

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

Instructions: This exam has three parts. Answer FOUR questions in total, choosing at least ONE from each part.

PART 1

Question 1:

Consider a model with two goods and three factors (labor, capital, land), each of which are used in the production of both goods. There is perfect factor mobility between the industries. Write down the zero-profit conditions for the goods, differentiate these, and answer:

- (a) For each good, if its price goes up, is there necessarily a factor that will *lose* in real terms (i.e. in terms of how much it can buy of either good)? Explain why or why not. Is there necessarily a factor that will *gain* in real terms? Explain.
- (b) For each factor, is there necessarily a good such that if its price goes up, then that factor will *lose* in real terms (i.e. in terms of how much it can buy of either good)? Explain why or why not. For each factor, is there necessarily a good such that if its price goes up then that factor will *gain* in real terms? Explain.
- (c) Suppose we simplify the problem and assume that the three factors of production are labor, capital, and an imported intermediate input. The price of the imported input is given exogenously by the world market. Now answer:
 - (i) If the price of the intermediate input goes up, is there necessarily another factor that will *lose* in real terms (i.e. in terms of how much it can buy of either good)? Explain why or why not. Is there necessarily another factor that will *gain* in real terms? Explain.
 - (ii) Now hold fixed the price of the intermediate input. Then for each of the other factors, is there necessarily a good such that if its price goes up, then that factor will *lose* in real terms (i.e. in terms of how much it can buy of either good)? Explain why or why not. For each of the other factors, is there necessarily a good such that if its price goes up then that factor will *gain* in real terms? Explain.

PART 1

Question 2:

- (a) Illustrate how a tariff and quota are “equivalent” under perfect competition.
- (b) Now illustrate how a tariff and quota can have *nonequivalent* effects on the import price when there is a foreign monopolistic exporter. Does this result also hold when the foreign and domestic firms are engaged in duopolistic competition? Explain.
- (c) Now illustrate how a tariff and quota can have *nonequivalent* effects on product quality. To simplify the problem, you may consider an exporting industry selling two varieties of a differentiated product: variety 1 is higher quality, and has a higher marginal cost (c_1) than for variety 2 (c_2), so that $c_1 > c_2$. The product is sold under perfect competition to an importing country, where demand for the high quality *relative to* the low quality good depends on the *relative* price p_1/p_2 . Then answer:
 - (i) Suppose that the importing country puts an *ad valorem* tariff t on imports of either variety. What happens to the *relative* price in the importing country? Therefore, what happens to demand for the high quality relative to the low quality good?
 - (ii) Suppose instead that the importer imposes a *quota* on the sum of imports of the high and low quality varieties. Then what happens to the price of *each* variety; to their *relative* price; and to the demand for the high relative to low quality good?
 - (iii) Briefly explain how changes in produce quality (like in automobiles) can be measured empirically. What trick can be used to reduce the standard errors in this equation?

PART 2

Question 1

a) Consider a setting where there are two countries and two factors - labor and capital. The numeraire good (agriculture) is produced under constant returns to scale using labor and capital. The production of differentiated manufactured goods, which also uses both labor and capital, entails fixed costs for both firm headquarters and for firm production plants, as well as a variable production cost. The headquarters cost is the most capital intense activity in this setting, followed by integrated manufacturing production (the combination of headquarters and production), manufacturing production, and agriculture.

- 1) Suppose that the home country is capital abundant, and that μ home firms perform assembly in the foreign country. Provide the capital market equilibrium conditions for home and foreign.
- 2) Derive and interpret the first order conditions governing the provision of headquarters services.
- 3) How does the opportunity for multinational production affect factor price equalization in this world economy?
- 4) Show how one would calculate the volume of trade worldwide for this equilibrium with MNC firms. How does the presence of multinational firms in this setting affect the volume of trade?

b) What essential differences in country and firm/industry characteristics determine whether vertical or horizontal multinationals arise? Describe the configuration of characteristics that will contribute to the development of each of these firm types.

PART 2

Question 2

Suppose, as in Aitken, Hanson, and Harrison (AHH), firm total costs are composed of production cost $h(\cdot)$, and distribution costs $m_d(\cdot)$, $m_f(\cdot)$ which represent distribution cost at home and abroad. The specific form of the production cost is $h(q_d+q_f) = (a/2) * (q_d+q_f)^2 + g*(q_d+q_f)$, while distribution costs are: $m_i(q_i) = (b_i/2)*q_i^2 + c_i q_i$ where $i = d, f$.

