WRITTEN PRELIMINARY Ph.D EXAMINATION

Department of Applied Economics
Jan.\Feb - 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 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. Health and nutrition in developing countries.

1. Many aid agencies have advocated that governments provide basic preventative health care services (sometimes called primary health care) at little or no cost to all citizens in developing countries. Give two reasons why this policy may not be very effective at improving health status in developing countries. Give one counterargument for each of your two reasons.

2. Suppose you are operating a refugee camp in an area that has been hit by a severe drought. One of your responsibilities is to provide food to malnourished children age 10 or younger. Your food supply is limited so you want to give it to the most severely affected children. If you have almost no medical equipment to do sophisticated medical assessments, what kind of measurements can you obtain that will help you decide which children are most in need? Assume that parents have very low levels of education, so they cannot provide much useful information about the health of their children. Also, explain whether “sophisticated” medical equipment could improve on what you propose. Be very explicit in your answer.

3. Consider a simple static model of food consumption for a household with two children. The utility function for the household depends only on calorie consumption of the parents \((C_p)\), calorie consumption of child 1 \((C_{c1})\) and calorie consumption of child 2 \((C_{c2})\):

\[
U_H = C_p^\alpha C_{c1}^\beta C_{c2}^\gamma
\]

where \(\alpha, \beta, \gamma\) are all \(> 0\). Assume that child 1 is very young and consumes only infant formula, denoted by \(F\), which has a price (per calorie) of \(p_F\). In contrast, child 2 and the parent consume only rice, denoted by \(R\), which has a price (per calorie) of \(p_R\). Assume that household income \((Y)\) is exogenously given to the household. Derive the household’s demand for infant formula \((F)\) and rice \((R)\) as a function of \(Y, p_F, p_R\) and the parameters of the utility function. Assume that each
unit of infant formula yields 1000 calories, and each unit of rice yields 1000 calories. [Hint: first work out the demands for the three kinds of calories in the utility function, and than convert this to demands for rice and infant formula.]

4. Suppose that the government cares only about children’s caloric intake because it has an effect on children’s school performance, as measured by test scores ($T$). Assume that child 1 is too young to attend school now (but will attend school when he or she is old enough), while child 2 is old enough to attend school now, and indeed he or she is attending school. According to research by Nobel prize winning economists and medical researchers, the following relationship holds between test scores and children’s calorie consumption: $T = 10 \times C_{\text{infant}} + 5 \times C_{\text{student}}$, where $C_{\text{infant}}$ is calories consumed while an infant (which are obtained from infant formula) and $C_{\text{student}}$ is calories consumed while a student in school (obtained from rice). The government has enough money to either subsidize infant formula and reduce its price (per calorie) from $p_F$ to $p_F/4$, or subsidize rice and reduce its price (per calorie) from $p_R$ to $p_R/2$. For simplicity (and without loss of generality), assume that $\alpha + \beta + \gamma = 1$. Using your answer from part 3 above, which type of subsidy is most effective in raising children’s test scores? [Hint: this may depend on the values of some exogenous variables and/or parameters.] For extra credit, explain why setting $\alpha + \beta + \gamma = 1.$ is just a normalization and not a restriction on the utility function.

II. Trade and multinationals: policy.

A primary effort of research on trade and multinationals is to analyze firms’ decisions about how to service foreign markets. These decisions include: trade, foreign direct investment, licensing, and joint ventures. Use Dunning’s concepts of:

1. Ownership
2. Location
3. Internalization
to explain these alternative servicing decision. Be sure to refer to national policies that can affect servicing decisions via their affects on ownership, location, and internalization advantages.
III. Risk, insurance, and social networks.

Consider a community in which two social networks exist, which we can denote as A and B. The people in each of these networks have developed a system to share risks. Membership in these networks is based on ethnic group. There are two ethnic groups in the community, A and B. All the people of ethnic group A are members of social network A, and all the people of ethnic group B are members of social network B. There is only one person in the community who belongs to both networks, since his father is from ethnic group A and his mother is from ethnic group B.

Consider the risk sharing that occurs for members of network A. Through bargaining at time period zero, or perhaps through some dictator social planner, there exists for all members of that group the following social welfare function:

\[ SWF_A = \sum_{i=1}^{N_A} \lambda_i U_i \quad \text{with} \quad \sum_{i=1}^{N_A} \lambda_i = 1, \quad \text{and} \quad U_i = \sum_{t=1}^{T} \beta^t \sum_{s=1}^{S} \pi_s u_i(c_{ist}) \]

where \( N_A \) is the number of people in network A, \( \lambda_i \) is the “social welfare weight” of person \( i \), \( s \) indicates a “state of nature” and \( \pi_s \) is the probability of that state of nature occurring. Assume throughout that \( u_i(c_{ist}) > 0 \) and \( u_i^*(c_{ist}) < 0 \) for all \( i \) and all values of \( c_{ist} \).

