WRITTEN PRELIMINARY Ph.D EXAMINATION

Department of Applied Economics

Summer – 2008

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 TWO questions from Set One

· Answer TWO questions from Set Two

· You have four hours to complete this examination
SET ONE

Answer TWO of the following THREE Questions (2 out of questions I, II or III).

I. Evolution of theory

The literature on international trade includes bodies of research referred to as: (1) traditional trade theory, (2) factor content theory, (3) New Trade theory, and (4) trade and multinationals theory. Recent research seeks to integrate these four literatures. Use your knowledge of these literatures to answer the following questions:

a) What are the key assumptions of each of the four literatures. In other words, what assumptions are relaxed relative to previous literatures?

b) Generally, how do the predictions of the models change as the assumptions are relaxed?

II. OLI concepts

Dunning (1977) introduced the concepts of ownership, location, and internalization (OLI). These concepts have been integrated in the trade and multinationals literature. Use your knowledge of this literature to interpret these concepts:

a) Ownership

b) Location

c) Internalization.
III. Theory vs. empirics

Use your knowledge of the trade and multinationals literature to explain the stylized facts below.

a) A large proportion of trade and direct investment occurs between relatively similar economies—similar in size and relative endowments. That is, flows tend to be North-North or South-South rather than North-South or South-North.

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

c) Direct investment has grown faster than trade in recent years.

d) A sizable portion of intra-industry trade (IIT) is intra-firm trade (IFT).
SET TWO

Answer TWO of the following THREE questions (2 out of questions IV, V and VI)

IV. Models of rural credit markets in developing countries.

Consider a rural credit market model in which both lenders and borrowers are risk neutral. The borrowers use the credit to invest in agricultural production, which is risky. If the harvest is a “success”, which happens with probability \( \pi \), total output is \( R \) and the borrower has to pay the interest rate \( i \) (which includes principle plus interest) to the lender. If the harvest is a “failure”, which happens with probability \( 1-\pi \), total output is 0 and the borrower does not have to pay anything to the lender.

Assume that there are two types of borrowers, denoted by 1 and 2. Type 2 borrowers invest in riskier investments (smaller \( \pi \)), but the return on those investments is higher:

\[
\begin{align*}
\pi(1) &> \pi(2) \\
R(1) &< R(2)
\end{align*}
\]

Unlike in class, assume that the expected value of the riskier investment is higher:

\[
\pi(1)R(1) < \pi(2)R(2)
\]

You could think of the type 2 people as those who will invest in a “new technology”, which is riskier but has a higher expected return than the old technology, but this interpretation is not essential for answering this question.

a) Assume that the (expected) utility of the borrowers depends solely on expected income. Show the (expected) utility of both types of borrowers, which you can denote as \( U(j) \), as expressions of \( \pi(j) \), \( R(j) \) and \( i(j) \), where \( j = 1 \) or 2 and it is possible that the interest rate is different for the two types of borrowers.

b) What are the expected profits (which you can denote as \( \Pi(j) \), where \( j = 1 \) or 2) of lenders from lending to the two types of borrowers. These should be functions of \( \pi(j) \), \( R(j) \) and \( i(j) \) [but you do not necessarily need all of these].

(this problem is continued on next page)
c) Consider a situation where there is only one lender, and that lender can identify which borrowers are type 1 and which are type 2 (he or she is a “fully informed monopolist”). Assuming that this lender wants to maximize his or her profits, what interest rate will he or she charge to each type of borrower? Assume that borrowers always have the option of working in the labor market for a wage of W (there is no risk associated with working for this wage) if they think that the interest charged by the lender is “too high”. Given these interest rates, which type of borrower will the lender prefer to lend to? Give the intuition for this result (please be brief when giving the intuition, one or two sentences is enough). [Note, your answers should be functions of $\pi(j)$, $R(j)$ and $W$.]

d) Now assume a different situation regarding the lenders. Assume that there are many lenders that compete against each other, and that they cannot distinguish between type 1 and type 2 borrowers (the “adverse selection” situation). Recall that in this situation the lender has no choice but to set one interest rate for both types of borrowers. For a given interest rate charged to both types of borrowers, which type of borrower has the highest utility? Which type of borrower is better for the lender in terms a yielding a higher profit at the given interest rate?

e) Continuing with the situation of part d) define $i^*(1)$ as the highest interest rate that type 1 borrowers are willing to pay (if the interest rate is higher then they will work for wage W), and define $i^*(2)$ as the highest interest rate that type 2 borrowers are willing to pay. Using your answer to part c) above, which “maximum” interest rate is higher?