- a) Derive the first order conditions for q_d and q_f .
- b) Suppose that domestic distribution costs do not depend on the level of multinational activity, while foreign distribution costs do. In particular, the presence of foreign multinationals causes spillovers that reduce foreign distribution costs. Use your first order conditions to derive reduced form equation that can be used to estimate *whether* a firm exports or not.
- c) Now suppose that multinational activity creates spillovers that reduce costs of distribution not only abroad, but also at home. Under what circumstances will the benefits of MNE activity cause expanded levels of export?
- d) Do the regression results in AHH support the hypothesis of spillovers to exporting? Describe.

PART 3

Question 1

Market power and trade restrictions in Taiwanese footwear exports, Aw '92. (30 points)

In Aw's 1992 paper on markups and trade restrictions in the Taiwanese footwear industry, inverse demand is given as

$$P_t^i = \alpha_0^i + \alpha_1^i Q_t^i + \alpha_2^i X_t^i + \alpha_4^i Z_t^i + \alpha_5^i Z_t^i Q_t^i \quad (1)$$

where P is export price, Q is export quantity, X is income in the destination market (the U.S.), Z is the price of the domestic substitute good, the t-th subscript indexes time, and the i-th superscript indexes industry – high quality or low quality footwear.

The empirical supply relationship is given by

$$P_t^i = \beta_0^i + \beta_1^i Y_t^i + \beta_2^i Y_t^j + \beta_3^i w_t - \lambda^i (\alpha_1^i + \alpha_5^i Z_t^i) Q_t^i \quad (6)$$

where the variables are as before, with the Y's indicating output of high and low quality footwear, and w is a vector of factor prices.

- (a) Write down the inverse demand elasticity. (2 points)
- (b) What is the role of the variable Z in identifying market power. You may respond with words. You may also use a graph to illustrate your answer, though this is not necessary. (8 points)
- (c) What value of λ^i is implied by perfect competition? By monopoly? By Cournot behavior? (8 points)
- (d) A different supply relation than (6) holds when the Voluntary Export Restraints (VERs) on Taiwanese footwear exports to the U.S. are binding. Write down this alternative supply relation (8 points). For 1 bonus point, write down a supply relation that nests this alternative and (6).
- (e) What do Aw's results imply about the level of market power in the Taiwanese footwear export industry? What do these results imply about the effects of the VER? (A one sentence reply will suffice in both cases). (4 points)

PART 3

Question 2. The Case of the Missing Trade and Other Mysteries (30 points)

1. In the first part of his famous paper, Dan Trefler looks at deviations of factor services trade from the predictions one would obtain from a “simple” Heckscher-Ohlin-Vanek model. He identifies two systematic ways in which the actual factor service trade flows fail to match the predictions. He labels one of these systematic departures “the case of the missing trade” and the other “the endowments paradox.”
 - (a) Please describe in words just what is “the case of the missing trade” and how is it identified in the data? (10 points)
 - (b) Please describe in words just what is the “endowments paradox” and how is it identified in the data? (10 points)

2. On page 1035, Trefler presents a specification which can allow for both “Hicks-neutral” and “nonneutral” technology differences across countries. This is equation (6), reproduced below. This framework nests the simple or unmodified Heckscher-Ohlin-Vanek Theorem (denoted H_0), a hypothesis of purely “Hicks-neutral” technological differences across countries (denoted T_1), and a hypothesis of both “Hicks-neutral” technological differences across countries and non-neutral technological differences across groups of countries (denoted T_2).

$$(6) \quad F_{fc}^m = \left\{ \begin{array}{l} \delta_c \phi_f V_{fc} - s_c \sum_{j \in C_{LDC}} \delta_j \phi_f V_{fj} - s_c \sum_{j \in C_{DC}} \delta_j V_{fj} + \mu_{fc}, \sim c \in C_{LDC} \\ \delta_c V_{fc} - s_c \sum_{j \in C_{LDC}} \delta_j \phi_f V_{fj} - s_c \sum_{j \in C_{DC}} \delta_j V_{fj} + \mu_{fc}, \sim c \in C_{DC} \end{array} \right\}$$

Here, the V 's denote factor endowments, the F_{fc}^m denotes the factor content of net exports measured using the U.S. technology matrix, s_c denotes the consumption share of country c , the μ_{fc} 's represent measurement error, the δ 's denote factor neutral technology differences across countries, and the ϕ 's denote non-neutral technology differences.

- (a) Briefly write down explicitly the parameter restrictions on equation (6) that would produce hypothesis T_1 . Are these parameter restrictions supported by Trefler's hypothesis tests? (5 points)

- (b) Briefly write down explicitly the parameter restrictions on equation (6) that would produce hypothesis H_0 . Are these parameter restrictions supported by Trefler's hypothesis tests? (5 points)