WRITTEN PRELIMINARY Ph.D EXAMINATION

Department of Applied Economics
June/July - 2006
Trade, Development and Growth

For students electing
New Trade Theory (8702) & Micro (8703) option

Instructions

• Identify yourself by your code letter, not your name, on each question
• Start each question’s answer at the top of a new page
• You are requested to answer a total of FOUR questions
• Answer ONE question from Set One
• Answer THREE questions from Set Two
• You have four hours to complete this examination
I. The Harris-Tordaro model

This problem presents a simple Harris-Todaro model of migration and analyzes the impact of a policy on income inequality. Note that the notation is somewhat different from the notation used in Apec 8703. The set-up of the model is:

- $L = $ the number of workers (all of which are identical)
- $w_u =$ the wage in the urban sector, which is fixed outside of the model
- $w_r =$ the wage in the rural sector, which is set so that labor supply equals labor demand in the rural sector
- $L_u =$ labor employed in the urban sector
- $L_r =$ labor employed in the rural sector
- $U = L - L_u - L_r =$ unemployed labor in the urban sector
- $D_u = D_u(w_u)$ is the demand for labor in the urban sector, and $D_u(w_u) < 0$

Assume that:

(a) Labor migrates until the expected wage in urban areas is equal to the wage in rural areas. Express the rural wage (in equilibrium) as a function of $D_u(w_u), w_u$ and $U$.

Assume that:

(b) The demand for labor in rural areas is flat, which means that $w_r$ is not affected by the supply of rural labor and this can be considered to be exogenous. Further, assume that $w_r < w_u$.

1. Using your answer to a), express the rate of unemployment as a function of $w_u$ and $w_r$, both of which can be considered to be exogenous.

2. Now, recall what a Lorenz curve is in the analysis of inequality. Draw a Lorenz curve for this economy, assuming that $U > 0$. Show where all three types of workers (rural, urban employed and urban unemployed) fit on the Lorenz curve. [Hint: the “curve” will be connected line segments, not a curve.]
3. Suppose that the urban wage increases. Is the new distribution of income more equal, less equal, or is the result indeterminant? Demonstrate your answer by drawing a new Lorenz curve.

4. Suppose that the urban sector expands the number of jobs but does not change the wage. Is the new distribution of income more equal, less equal, or is the result indeterminant? Demonstrate your answer by drawing a new Lorenz curve.

II. Stylized Facts on Trade and Multinationals

Use your knowledge of trade and multinational theory to explain of the five stylized facts below.

1. A large proportion of trade and direct investment occurs between relatively similar economies—similar in size and relative endowments.

2. A large proportion of trade and direct investment is two-way trade in similar products (i.e., intra-industry).

3. Direct investment has grown faster than trade in recent years.

4. A large proportion of direct investment is concentrated among developed countries. That is, direct investment tends to flow North-North rather than North-South or South-South.

5. A large proportion of direct investment is "horizontal" rather than "vertical."

6. Select **ONE** of the above 5 observations and "Sketch" how you would "model" the respective observation.
SET TWO:

*Answer THREE of the following four questions (III to VI)*

**III. New trade theory: direction & type of trade**

The "new trade theory" has enriched our understanding of the causes and consequences of trade by adding elements of increasing returns to scale, imperfect competition, and product differentiation to the traditional comparative advantage models of trade. Recent research develops theory models where market structure is determined endogenously. Market structure refers to the choice of firm types—national enterprise (NE)- versus multinational enterprises (MNEs). In this context, demonstrate/discuss how the equilibrium market structure depends on:

1. Firm-level scale economies and plant-level scale economies
2. Tariffs and transportation costs
3. Similarity of country size and relative endowments

Be analytical in answering these questions.

**IV. New trade theory: trade, investment & knowledge capital**

Recent research develops theoretical models to analyze the liberalization of trade versus the liberalization of direct investment. Demonstrate/discuss the impact, on equilibrium market structure, of:

1. Liberalizing trade while maintaining a ban on investment
2. Liberalizing investment while maintaining a ban on trade
3. Liberalizing both trade and investment.
4. Recent research considers the distinction between horizontal and vertical multinationals within the hybrid "knowledge-capital model." According to theoretical predictions, what country characteristics explain horizontal multinationals versus vertical multinationals.

V. Labor supply

This problem asks you to derive some results from a modification of Jacoby’s (1993) model of agricultural households’ labor supply. There are three household members (husband, wife and child). The household utility function is:

$$U = U(C, L_1, L_2, L_3, S_3)$$

where $C$ is consumption of the only good, which is an agricultural good (note that there is no $Q$ home-produced good), $L_i$ is the leisure of person $i$, and $S_3$ is time that the child spends in school for this year (e.g. weeks in school). (The original model also had a “taste shifter” variable, $Z$, but you can ignore that for this problem.)

The agricultural production function takes the form:

$$Y = F(L_1, L_2, L_3, H_1, H_2, H_3, A)$$

where $L_i$ is the labor supply of person $i$, $H_i$ is hired labor of three types (adult male, adult female and child), and $A$ is a vectors of fixed inputs such as land. The household budget constraint is:

$$C = Y - W_1^H H_1 - W_2^H H_2 - W_3^H H_3 + W_1 M_1 + W_2 M_2 + W_3 M_3 - p_S S_3$$

where $W_i^H$ is the wage of hired labor of type $i$, $W_i$ is the wage household members of type $i$ can earn in the labor market, $M_i$ is the household’s marketed labor of type $i$, and $p_S$ is the price of one time unit of school. The market price of $C$ is set to 1.

Finally, there are three labor supply constraints for the household’s male, female, and child labor:
\[ T_1 = L_1 + M_1 + L_1 \]

\[ T_2 = L_2 + M_2 + L_2 \]

\[ T_3 = L_3 + M_3 + L_3 + S_3 \]

where \( T_i \) is the household’s endowment of labor time of type \( i \).

1. What are the household’s choice variables in this model? Do not include endogenous variables that are functions of other endogenous variables. Just show the variables that the household chooses to maximize its utility.

2. Show the first order conditions for this household’s utility maximization problem.

3. In this model, which adds schooling for children, are household consumption decisions (including consumption of schooling for the child) separable from household production decisions? Demonstrate your answer using your first order conditions in b). Assume that household labor and hired labor of each type (male, female and child) are perfect substitutes, and that \( W_i^H = W_i \) for \( i = 1, 2 \) and 3.

4. Suppose that the price of schooling, \( p_3 \), increases. Show what happens to \( S_3 \), again referring to the first order conditions. Assume that \( U''_{S3} \leq 0 \) and that \( \partial^2 U / \partial C \partial S_3 = 0 \).

VI. R&D and R&D spillovers

In a world where a large country in trade (called Home) innovates, carefully sketch out the details of an economic framework for evaluating the magnitude and incidence of the economic consequences of international (i.e., cross-country) R&D spillovers.

Use this basic framework answer the following:
1. Are benefits to producers in the innovating (i.e., Home) country increased or decreased as a consequence of R&D spillovers to other countries? Illustrate and discuss.

2. Does overall welfare in the innovating (i.e., Home) country increase or decrease as a consequence of spillovers? Illustrate and discuss.

3. Describe and explain the implications for rest-of-world producers if only the Home country innovates, absent international spillovers. How does your answer change if Home country research also transfers to countries elsewhere in the world?