WRITTEN PRELIMINARY Ph.D EXAMINATION
Department of Applied Economics
Winter - 2007
Trade, Development and Growth

For students electing
Macro (8701) & New Trade Theory (8702) 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. Trade and Multinationals: Stylized Facts. Consider the following changes in the patterns of international trade and investment:

1. Since the late 1980s, foreign direct investment (FDI) has grown worldwide. According to UNCTAD, FDI increased from $203 billion in 1990 to $735 billion in 2001.

2. Developing countries received $238 billion of this investment. Accordingly, developed countries are predominant sources and recipients of FDI.

3. Further, FDI tends to be horizontal in that the output of foreign affiliates is sold in the foreign country.

4. As FDI has grown, trade within companies has also grown. This trade (referred to as intra-firm trade) includes trade between subsidiaries located in different countries and between a subsidiary and its headquarters. According to the WTO, approximately one third of the $6.1 trillion total of world trade in 1995 was intra-firm trade. Consequently, since the 1980s an increasingly large share of trade is related to investment.

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

II. Agricultural Led Growth

Rosenstein-Radan, Nurkse, and Hirshman, among others, emphasized industrial development as the main source of economic growth. Agricultural was viewed as the "backward" sector. Mellor, Schultz, the Berg report and the 1982 World Development Report, among others, challenged this view; they suggest that agricultural growth is causally prior to industrial development. Triffin and Irz’s recent time series analysis of 85 countries over
the period 1960 - 2005 find overwhelming evidence in support the Mellor - Schultz et al view of the agricultural led growth line of causation.

Using, in Prescott’s terminology "growth theory considerations," consider a country at the early stage of development. The environment is as follows: Most workers are in agriculture, a large share of income is spent on food so that households are at subsistence levels, and international capital markets are not available. Use your knowledge of growth theory to explain, as concisely and analytically driven as possible, agriculture’s likely role in the country’s transition to higher real worker income. While you need to draw upon your knowledge of growth theory, do not waste time developing an analytical model here. Instead, use the results that such a model would suggest.

More specifically:

1. Explain at least three of the likely "main sources" of growth of the economy.

2. Discuss how the initial conditions (low returns to labor and land, and a high proportion of income spent on food) might act as a constraint to the growth of the economy.

3. As the country proceeds in transition growth, that is, as the initial conditions discussed in (2) become less of a constraint
   (a) Explain how the activities of rural households engaged in agriculture can provide the conditions for growth of the rest of the economy,
   (b) Explain/discuss how the activities discussed in (a) above cause and/or contribute to the growth of the manufacturing and service sectors
   (c) How does the growth of the manufacturing and service sectors impact resources and incomes in agriculture?

4. Given your answers above; (answer a. or b. but not BOTH)
   (a) How will a policy of import substitution - industrialization likely affect the structure of the economy and "slow down" a country’s transition to long-run growth?
(b) How will "backward or non-market friendly institutions" likely affect the structure of the economy and "slow down" a country’s transition to long-run growth?
III. Trade and Multinationals: Theory Models.

A primary effort of the theory research on trade and multinationals is to explore firms’ decisions about how to service foreign markets. These decisions include servicing via trade, FDI, licensing, or joint ventures. In modeling these decisions, prominent features include:

1. accounting for firm-level economies of scale relative to plant-level economies;
2. redefining the unit of analysis to include multinationals in addition to national firms; and
3. accounting for the non-rival characteristics of nonphysical factors of production (e.g., knowledge or intellectual property).

Discuss the links between these modeling features and the concepts of ownership, location, and internalization of Dunning’s eclectic paradigm.

IV. Trade Liberalization and Economic Growth

The results in the table show that the liberalization of world agriculture is expected to cause a real increase in world agricultural prices. The word "world" is emphasized because the removal of agricultural tariffs in some countries may cause their agricultural prices to fall by more than the price increases appearing in the table.