f) Continuing with the situation of parts d) and e), let $\rho$ be the risk-free rate of interest that lenders can use to “put their money in the bank” instead of lending to borrowers of each type. Continue to assume that there is competition among lenders. Show what $\rho$ equals when both type of lenders are willing to borrow, and when only one type of lender is willing to borrow. Assume that the proportion of borrowers who are type 1 is $p(1)$, and thus the proportion of borrowers who are type 2 is $1 - p(1)$. Your answer should be an expression of $\rho$ as a function of some (or maybe even all) of the parameters of the model. Are there any values of $\rho$ that are “socially inefficient” in that capital is allocated to two or more sets of activities that do not have the same return to society? Explain why these values of $\rho$ are socially inefficient.
V. Factor Productivity and Technical Change

1) Using the relationships between a partial-, a multi-, and a total-factor productivity index, describe what Abramovitz meant by the notion that productivity is a “measure of our ignorance.”

2) 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.

3) 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.
VI. Inequality and economic efficiency (sugarcane).

Consider a community of sugarcane farmers. They all face the same technology for output per acre:

\[
\text{Output per acre} = f(l), \quad \text{where } l \text{ is labor per acre, and } f'( ) > 0, f''( ) < 0
\]

There are N “big” farmers, each of whom owns B acres of land, and M “small” farmers, each of whom owns S units of land.

All of these farmers take their sugarcane to a sugarcane cooperative that runs a sugarcane processing plant. The (per unit) cost of producing one unit of sugar from one unit of sugarcane is a function of the total amount processed:

\[
c = c(Q), \quad \text{where } c'( ) < 0 \quad \text{and } Q = \text{total sugarcane processed by the mill}
\]

Let \( p^* \) be the (exogenous) price of sugar, \( p \) be the price of sugarcane paid by the mill to farmers, and \( w \) be the wage rate for labor. [Note that in the lectures \( w \) was assumed to equal 1, but here that assumption is not made. Another change from the lecture is the \( c( ) \) is a function of \( Q \), not a function of some “capacity”.

a) Assume that both types of farmers maximize their profits, taking \( w \) and \( p \) as exogenous. For simplicity, suppose that they hire all the labor they use, and do not use any household labor. Show the first order condition for the farmer’s maximization problem (in terms of labor hired per acre of land).

b) How does the demand for labor (per acre of land) change as the relative price of sugarcane (\( p/w \)) changes? [Hint: it may be more intuitive to express the relative prices as \( w/p \) instead of \( p/w \).] Explain whether there is a well defined demand for labor (per acre of land) function that is a function of the relative price of sugarcane. If there is, express labor demand (per acre) as a function of the relative price of sugarcane and write the farmer’s profit function (per acre) as a function of that relative price and the price of sugarcane. If not, explain why it is not well defined.

(this problem is continued on next page)
c) Show how the total amount of sugar produced by all of the farmers, Q, is a function of the number of the two types of farmers, the acres that each type has, and the relative price of sugarcane paid by the sugarcane mill. Assume that all farmers in this area bring their sugarcane to this mill. Using your answer to part b), show the direction of the impact on Q of an increase in w. Show the direction of the impact on Q of an increase in p.

d) Next, let’s work out the price of sugarcane that the mill pays to the farmers (p) that is socially optimal. For this community, show what the social benefit is (to the community) for each acre of sugarcane that is processed into sugar. [Hint: this expression should have p*, c(Q) and w in it.] Differentiate this with respect to p to obtain a first order condition for maximizing the social benefit of processing one acre of sugar cane. [Hint: You will need to express Q as a function of p before differentiating.] For extra credit, show that this first order condition can be interpreted as indicating that the mill should set the marginal revenue of processing another unit of sugar cane equal to the marginal cost.

e) The government has heard news reports of “big” land owners effectively taking control of sugar cooperatives, raising prices, and distributing profits only to “big” land owners (giving none of the profits to “small” land owners). So the government passes a law stipulating that all sugarcane processing cooperatives must set the price p to farmers so that profits of the cooperative equal zero, and that no “payments” of any kind can be made to anyone. Will this price be the same as the optimal price derived in part c)? Give the intuition behind your answer. [Note that, unlike the model in class, there is no G(K) function here, that is there are no fixed capacity costs.]