Written Exam at the Department of Economics Winter 2017–18

Advanced International Trade

3–hour closed–book exam

December 22 2017

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

This document consists of 4 pages in total.

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Problem 1:

Consider an economy with one monopolistically competitive industry. In this industry, each firm produces a unique variety of a differentiated product. As in Melitz (2003), firms are heterogeneous in terms of their productivity level. A firm with productivity φ needs l workers to produce an output level of q of its variety:

$$l(\varphi) = f + \frac{q(\varphi)}{\varphi} \tag{1}$$

where f is a fixed cost of production.

Demand for firm φ's variety is defined as:

$$q(\varphi) = \frac{R}{P}\left[\frac{p(\varphi)}{P}\right]^{-\sigma} \tag{2}$$

where $\sigma > 1$ is a utility parameter describing the constant elasticity of substitution (CES), R is aggregate revenue, P is the aggregate price index and $p(\varphi)$ is the price set by firm φ. Firm revenues are given by $r(\varphi) = p(\varphi)q(\varphi)$. Prices are set as a constant markup over marginal costs, i.e., $p(\varphi) = \frac{\sigma}{\sigma-1}\frac{w}{\varphi}$. Let the wage be the numeraire, $w = 1$.

1. Show that the profits of firm φ is:

   $$\pi(\varphi) = B\varphi^{\sigma-1} - f$$

   Find an expression for B and discuss if B is common and exogenous to each firm in the economy.

2. Suppose the economy opens up to trade with another yet identical country. Firms may now sell their varieties to foreign consumers and vice versa. The potential profits received by firms are:

   $$\pi_D(\varphi) = B^F\varphi^{\sigma-1} - f_D$$
   $$\pi_X(\varphi) = B^F\varphi^{\sigma-1} - f_X$$

   where profits from domestic sales are equal to π_D, whereas profits from export sales are given by π_X. Assume that the fixed costs of exporting is greater than the cost of serving the domestic market, $f_X > f_D$. Assume moreover that the B-parameter is lower in the open economy compared to autarky, i.e., $B^F < B^A$, where F refers to the open economy equilibrium and A the autarky equilibrium from the previous question.

   Draw potential firm profits in the open and closed economy settings using a graph with $\varphi^{\sigma-1}$ on the first axis and profits on the second axis. Describe which firms serve the domestic market and which firms export. Do all exporters increase their total profits relative to their autarky profit levels?

3. Does the transition from autarky to free trade generate welfare gains for consumers? Provide a short and complete discussion of the role of firm heterogeneity for the possible gains from trade.

Problem 2:

Consider a world economy consisting of $i = 1, ..., N$ countries. Each country produces a differentiated good using a constant return to scale technology that uses labor as the only production input. The supply of labor is inelastic and given by L_i. On the demand side, there is a representative agent in each country maximizing the following utility function:

$$U_j = \left[\sum_{i=1}^{N} c_{ij}^{(\sigma-1)/\sigma} \right]^{\sigma/\sigma-1} \tag{3}$$

where c_{ij} is the quantity of country i's good consumed by country j and $\sigma > 1$ is the elasticity of substitution between goods. Let X_{ij} denote the value of country j's total imports from country i:

$$X_{ij} = \left(\frac{p_{ij}}{P_j} \right)^{1-\sigma} Y_j \tag{4}$$

where $Y_j = \sum_{i=1}^{N} X_{ij}$ is total expenditure in country j and $P_j = \left[\sum_{i=1}^{N} p_{ij}^{1-\sigma} \right]^{1/(1-\sigma)}$ is country j's price index. Markets are perfectly competitive and optimal prices are set as $p_{ij} = w_i \tau_{ij}$, where $\tau_{ij} \geq 1$ is an iceberg trade cost between country i and country j. Balanced trade implies $Y_j = w_j L_j$. Let the wage in country j be our numeraire ($w_j = 1$).

Suppose country j is affected by a foreign shock that affects wages and trade costs in all other countries in the world but country j. Accordingly, the foreign shock leaves country j's labor endowment as well as its ability to serve its own market unchanged ($d \ln \tau_{jj} = 0$).

1. Show that the foreign shock leads to the following changes in country j's price index:

$$d \ln P_j = \sum_{i=1}^{N} \lambda_{ij} (d \ln w_i + d \ln \tau_{ij}) \tag{5}$$

   where $\lambda_{ij} = X_{ij}/Y_j$ is the share of country j's expenditure that is devoted to goods from country i and $d \ln x = \widehat{x} = dx/x$ denotes percentage changes. Provide a short and complete account of the relationship in (5).

2. Write down an expression for relative imports, $\lambda_{ij}/\lambda_{jj}$. Show that the foreign shock leads to the following changes in relative imports:

$$d \ln \lambda_{ij} - d \ln \lambda_{jj} = (1 - \sigma)(d \ln w_i + d \ln \tau_{ij}) \tag{6}$$

   Provide a short and complete account of the relationship in (6).

3. Real income is a measure of welfare, i.e., $W_j = Y_j/P_j$. Show that the foreign shock leads to the following changes in real income:

$$d \ln W_j = \frac{d \ln \lambda_{jj}}{1 - \sigma} \tag{7}$$

   Provide a short and complete account of the relationship in (7).

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4. Calculate the welfare changes for a hypothetical country transitioning from autarky to a new equilibrium with trade. Assume that $\lambda_{jj} = 0.82$ and $\sigma = \{5, 10\}$. Explain how σ impacts the gains from trade. Discuss if other theories from the syllabus lead to similar predictions regarding gains from trade.

Problem 3:

Answer True or False to each of the statements below. Briefly explain your answer.

1. The empirical study of Caliendo and Parro (2015) shows that the real wages of US workers decreased in response to North American Free Trade Agreement, while Mexican workers experienced a real wage increase.

2. In a Specific Factors model with two industries and three factors (labor and industry-specific capital), a lower cost of offshoring labor-intensive tasks will unambiguously increase wages because of the productivity effect.

3. According to Autor, Dorn and Hanson (2013), import competition from China has significantly increased aggregate unemployment in the US.

4. The Law of Comparative Advantage states that a country should, on average, import the goods that have lower relative autarky prices compared to other countries.