Written Exam for the M.Sc. in Economics 2009

International Trade and Investment
Final Exam/ Elective Course/ Master's Course
Fall 2009

4-hour closed book exam

- There are pages in this exam paper, including this instruction page
- You need to answer all THREE questions, so manage your time accordingly.
- Make your math legible and easily followed, with the final answer boxed.
- Partial credit may be given.

Good Luck!

1. Empirical questions

   (a) Has the intra-industry share of trade increased or decreased in the last 50 years? Is there more or less trade between countries with similar capital/labor ratios? increased/ more

   (b) What two trade models do Head and Ries (2001) test? Which model's predictions are supported by their results? Armington's national product differentiation model versus Krugman's increasing returns to scale model. They find support for Armington across time, but Krugman across industries.

   (c) Define the intensive margin of trade and the extensive margin of trade. The intensive margin is the change in trade volume per (good, variety, or firm). The extensive margin is the change in the number of (goods, varieties, firms).

   (d) Do exporting firms, on average, pay higher or lower wages than their non-exporting counterparts? A: higher

   (e) Explain the Alchian-Allen Effect and its cause. A:Countries ship higher quality/higher priced goods farther away because the relative CIF price of a high-quality good is lower in far away destinations.

   (f) What is the Leontief Paradox? The US, a capital intensive country, had a labor intensive net factor content of trade in 1948. This goes against Heckscher-Ohlin theory.

2. Factor Price Equalization (FPE)

   Use a single graph for this question. Consider a world with 2 countries(Denmark and Finland), 2 factors (capital & labor), and an infinite number of goods. Each good is produced using a concave, constant returns to scale production function using both labor and capital. Each good has a different capital/labor intensity. Technology is freely movable across countries. The two countries take world prices as given. Preferences are identical and all goods are demanded in both countries.

   (a) Using capital as the vertical axis, draw the FPE set for this world economy. (You should draw this graph pretty big.) A:

   (b) Place an endowment point OUTSIDE the FPE set corresponding to a world in which Denmark is labor-abundant. Label the endowment point

E. What can you say about factor prices in the two countries? A: Since we are not in the FPE set, we should not expect factor prices to be equal. Rents relative to wages should be higher in the labor-abundant Denmark.

(c) Given endowment E, let's look at the production of a particular good y with capital/labor intensity = 2. How many countries produce good y? (0,1, or 2?) Explain your answer. A: According to the Feenstra text, 1 country should produce this good. It would be the country that can produce it at lower cost. We do not know that country from the information given.

(d) Now suppose open migration occurs between Denmark and Finland and after 10 years, we arrive at a new endowment point J inside the FPE. Label this endowment point J.

(e) What can we say about the production of y under this new endowment point J? (Who produces y? How much of y is produced?) A: Nothing. Production is indeterminate in the FPE where the number of goods is greater than the number of factors.

(f) Suppose the technology used to produce y improves so that the world price of y decreases very slightly. How does that affect factor prices in the country or countries that produces y? A: Stolper-Samuelson says that one of the factor prices will decrease more than the price of y. The price of the other factor will increase.

3. An extension of The Krugman (1980) model

Assume there are an infinitely countable number of potential firms indexed by $i \in [1, 2, ..., \infty)$ with labor cost function

$$l(i) = f(i) + w\beta q(i) \tag{1}$$

where $w = 1$ is the wage normalized to 1, β is the marginal cost, and $q(i)$ is the quantity that firm i outputs. The fixed cost $f(i)$ is unique to the firm and equals $f(i) = iA$. So firm 5 has a fixed cost of $5A$, firm 10 has twice the fixed cost as firm 5, etc... The firms compete in a market where total expenditure on the varieties in the market is Y, which is exogenous to the industry. The sub-utility function for varieties is $u = \sum_{i \in \Omega} c_i^{\frac{\sigma-1}{\sigma}}$, where Ω is the set of firms in the market. N is the endogenous number of firms in the market, where $N = |\Omega|$, the number of firms in Ω. A, β, σ, Y are the model parameters.

(a) Given this information, what is the firm's profit maximizing price in terms of the parameters of the model?

$$p = \frac{\sigma}{\sigma - 1}\beta \tag{2}$$

(b) Show that firm $i's$ profits in terms of the parameters of the model and N is $\pi_i = \frac{Y}{\sigma N} - iA$.

$$\pi_i = \frac{p^{1-\sigma}Y}{\sigma P} - f_i \tag{3}$$

$$P = Np^{1-\sigma} \tag{4}$$

$$f_i = iA \tag{5}$$

$$\pi_i = \frac{Y}{\sigma N} - iA \tag{6}$$

(c) Use the profit cutoff condition to find the endogenous set Ω.
A: Firm i will be in the market if

$$\pi_i = \frac{Y}{\sigma N} - f_i \geq 0 \tag{7}$$

$$\frac{Y}{\sigma N} - Ai \geq 0 \tag{8}$$

$$i \leq \frac{Y}{A\sigma N} \tag{9}$$

so if firm i is in the market, so are all firms $i' < i$. Therefore, $\Omega = \{1, 2, ..., N\}$. Firm N must satisfy the condition:

$$N \leq \frac{Y}{A\sigma N} \tag{10}$$

$$N^2 \leq \frac{Y}{A\sigma} \tag{11}$$

Thus $\Omega = \{1, 2, ..., N\}$, where N is a highest number that satisfies $N \leq \sqrt{\frac{Y}{A\sigma}}$.

(d) Suppose $\sqrt{\frac{Y}{A\sigma}}$ is a whole number. What is the output $q(i)$ for firm i in terms of the model parameters?
A:

$$q(i) = \frac{p^{-\sigma}Y}{P} = \frac{p^{-\sigma}Y}{Np^{1-\sigma}} = \frac{Y}{Np} = \sqrt{\frac{AY}{\sigma}}\frac{(\sigma - 1)}{\beta} \tag{12}$$

(e) In this model, how does a 10% increase in the expenditure Y affect the number of firms? Compare this prediction to the long run equilibrium prediction of Krugman 1980. Your choices are: i. Decrease by more than 10% ii.Decrease by 10% iii. Decrease by less than 10% iv.Does not change v. Increase but less than 10% vi.Increase by 10% vii.Increase by greater than 10%.

A: It increases by less than 10% because the additional firms have higher fixed costs. In Krugman, a 10% increase in L results in a 10% increase in the number of firms, so this model implies a lower extensive margin than Krugman.

(f) In this model, how does a 10% increase in the expenditure Y affect the output quantity per firm? Compare this prediction to the long run equilibrium prediction of Krugman 1980. Your choices are: i. Decrease by more than 10% ii.Decrease by 10% iii. Decrease by less than 10% iv.Does not change v. Increase but less than 10% vi.Increase by 10% vii.Increase by greater than 10%.

A: It increases by less than 10% because the extensive margin increases by less than 10%. Krugman predicts no change in firm-level output in the long run so this model predicts a bigger intensive margin than Krugman.