<table>
<thead>
<tr>
<th>CGE Model Results: Percent Change In The Real Index of World Market Agricultural Price From Liberalizing World Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Change From Base Period Prices</td>
</tr>
<tr>
<td>Remove all Ag. Sector Distortions</td>
</tr>
<tr>
<td>Remove all Ag. Sector Tariffs</td>
</tr>
<tr>
<td>Remove Domestic Ag Subsidies</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th></th>
<th>World</th>
<th>Developed Countries</th>
<th>Developing Countries</th>
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</thead>
<tbody>
<tr>
<td>Remove all Ag. Sector</td>
<td>9.86</td>
<td>6.56</td>
<td>3.22</td>
</tr>
<tr>
<td>Distortions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove all Ag. Sector</td>
<td>7.01</td>
<td>3.99</td>
<td>3.07</td>
</tr>
<tr>
<td>Tariffs</td>
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<tr>
<td>Remove Domestic Ag</td>
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<tr>
<td>Subsidies</td>
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</tbody>
</table>

Source: The Road Ahead, USDA/ERS
1. Define and state the properties of an agricultural GDP function for which the underlying technology is CRS, the sector employs three factors of production; land, labor and capital, and land markets are complete and the sector is competitive.

2. Given (1), derive and discuss the direct and the indirect effects on agricultural GDP and agricultural supply for the case where liberalization leads to an increase in the output price received by farmers. Here, you may need to distinguish between concepts of partial and general equilibrium supply, the characteristics of the rest of the economy as well as assumptions about relative factor intensities.

3. "Short" answer questions:

   (a) Based on neoclassical growth theory, will the above increase in agricultural price received by farmers affect the sector's long-run rate of growth? Explain and/or derive the reason for your answer.

   (b) Why would you expect the discounted present value of some money metric of utility change to be greater when the above analysis is conducted with a dynamic inter-temporal model compared to a static CGE model in which the gains are discounted over the same period of time?

   (c) Suppose the liberalization of world agricultural trade means the removal of Morocco’s protection on wheat, sugar and bananas so that prices received by farmers falls. Suppose, as we experienced, the model suggests that Morocco’s economy-wide GDP falls as a result. Based on the modeled economy, briefly explain the cause of this result.

   (d) Some developing countries are net-food importers. Liberalization of world agriculture may result in a "negative terms of trade" effect.

      i. In a static two-sector open economy model, what is the economic effect of a negative change in the terms of trade?

      ii. In a neoclassical growth model, explain why or (why not) this same concept may apply

      iii. Even if the terms of trade change are negative (i.e., lead to a negative discounted present value willingness to pay for the
representative household), list and discuss one reason why an economist may still recommend such a change as being welfare enhancing for society.

V. The Natural Resource Curse

Many of the world’s economies have foreign exchange earnings from natural resources, such as petroleum, diamonds, and precious metals. These resources require relatively little of the economy’s other labor and capital resources to produce, and they tend to generate relatively high rents or royalties that largely accrue to government. The studying of these economies by economists has given rise to the phrase "the natural resource curse" because they typically grow more slowly than the rate of growth in the world economy.

Your task is two fold:

1. Using growth theory considerations and either a graphical or analytical framework, explain how the presence of this sector an a small open economy that produces traded goods and a home good is likely to affect the country’s transition, by sector, to long-run growth when the government simply passes on to households in lump-sum the entire royalties/rents earned from the extraction and export of the natural resource. (ignore problems of depletion of the natural resource stock over time). Your answer to this question should include (but not necessarily limited to) discussion of:

   (a) How the royalties/rents will likely affect the country’s trade balance?

   (b) How the royalties/rents are likely to alter the final good shares in GDP of say, manufacturing, services and agriculture relative to the case of the same economy without these inflows, and

   (c) How will these inflows likely affect payments to labor?

2. Now, suppose that the resource royalties/rents generated are NOT allocated lump-sum to households. Instead, they are subject to lobbying and rent seeking by special interests to be invested in projects which
(for our purposes here) are unproductive, i.e., they yield NO product/service that enters the representative households utility function either directly or indirectly. Now, "re-answer question 1. That is, explain how this environment is likely to affect the country’s transition, by sector, to long-run growth. Your answer to this question should include (but not necessarily limited to) discussion of:

(a) How the royalties/rents will likely affect the country’s trade balance?
(b) How the royalties/rents are likely to alter the final good shares in GDP of say, manufacturing, services and agriculture relative to the case of the same economy without these inflows, and
(c) How will these inflows likely affect payments to labor?

VI. Neoclassical Growth Theory

The three sector growth model of a small open economy (with homothetic preferences, complete markets, and CRS technologies) is often used as a point of departure to explain structural change (i.e., changes in sectoral output shares in total GDP) in the process of economic growth. This question presumes you know the fundamental assumptions, analytics, the definition of and characterization of equilibrium of this model. Consequently, the main focus is on the model’s comparative static/dynamic properties and their interpretation.

