo.gl/klVf2). Which factors increase trade flows? Which factors decrease trade flows?

1.ii) Re-run the gravity regression with bilateral controls for a common official language, contiguity, and a historical colonial relationship. Report the new estimate of β_{FTA}.

How does sharing a common official language, contiguity, and a historical colonial relationship affect trade flows between countries? Which of the three has the strongest impact on trade?

1.iii) Re-run the gravity equation with the bilateral controls from 1.ii), but instead of using $\log Y_i$ and $\log Y_j$ use fixed effects for each country as a proxy for country size. What is the new estimate on β_{FTA}?

1.iv) Based on the estimated coefficients from the gravity regression in 1.iii, how much higher, in terms of percent change, would we have expected exports to be from China to the United States in 2000 if they had a free trade agreement?

1.v) Based on the estimated coefficients from the gravity regression in 1.iii, how much higher, in terms of percent change, would we have expected exports to be from China to the United States if "the world was flat" (keep estimates same, except change $D_{\text{China,US}} = 0$ or $\beta_{\text{dist}} = 0$)? How does these results compare to the results form 1.iv?

1.vi) What are some issues with using the gravity regression in 1.iii to predict the impact of a free trade agreement between China and United States?

Problem 2. Multidimensional Ricardian Models

Consider the Multidimensional Ricardian framework from Eaton-Kortum (2002). There is a continuum of goods, $j \in [0,1]$ and three countries (country 1, country 2, and country 3). Suppose goods are produced using labor alone. In the base case, suppose that $\sigma = 2$, $\theta = 8$, $T_1 = 2$, and $T_2 = T_3 = 1$, and each country has a labor supply equal to one, $L_j = 1; j = 1,2,3$.

2.i) What are the Exogenous Variables for this model? What are the Endogenous Variables for this model? How many equilibrium equations do we have?

2.ii) Suppose that there is frictionless trade, so that $d_{ni} = 1 \ \forall i, n = 1,2,3$. Normalize $w_1 = 1$. Compute the equilibrium wage vector and trade share matrix by hand. Show your work.

2.iii) Now suppose that country 1 and country 2 are close to each other, $d_{12} = d_{21} = 1.2$, while country 3 is far away, $d_{3i} = d_{i3} = 1.5; i = 1,2$. Using R, solve for the new equilibrium wage vector and trade share matrix numerically and report them in your assignment.

2.iv) Suppose country 3 is able to eliminate its trade costs with country 1 (for example, through a FTA), so that $d_{13} = d_{31} = 1$, while all other trade costs remain the same as in 2.iii). Report the new equilibrium wage vector and trade share matrix.

Compute the change in welfare for each country using the formula

$$\widehat{W}_i = \left(\frac{w_i'}{p_i'}\right) / \left(\frac{w_i}{p_i}\right)$$

Where w_i' and p_i' are the equilibrium wage and price index for country i after lowering the trade costs, and w_i and p_i are the equilibrium wage and price index in country i using the trade costs in 2.iii).

2.v) Verify that you can get the same welfare changes as 2.iv by using only the before and after trade share matrix and the trade elasticity (θ). The formula is

$$\widehat{W}_i = \left(\frac{\pi_{ii}'}{\pi_{ii}}\right)^{-\left(\frac{1}{\theta}\right)}$$

and is a general result for models that generate gravity equations. Show your work by writing the above equation with the appropriate numbers substituted in.

2.vi) Suppose China and the United States enter into a Free Trade Agreement. Based on the results from 2.iv, would this be good or bad for Mexico?

Do you think similar results should hold in terms of the impact on Mexico of China's entrance into the WTO? Why or why not?

Problem 3. Least Traded Products

Download data on exports from China to the United States from my website.

The data is reported at the 4-digit SITC Rev. 2 level. The years of coverage are 1995, 1996, 1997, and 2015. China joined the WTO in 2001. Follow the instructions on my website to do the following exercises.

3.i) Sort the products by the average amount of exports over 1995 to 1997. Group the products into 10 bins, so that each bin accounts for 10 percent of total exports in 1995, where the products with the least trade from 1995 to 1997 are in the first bin and the products with the most trade from 1995 to 1997 are in the last bin. Put products with zero trade in the initial period into the first bin. Allow products to split among bins so each bin contains exactly 10 percent of total exports.

How many products are there in each bin?

3.ii) Compute the share of trade accounted for by products in each bin in 2015. Which bins experience the most growth? Which bins experience the least growth?

3.iii) Construct a bar graph showing what fraction of trade each bin accounts for in 2015 compared to in 1995. Include a copy of the graph in your assignment. Be sure to label the graph and make it look professional.

3.iv) Recall that in Problem Set 1, we saw that goods with a higher Revealed Comparative Advantage experienced less growth in trade following a trade liberalization. Are these results compatible with that finding?

What do you think might explain our findings?