WRITTEN PRELIMINARY Ph.D EXAMINATION

Department of Applied Economics
June. - 2014
Trade, Development and Growth

For students electing
Macro/Trade (8702/Prof. Smith) & Micro (8703/Prof. Glewewe and Bellemare) 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. Rural Credit Markets With Moral Hazard and Adverse Selection.

A farmer with a given amount of land cultivates a crop using an input $x$. The output depends on the innate talent of the farmer. There are 2 possible states: $S$ (success) or $F$ (failure). Output, which depends on the amount of inputs ($x$) used and on success or failure, is as follows:

$$f_S(x) \text{ if state } = S(\text{success})$$

$$f_F(x) \text{ if state } = F(\text{failure})$$

Both $f_S(x)$ and $f_F(x)$ are strictly concave, $f_F(0) = 0$, $f_S(0) = 0$, and $f_S(x) > f_F(x)$ for all $x$.

The farmer needs to borrow money to purchase the input $x$, which has a price $= 1$. The lender offers two sizes of loans, $x_L$ (low) and $x_H$ (high), where $x_L < x_H$. The “gross” interest rate, which includes the principal, is $R(= 1 + r)$, and is the same for both loans. Assume throughout that the farmer is risk neutral.

Questions

a) The units of the output are set so that its price is also $= 1$. The value of the output when a small loan is taken, and the state is “failure”, is exactly enough to pay back the loan: $f_F(x_L) = x_LR$. Suppose that the farmer borrows a large loan, so that he or she borrows $x_L$. If the state is “failure”, will the harvest be sufficient to pay back the loan? No math is needed to answer this question.

b) For a given farmer, the probability of success is $p$, and thus the probability of failure is $1 - p$. Assume that, if the farmer cannot pay back the loan, the lender gets all of the output. If the farmer can repay, the loan is paid in full. What is the farmer’s expected profit if he or she takes the smaller loan ($x_L$)? What is the farmer’s expected profit if he or she takes the larger loan ($x_H$)?
c) Suppose that the following relationship holds if the state is “success” (S):

\[ f_S(x_H) - x_HR > f_S(x_L) - x_LR \]

State in words what this relationship means. Given this relationship, and your answer to b), will the farmer (who wants to maximize expected profits) prefer a large loan \( x_H \) or a small loan \( x_L \)?

d) Next, consider moral hazard. The farmer has the option of selling all of the input purchased using the loan for a higher price, \( q \), than he or she pays for it when using money borrowed from the lender (that is, the lender makes the input available for a price of 1, but the farmer can sell it for \( q \), which is \( > 1 \)). For simplicity, if this happens the farmer sells all of the input. Most importantly, the lender cannot seize any of the income that the farmer gets from selling the input; it can seize only the crop grown by the farmer. If the farmer sells all of the input, what is his or her expected profit if he or she takes the smaller loan \( x_L \)? What is the expected profit if he or she takes the larger loan \( x_H \)? Which does the farmer prefer to borrow, the smaller loan or the larger loan?

e) Given this state of affairs, and assuming that different farmers have different values of \( p \) (the probability of “success”), what are the values of \( p \) that correspond to the farmers that the lender would be willing to lend to, and what are the values of \( p \) that correspond to farmers that the lender would not be willing to lend to? For the farmers that the lender is willing to lend to, what is the expected profit of those farmers, and what is the expected profit of the lender? Your answer should depend upon \( p \).
II. Trade Theory

Instructions: Answer all parts of this question. Use intuition and relevant models/diagrams to illustrate and support your conclusions. Be sure to write clearly and label your diagrams precisely. Feel free to use abbreviated notation to simplify your answers. Be sure to: (1) note all assumptions that you make, (2) indicate how your conclusions change if you relax these assumptions, and (3) consider both theoretical and empirical analyses/literature.

Questions

1. Consider a case where countries differ in their relative abundance of capital and labor. Industrialized countries are relatively abundant in capital and developing countries are relatively abundant in labor. Assume that capital is used intensively in the manufacturing industry and labor is used intensively in the agricultural industry. Evaluate the welfare effects of trade liberalization on the welfare of capital owners and laborers in the long run. Focus your analysis on the developing country.

2. Consider a case where high skilled labor is specific to the manufacturing industry and low skilled labor is specific to the agricultural industry. Consider an industrialized country that is relatively abundant in high skilled labor and a developing country that is relatively abundant in low skilled labor. Evaluate the short run effects of trade liberalization on the welfare of these immobile laborers, as well as the welfare of a mobile factor endowment such as capital. Focus your analysis on the developing country.

3. The motives for inter-industry trade are similar to the motives for vertical FDI; and the motives for intra-industry trade are similar to the motives for horizontal FDI. Evaluate these relationships.
III. Child Labor And Schooling, With A Little Econometrics.

A household with one child is considering whether to send the child to school or send him or her to work. Let the variable $d$ take only 2 values: $d = 1$ if the child works, and $d = 0$ if the child goes to school. The child is either working or in school, and (unlike models discussed in class) cannot do both at the same time. The utility function of the household ($U$) is:

$$U = C + u_s(1 - d)$$

where $C$ is household consumption and $u_s$ is the utility the household obtains from the child being in school, which is a function of the vector $x$ and a random error term $\varepsilon$:

$$u_s = x' \beta + \varepsilon$$

Finally, the household faces the following budget constraint (note that schooling is free):

$$C = y + wd$$

where the price of $C$ is equal to 1, $y$ is adult income, which is exogenous, and $w$ is the wage income of the child if he or she works.

