WRITTEN PRELIMINARY Ph.D EXAMINATION

Department of Applied Economics
Jan./Feb. - 2011
Trade, Development and Growth

For students electing
Macro (8702/Prof. Smith) & Micro (8703/Prof. Glewwe)
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
SET ONE:
Required Question; Answer ONE Question (I or II but not both)

I. Child labor and consumer boycotts.

Assume that firms in a developing country can use either child labor or adult labor, or both, to produce soccer balls. Let \( A \) by the number of adults hired by a firm, and let \( C \) be the number of children hired. Labor is the only input, and the production technology has constant returns to scale, so let the production function be:

\[
Y = F(A, C) = b[A + \gamma C], \text{ where } b > 0 \text{ and } 0 < \gamma < 1
\]

The restriction that \( 0 < \gamma < 1 \) simply indicates that the productivity of child labor is less than the productivity of adult labor.

Questions

1. Assume that the price for soccer balls faced by the firm equals 1 if the firm does not use child labor. However, there is a boycott on soccer balls produced by child labor, so that a firm that sells soccer balls produced by child labor receives a price of \( \alpha \) where \( \alpha < 1 \). Denote child wages by \( w_C \) and adult wages by \( w_A \), and assume that \( w_A > w_C \). What are the profits of a firm that hires only adult labor? What are the profits of a firm that hires child labor (and maybe some adult labor as well)? These expressions for profits should be functions of \( A, C, \alpha, \gamma, b, w_A \) and \( w_C \).

2. Consider a firm that hires both adult and child labor. Clearly the amount of money required to hire one more adult, \( w_A \), could be used to hire \( w_A/w_C \) more child laborers. Using your answer to part (1.), under what conditions is it more profitable for this type of firm to hire an adult worker, as opposed to hiring more child workers?

3. Consider your answer to (2.), in particular the condition that indicates when it is more profitable to hire another adult than it is to hire another child. What does this imply about the replacing current child laborers with adult laborers? More generally, under what conditions would you
expect to find the following types of firms: (a) All labor is adult labor; (b) All labor is child labor; and (c) Both child and adult labor are hired. You do not have to show a lot of derivations in your answer: just use economic reasoning.

4. Assume that an increase in the number of consumers who boycott soccer balls produced using child labor decreases the equilibrium wage rate for child labor, that is decreases $w_C$. To see what impact the boycott has on poor households in developing countries, assume that these households have the utility function $U = c^\alpha \ell^\beta$, where $c$ is household consumption, $\ell$ is child leisure (adults are assumed not to have leisure), and $\alpha > 0$ and $\beta > 0$. Let the household budget constraint be $c = I + (T_C - \ell)w_C$, where $I$ is adult income (assumed to be fixed) and $T_C$ is total child time. The household chooses $c$ and $\ell$ to maximize utility. Show the first order conditions for this household’s constrained maximization problem.

5. Use your answer to part (4) to find the utility maximizing values for child leisure and for household consumption, assuming an interior solution. What is the impact of the increase in the consumer boycott on the amount of time that children spend working (which is $T_C - \ell$) and household consumption? Comment on whether this model is sufficient for making policy decisions regarding child labor.
II. Protectionist Policies

In The Economist magazine, there is an article that states: "Protectionists in rich countries often complain that low wages give emerging economies, such as China or Malaysia, an unfair advantage. If it costs $16 an hour to employ a worker in America..., but less than $1 in China, then... free trade will threaten the prosperity of today’s rich nations.” This fear, however, is based upon a confusion about the concept of comparative advantage. Use your knowledge of at least one model of international trade to clarify this confusion. Specifically, analyze the effects of trade (or protectionist policy) on:

1. factor prices/returns within countries.
2. factor prices/returns across countries.
SET TWO:
Answer THREE of the following four questions (III to VI)

III. Export subsidies

Consider the policy of export subsidies. Examine the effect of eliminating this policy on

1. prices,
2. trade, and
3. welfare.

Make an assumption about whether your countries can affect the world price (i.e., large/small country assumption).
IV. Forms of trade

1. Define the following terms:

   (a) Inter-industry trade
   (b) Intra-industry trade
   (c) Inter-firm trade
   (d) Intra-firm trade

2. Now, evaluate the economic determinants of each of these forms of trade.
V. Measuring Productivity

1. Using a Laspeyres indexing procedure to aggregate inputs will cause measured multi-factor productivity to increase in response to changes in relative factor prices, even in the absence of technical change. True or false? Illustrate graphically and explain in a one output, two input world.

2. Setting aside the problem of aggregation bias, identify and carefully discuss at least two additional reasons for measured multi-factor productivity growth to deviate from zero.

3. Measuring the Welfare Effects of R&D: Using a clearly labeled figure of a multi-market model and associated explanation, evaluate the statement: "Research spillovers to the rest of the world increase the national welfare of an innovating, exporting country compared with a situation of no spillovers, true or false."
VI. Landlord and tenant contracts

(This is a variation of a model discussed in Apec 8703.)

A landlord leases a plot of land to a tenant. Tenant effort, denoted by $e$, cannot be observed by the landlord. Actual output, which is random, equals either 0 or 1. The probability that output (denoted by $y$) equals either 0 or 1 is a function of $e$:

$$Prob[y = 1] = e$$

$$Prob[y = 0] = 1 - e$$

Production requires a fixed amount of inputs, denoted by $B$. Assume that the contract is a sharecropping contract, where the shares of the output ($y$) going to the tenant and the landlord are the same as the shares that each must contribute to the inputs.

Finally, contracts take the following form. The landlord selects $\alpha$, which is the share of the output given to the tenant (and the share of $B$ that must be paid by the tenant). In addition, the tenant must pay "$r$" to the landlord as an upfront "fee". (However, if $r<0$ then the landlord provides the tenant with an upfront payment.) This fee must be paid both if $y = 1$ and if $y = 0$, and it does not depend on $y$.

Questions

1. Based on the above description of the contract, what is the tenant’s income if $y = 1$? What is it if $y = 0$? [Note: income could be $< 0$ if $y = 0$.] What is the tenant’s expected income, given the above probabilities for $y = 1$ and $y = 0$?

2. Write out the expression for the landlord’s expected profits as a function of $\alpha$, $e$, $B$ and $r$.

3. Assume that, in addition to expected income, tenants “suffer” a disutility of $-e^2/2$ for the effort they put into working the plot. Assume that the units of this disutility are the same as those for expected income. Given $\alpha$ and $r$, and using your answer to (1.), what is the tenant’s optimal level of effort?
4. The landlord knows that the tenant will choose the level of effort as given in your answer to (3.). He also knows that the tenant will not agree to the contract if his (the tenant’s) expected utility is <0. In effect, that means that the landlord faces a constraint that the tenant’s expected utility should be equal to zero. Given this situation, and your answer to (2.), what is the landlord’s optimal choice for the share of output that should go to the tenant (optimal α)? What is the intuition for this result?

5. Given your answer to (4.), what value of r maximizes expected profits for the landlord?