1. Assume that each person in the network A earns an income of \( y_{ist} \) at time \( t \) if state \( s \) occurs. Assume also that the network cannot save or borrow money over time, so total income of the network members must equal total consumption of network members for each time period. For simplicity, assume that the person who is a member of both network A and network B gives half of his income to each network in each time period. Network A is effective in maximizing social welfare for that network, subject to the constraint that total consumption must equal total income in every time period. For any two persons in network A, \( i \) and \( j \), what is the relationship between their marginal utility of consumption and their social welfare weights? Derive your result, using...
the notation that $y_{ist}$ is the income of person $i$ at time $t$ if state $s$ occurs. [Notational hint: use $N_A$ to denote the number of people in network $A$.]

2. Suppose that $u_i(c_{ist})$ has the following functional form for all $i$, $s$ and $t$:

$$u_i(c_{ist}) = (1 - \rho)^{-1} \theta_i c_{ist}^{1-\rho} \quad \theta_i > 0$$

Note that this assumes constant relative risk aversion. The $\theta_i$ term simply shows that individuals differ in their “efficiency” of converting $c_{ist}$ into utility. Use your result in 1.) to derive $\ln(c_{ist})$ as a function of $\ln(c_{jst})$, $\rho$, $\theta_i$, $\theta_j$, $\lambda_i$ and $\lambda_j$. Explain in words what this means about the relationship between the consumption of person $i$ and person $j$ in the same risk sharing network (network $A$).

3. Use your answer to part 2.) to express the relationship between the consumption for person $i$ in network $A$ (at time $t$ if state $s$ occurs) to the average (log) consumption levels of all people in that network (at time $t$ if state $s$ occurs). Explain in words what this means. [Hint: sum over $j$ for both sides of your answer to 2.)]

4. Use your result in 3.) and apply it to the person who is a member of both networks, $A$ and $B$. For notational convenience, let this be $k$th person in both networks. Show the relationship between the average (log) consumption in network $A$ (averaging over all people in that network) and average (log) consumption in network $B$ (averaging over all people in that network). How is the change in average (log) consumption in network $A$ from time $t$ to time $t + 1$ related to the change in the average (log) consumption in network $B$ from time $t$ to time $t + 1$? Explain the intuition behind your results.
IV. Trade and multinationals: theory.

A dominant feature of models in trade theory is the assumption of a national firm that produces in one location. Yet, this assumption is inconsistent with the stylized fact that many industries are dominated by multinational firms. Recent theoretical research has reconciled trade theory with this stylized fact by endogenizing multinational firms into general equilibrium trade models. Based on the recent theory literature, analyze how equilibrium trade and foreign direct investment depends on:

1. Firm-level economies of scale
2. Plant-level economies of scale
3. Trade barriers (such as tariffs)
4. Country sizes
5. Country relative endowments
6. Knowledge assets
V. R&D and R&D spillovers

In a two-country world where a large exporting country (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. Does the welfare of producers in the Foreign (i.e., non-innovating) country increase or decrease as a consequence of R&D spillovers emanating from the Home country compared with a situation of no spillovers? Illustrate and discuss.

2. Research spillovers to the rest of the world increase the national welfare of the Home country compared with a situation of no spillovers. True, false, explain.

3. Carefully describe the data requirements to estimate the welfare consequences of international R&D spillovers in a multi-market equilibrium displacement model.
VI. Trade and multinationals: stylized facts.

Consider the following changes in the patterns of international trade and investment:

1. Foreign direct investment (FDI) has grown worldwide.
2. Developed countries are the predominant sources and recipients of FDI.
3. FDI tends to be horizontal rather than vertical.
4. Trade within companies (“intra-firm trade”) has grown.
5. A large proportion of trade and FDI occurs between relatively similar economies.
6. A large proportion of trade and FDI is two-way trade in similar products (“intra-industry trade”).
7. FDI has grown faster than trade in recent years.

Use your knowledge of trade and multinationals theory to explain five of the above stylized facts. Be sure to discuss key assumptions and features of the models in this literature.