

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

Instructions: This exam has three parts. Answer FOUR questions in total, choosing at least ONE question from each part (A, B, C).

PART A

Question 1

- Consider a model where three factors (capital, skilled labor and unskilled labor) are used in the production of two tradable goods. The factors are perfectly mobile within the country, and each factor is used in the production of the two goods. Provide the zero-profit conditions for the two goods, and differentiate them.
- Now consider the effects of changing goods prices on factor rewards. In particular, for each good, is there necessarily a factor that will lose in real terms? Explain.
- Again, consider the effects of changing goods prices on factor rewards. For each good, is there necessarily a factor that will gain in real terms? Explain.
- Suppose instead that the third factor is an imported intermediate input (rather than unskilled labor). If there is an exogenous increase in the price of the intermediate input, can you conclude that there is necessarily a factor that will gain in real terms? And, whether there a factor that will necessarily lose in real terms? Explain.

Question 2

A foreign firm sells $i = 1, \dots, M$ product varieties, which are distinguished by their characteristics z_i . The price for each variety is p_i and the demand is c_i . Based on characteristics, unit production costs are $g(z_i)$, while the consumers experience scalar quality, $f(z_i)$.

- Provide the profit maximization problem for the firm, as well as its analogue which is based on quality-adjusted demand ($d_i \equiv f(z_i)c_i$) and quality-adjusted prices ($q_i \equiv p_i/f(z_i)$). Differentiate the firm's objective function to derive first-order condition with respect to z_i .
- Now suppose the foreign firm is made subject to a quota that limits its exports to a maximum of \underline{X} units, or $\{ \sum c_i \leq \underline{X} \}$. Using λ as the langrange multiplier on the quota constraint, show how the firm's objective function is changed. Then derive the new first order condition for the optimal choice of characteristics z_i . Demonstrate and explain how a quota can lead to quality upgrading in this context.
- By what other mechanism may a quota lead to quality upgrading? Explain.
- Would an ad valorem tariff on imports have the same effect as the quota described in b)? A verbal explanation is sufficient.

PART B

Question 1

An extensive literature seeks empirical evidence on the sources and magnitudes of spillovers from multinational firms to host economies.

- A) Explain why it is often difficult for empirical work to identify positive spillovers, even in cases where the presence of multinational firms helps to increase local firm productivity or to increase local wages.
- B) Describe research methods that have been applied to deal with the issues you raise in part A).
- C) Researchers have noted that plants acquired by foreign buyers are often more productive than non-acquired local plants. What are the common explanations for the differential productivity of non-acquired versus and foreign-acquired plants?
- D) In an ideal setting, one would like to observe how acquisitions affect the productivity of acquired firms, measuring the effects of acquisition, as:

$$E(Y_1 - Y_0 | FDI = 1) = E(Y_1 | FDI = 1) - E(Y_0 | FDI = 1)$$

In other words, we would like to compare the productivity, Y , of a plant that is acquired ($FDI = 1$) in the case where it is acquired (Y_1), with the productivity of the same plant, in the unobserved counterfactual where it was not acquired (Y_0). Describe how it is possible to gain empirical identification of acquisition effects on productivity using data that are available. Then describe empirical evidence on this topic from the literature.

Question 2

In Grossman and Helpman's model of outsourcing partner choice, Nash bargaining over the order contract splits the total surplus evenly between the final goods producer in the North, and its partner. Each receives half of the surplus generated by successful project, or $S^i/2$. However, creation of a successful partnership requires the outsourcing partner to make costly modifications. Modification or customization costs are $w^i \mu^i x$, where the potential production location is $i=N,S$, w^i is wage, μ^i the cost of performing modifications, and x is the distance in product space between the final goods producer, and the potential producer of parts. In either market, there are m^i potential partners.

- A) Suppose $S^i/2 \geq w^i \mu^i x$, how much does the Northern firm need to pay a potential Southern partner to ensure that the Southern partner will make the full investment in modification or customization? Explain.
- B) Now suppose γ^i is the portion of a contract that can be legally enforced. If $S^i/2 < w^i \mu^i x$, but $[S^i/2 \geq (1-\gamma^i)w^i \mu^i x]$, describe the investment contract that will ensure the Southern partner will make the full investment in customization.
- C) Grossman and Helpman show that search length x is limited. What is the maximum search distance? Will firms always search this maximal distance? Explain.
- D) Suppose an initial outsourcing equilibrium involves some production of intermediate inputs or parts in both North and South. How will an increase in the South's labor force affect the numbers of intermediate suppliers in North and South? What is the economic intuition for this result?

PART C

Question 1

Suppose there are three identical countries which do not trade. Each has a manufacturing sector with a mass of firms, M , which draw a particular productivity level, z , from the following distribution,

$$H(z) = 1 - z^{-k},$$

which has positive support over the interval $(0, \infty)$. Each firm produces z units of output per unit of labor employed, with an additional f units of labor required by each firm to cover fixed overhead costs. Consumer demand for its unique good is characterized by the utility function

$$U = \left[\int_{\omega \in \Omega} c(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}},$$

Where ω represents the quantity consumed of a particular good and Ω the set of all available goods.

- a) Assume that the mass of firms entering the market must pay a one-time, upfront sunk cost, f_e , before finding out how productive they are. Specify the exact equilibrium conditions necessary to find the productivity level of the least productive firm that will enter the market if firms all face a uniform probability of forced exit, d . Use these conditions to derive an analytical solution to for this cutoff productivity parameter.
- b) Write down the formula that reveals the “number” (M) of active firms in the market at any one time in terms of the threshold productivity parameter. Is M the same as the number of firms entering the market in any given period? Why or why not?
- c) Suppose that the countries begin to engage in free trade, with an additional fixed cost required for firms that export, f_x . Derive the relationship between the threshold productivity level for firms serving only the domestic market and the threshold for exporters. Will all exporters see an increase in market share and profitability?
What is the condition that determines whether the number of available varieties will increase or decrease?
- d) Compare and contrast the theoretical results of the Melitz (2003) model under free trade with that of Krugman (1980). What issues does the Melitz framework resolve?
- e) Compare and contrast the assumptions of the Melitz model above with that of Stephen Yeaple’s framework with heterogeneous workers. What stylized facts can the Yeaple model explain that the Melitz framework does not? Does the Yeaple model leave any issues from part (d) unresolved?

Part C (Continued)

Question 2

Consider the Eaton and Kortum (2003) model of geography and trade.

- a) Write down the formula determining the fraction of goods that a country will import from any one particular trading partner. Describe the parameters and what they mean in detail. In what sense is this a “gravity” model? In what dimensions is there heterogeneity in the model?
- b) What is special about the Fréchet distribution used in the model? Why did the authors choose to use it?
- c) What is the number of firms operating in any particular country in any given period?
- d) Discuss the role of the variety (number) of goods in the model. Is variety the mechanism through which trade impacts consumer welfare? If so, how? If not, then what is the mechanism through which trade impacts consumer welfare? Explain carefully, using specific equations to illustrate your answer when appropriate. (It is fine to assume zero trade costs.)
- e) Compare and contrast the market structure and sources of gains from trade in this model with that of Dornbusch, Fischer, and Samuelson (1977), Bernard, Eaton, Jensen, and Kortum (2003) and Melitz (2003).