**Questions**

a) What is the utility of the household if the child goes to school? Denote this by $U_0$. What is the utility of the household if the child works? Denote this by $U_1$. Your expressions for $U_0$ and $U_1$ should be functions of $y, w, x$ and $\varepsilon$ (though not necessarily all of these), and should not include $d$ or $u_s$.

b) The household sends the child to school if the utility from doing that is greater than or equal to the utility of sending the child to work. Express this decision rule in terms of a relationship among the variables $y, w, x$ and $\varepsilon$.

c) Assume that $\varepsilon$ follows a standardized normal distribution, so that $\varepsilon \sim N(0, 1)$, and that $\varepsilon$ is uncorrelated with all the other variables. Use your
answer for b) to express the probability that the child goes to school as a function of some or all of the variables \( y, x \) and \( w \), but not as a function of \( \varepsilon \). Use the standard notation that a density of a variable with a standardized normal distribution is denoted by \( \phi() \) and the cumulative distribution function for such a variable is denoted by \( \Phi() \). [Hint 1: Probit! Hint 2: You may not need both \( \phi() \) and \( \Phi() \).]

\[ d \] Let there be three \( x \) variables, child age, child sex, and parental education. You have data on all three of these variables, and on \( y \) and \( d \), for all children and their households. Suppose that \( w \) varies by child, and that you observe \( w \) for all children who are working. Are these data sufficient to estimate the probability that a child goes to school as you expressed in c)? If so, very briefly explain how you would estimate it. If not, what data are still needed? Please be brief.

\[ e \] Finally, assume that child wages are determined by the function \( w = z'\gamma + \eta \), where \( \eta \) is also uncorrelated with all variables, and uncorrelated with \( \varepsilon \), and is also normally distributed. Modify your answer to c) to express the probability that the child goes to school as a function of some or all of the following variables \( y, x \) and \( z \), but not as a function of \( w, \varepsilon \) or \( \eta \).

\[ f \] Let there be three \( z \) variables, child age, child sex, and child height. You have data on all three of these variables, and on the three \( x \) variables, and on \( y \) and \( d \), for all children and all households. Are these data sufficient to estimate the probability that a child goes to school as you expressed in e), or do you also need data on \( w \)? Also, are these data sufficient to estimate the relative impact of child sex and parental education on the utility that parents obtain from sending their child to school? Please be brief.
IV. Share Tenancy

There is a long tradition of research on share tenancy in economics going back to Smith’s (1776, 1976) *Wealth of Nations.*

**Questions**

a) Discuss how sharecropping can be the result of a failure of the insurance market.

b) Discuss the empirical issues one must be mindful of when studying principal-agent relationships empirically. Note that your answer must go beyond a simple mention of the causes of statistical endogeneity (i.e., measurement error, unobserved heterogeneity, reverse causality/simultaneity) to focus on the context-specific causes of endogeneity in this context.

c) How would you go about testing between the Marshallian view that sharecropping is inefficient and the Cheungian view that sharecropping is first-best efficient? In other words, how would you go about determining empirically whether there is an efficiency loss associated with share tenancy relative to fixed rent due to moral hazard?
V. Trade Policy

Instructions: Answer all parts of this question. Use intuition and relevant models/diagrams to illustrate and support your conclusions. Be sure to write clearly and label your diagrams precisely. Feel free to use abbreviated notation to simplify your answers. Be sure to: (1) note all assumptions that you make, (2) indicate how your conclusions change if you relax these assumptions, and (3) consider both theoretical and empirical analyses/literature.

Questions

1. The developed countries of the “North” (including the US and EU countries) have resisted the liberalization of agricultural export subsidies. Use a partial equilibrium framework to illustrate whether or not the liberalization of export subsidies is economically rational from the North’s point of view and from a global point of view.

2. Consider a scenario where governments redistribute the “gains from trade” from those who win from trade liberalization to those who lose from trade liberalization. Propose a potential redistribution scheme in the case where agricultural export subsidies are liberalized.
VI. Trade-Related Policies and Institutional Arrangements

Instructions: Answer one part of this question. Use intuition and relevant models/diagrams to illustrate and support your conclusions. Be sure to write clearly and label your diagrams precisely. Feel free to use abbreviated notation to simplify your answers. Be sure to: (1) note all assumptions that you make, (2) indicate how your conclusions change if you relax these assumptions, and (3) consider both theoretical and empirical analyses/literature.

Questions (answer 1, or 2, or 3)

1. Trade Arrangements: Consider a trade arrangement such as the WTO, where only a small number of countries remain outside the arrangement. Specifically, consider the case where governments consider only the welfare of consumers.

   (a) Do the excluded countries have an incentive to join the arrangement from a consumer welfare perspective?

   (b) Do the included countries benefit from a broadening of membership from a consumer welfare perspective?

2. Trade and Growth

   (a) Consider the case where a country’s growth can affect the terms of trade. Compare the effects of export biased growth with import biased growth on production behavior and the volume of trade.

3. Trade-Related Environmental Policies

   (a) Consider the scenario where the production of GMO crops creates a negative production externality in a small exporting country. This externality could be the unwanted contamination of nearby land with GMO seeds blown by the wind. Assume that this externality is contained within the country. Examine the welfare effects of a second best policy for correcting this externality on the welfare of the exporter of the GMO crops.