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**PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE**

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**Instructions.** You should answer a total of 4 questions, including at least one question from each of the parts (A, B, and C).

**Part A**

**1. Heckscher-Ohlin Model:**

Modern testing of the Heckscher-Ohlin-Vanek (HOV) model allow technologies to differ across countries. In this question we explore the results from that approach.

- (a) Derive the HOV equations while allowing the technology matrix to differ *by a scalar* across countries. What results does Treffer (*AER*, 1993) find when using this approach?
- (b) Instead of allowing the technology matrix to differ by a scalar across countries, suppose that instead that we allow the entire matrix to differ across countries, i.e. either we allow all factors to differ in their productivities across countries, or we use the actual data from each country to construct the technology matrix. Then what is the logical problem that we run into while testing the HOV theory? How does Treffer (*JPE*, 1995) deal with this problem?
- (c) In their 2001 *AER* article, how exactly do Davis and Weinstein allow technologies to differ across countries so as to not run into the problem in (b)? What results do they find?

**2. Tariffs with Imperfect Competition:**

- (a) Consider two firms – home and foreign – engaged in Cournot competition. The importing country applies a specific tariff against the foreign firm. Write down the expressions for profits and derive the reaction curves, mathematically and graphically.
- (b) How will an increase in the tariff affect the reactions curves and the Cournot-Nash equilibrium? What condition(s) needs to be satisfied for the tariff increase to raise welfare in the importing country? (*Hint:* These condition(s) are an extension of the single-firm case with a specific tariff, which you may analyze before the two-firm case, if needed).
- (c) Suppose in part (a) that the foreign firm is charging a lower price in the importing country than in its own local market, so that it is dumping. Then why would an antidumping duty be unlikely to raise the importer's welfare? That is, how does the application of a antidumping duty differ from the application of a tariff that you analyzed in part (b)? What empirical evidence supports this view of antidumping duties?

## **Part B**

### **3. Nexus between exchange rate management and macroeconomic stabilization:**

Consider:

- i) a short-run IS-LM-BP model with fixed exchange rate (maintained by non-sterilized intervention), and,
- ii) the perfect capital mobility case, i.e. domestic bonds and foreign bonds are perfect substitutes, with the foreign interest rate,  $r^* = 10$  percent per year.

A rumor starts that there will be a 40 percent devaluation next year, and the participants in the foreign exchange market believe the rumor.

- (a) Analyze the short-run consequences of the above situation.
- (b) What will happen to the capital account balance?
- (c) What is the implication for stabilization policy that is committed to keeping output at the present level?

*[Hint: domestic interest rate,  $r = r^* + (\text{expected rate of depreciation})$ ]*

### **4. The Gold Standard and the Bretton Woods Adjustable Peg**

- a) Explain the automaticity and mutuality features of the gold standard.
- b) What are some of the policies that can be followed by governments that would annihilate these automaticity and mutuality features? Why weren't these policies observed frequently during the gold standard period?
- c) Give three reasons why the Bretton Woods system ended in 1973?
- d) What were the arguments of Milton Friedman in his work, "The Case for Flexible Exchange Rates" and which one is the most correct one analytically?

## **Part C**

### **5. Foreign Investment and Horizontal Multinationals:**

Markusen examines how firms decide whether to serve their customers in country  $j$  by exporting output from their home country  $i$  plant, or by opening a production affiliate in  $j$ . If the firm produces in  $i$  and exports to  $j$ , it faces iceberg transportation cost,  $T_{ij} > 1$ . If the firm adds a plant, it incurs a fixed cost, which is  $\alpha$  units of labor in the plant location. Production requires  $\beta$  units of local labor for each unit produced. Wages in  $i$  and  $j$  are  $w_i$  and  $w_j$ .

- a) For a firm located in country  $i$ , write down the profit functions that are associated with export to  $j$ , and with production using an affiliate in  $j$ . [Use  $p^i$  to represent the FOB price, and  $p^{ij}$  to represent the CIF price.]

- b) Assume demand is CES, and the elasticity of substitution is  $\sigma$ . Provide an inequality that describes the conditions that will cause the firm to prefer local production over exporting. Then interpret your result.
- c) What further constraint must be satisfied for horizontal multinationals to arise in equilibrium? What characteristics, in terms of country size and dispersion, are most likely to give rise to this equilibrium with horizontal multinationals?
- d) Markusen's model implies that exports and FDI should be substitutes, since firms decide to do one or the other. However, empirical work which regresses industry exports on industry FDI, generally uncovers a positive relationship, rather than the negative sign that is implied by substitution. How can this empirical result be explained? Does it imply that substitution effects of FDI are irrelevant?
- e) Helpman, Melitz and Yeaple note that the prevalence of FDI relative to export at an industry level is related to industry dispersion. What correlation do they observe? And how does their model explain this correlation?

## 6. Outsourcing:

As in Yi (2003), consider a 3 stage production technology. Stage 1 involves Cobb-Douglas production of an intermediate input ( $y_1$ ) from labor and capital, while stage 2 involves Cobb-Douglas production of an intermediate input ( $y_2$ ) which combines labor, capital and the appropriate stage 1 input.

$$y_1^i(z) = A_1^i(z)k_1^i(z)^{\alpha}l_1^i(z)^{1-\alpha}$$

$$y_2^i(z) = x_1^i(z)^{\theta}[A_2^i(z)k_2^i(z)^{\alpha}l_2^i(z)^{1-\alpha}]^{1-\theta}$$

In stage 3, the full range of stage 2 goods are costlessly assembled into a non-traded good ( $Y^i$ ), according to:

$$Y^i = \left\{ \int [x_2^i(z)]^{(\sigma-1)/\sigma} dz \right\}^{\sigma/(\sigma-1)}$$

- a) What do stage 2 firms maximize? How about stage 3? Write down the appropriate expressions, and discuss the role of tariffs in production decisions.
- b) Using Yi's Dornbusch/Fischer/Samuelson Ricardian diagram with vertical specialization, draw and label an equilibrium in which a range of goods are produced which involve home's production of stage 1 intermediates and foreign's production of stage 2 intermediates. Then show how the equilibrium will change if tariffs are reduced.
- c) Trade volumes increased dramatically between 1960 and 1990. If Yi's model is correct, are the gains from this trade expansion larger or smaller than the gains that are implied by a conventional model of trade that does not account for vertical specialization?

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- d) Grossman and Helpman (2005) describe the outsourcing decisions of Northern firms who must select a partner in the North or South to produce intermediate inputs. (It is assumed that the Northern partner can not produce the inputs itself). In the first stage of the model, the Northern firm conducts a partner search either in North or South. If a potential partner is identified, the potential partner must undertake costly modifications and produce a prototype in the second stage. Finally, if the second stage is successful, the firms will start production, and split the profits according to Nash bargaining.

To explore the nature of outsourcing, Grossman and Helpman perform comparative static exercises, beginning with an initial equilibrium in which partner searches are conducted in both the North and the South. These exercises yield some interesting findings: 1) an increase in the South's labor force ( $L_s$ ) can increase the relative wage of Southern workers (an increase in  $W_s/W_n$ ), and 2) an increase in Southern legal protections - which increase the proportion of stage two activities that can be legally monitored in the South - may not increase outsourcing in the South.

What is the intuition for these results?