Given initial conditions, where we assume \( \hat{k}(0) < \hat{k}_{ss} \), a solution of the model entails obtaining values for \( t = 0, \ldots, t^* \) of endogenous variables

\[
\{ \hat{y}_a(t), \hat{y}_m(t), \hat{y}_s(t), \hat{k}(t), p_s(t), \hat{w}(t), r(t) \}
\]

where: \( a \) (agriculture), \( m \) (manufacturing), \( s \) (non-internationally traded goods), \( \hat{y}_j \) is supply per effective worker, \( \hat{k} \) is capital stock per effective worker, \( p_s, \hat{w} \), and \( r \) denote price, wage rate per effective worker and the real rate of return to \( \hat{k} \) per effective worker, respectively. From this sequence, the sequence of other endogenous variable can be calculated.

1. Comparative static/dynamic questions: Show, derive or otherwise indicate the structural features of the modeled economy that determines, in transition to long-run equilibrium, the sign of:
(a) the price of "home goods"
\[
\frac{\dot{p}_s}{p_s}
\]

(b) and show/derive the determinants of the rate of growth in
i. the supply of agriculture
\[
\frac{\dot{Y}_a}{Y_a}
\]
ii. the supply of manufacturing
\[
\frac{\dot{Y}_m}{Y_m}
\]
(c) and, what is the rate of growth of these variables, \( \left( \frac{\dot{p}_s}{p_s}, \frac{\dot{Y}_a}{Y_a}, \frac{\dot{Y}_m}{Y_m} \right) \), in long-run equilibrium?

2. The flow budget constraint of the representative household can be written in of two equivalent ways, one of which is
\[
\dot{A} (t) = w (t) L (t) + r (t) A (t) - \sum_{j=a,m,s} p_j (t) Q_j (t)
\]
where assets \( A (t) \) are defined as the value of capital and land, i.e.,
\[
A (t) = K (t) + P_H (t) H
\]
where we normalize the price of the capital good to unity, \( P_H \) is the price of land (or some other fixed natural resource), \( H \) is the quantity of land that we presumed to be fixed, and \( \sum_{j=a,m,s} p_j (t) Q_j (t) \) is total expenditures. We can also write the budget constraint as
\[
\dot{K} (t) = w (t) L (t) + r (t) K (t) + \Pi (t) H - \sum_{j=a,m,s} p_j (t) Q_j (t)
\]
where, \( \Pi (t) = \pi (p_a, \dot{w} (t), r (t)) \), is the rental rate that "clears" the agricultural land market.
(a) Using these two budget constraints, derive the no-arbitrage condition between land and capital, i.e., derive the condition whereby households are indifferent between holding an additional increment of land or capital in their portfolio (hence, there is no remaining incentive to arbitrage).

(b) In the process of transition growth, it is well known that
\[ \dot{\Pi} = \pi_w \frac{\dot{w}}{w} + \pi_w \frac{\dot{r}}{r} \]
can be positive or negative. Suppose \( \dot{\Pi} \) is positive. What is the affect of \( \dot{\Pi} > 0 \) on the price of land in transition.

(c) Suppose there are "two" \( r' \)'s in this economy. Let
\[ r_u : \text{interest rate in the formal urban capital market which is not available to rural HH} \]
\[ r_r : \text{interest rate in the informal rural capital market which is not available to urban HH} \]
Suppose:
\[ r_r (t) > r_u (t) \]
i. What are the implications of this "capital market segmentation" to the no-arbitrage condition derived in a.? Discuss the likely implications on the price of land and land and on urban - rural land holdings if a market for land were added in such a way that the rural and urban households could engage in land transactions.

3. For the case of homothetic preferences and unitary inter-temporal elasticity of substitution, the Euler equation for the representative household can be written as
\[ \frac{\dot{E} (t)}{E (t)} = \rho + x \]
(a) Discuss the "meaning" of this condition
(b) Now, choose another household in this economy, call this household $i$.

i. What is the relationship between $\hat{E}_j(t)$ and $\hat{E}(t)$ for $t_1, t_2, \ldots, t^*$?

ii. Suppose you know, for $t = 0$, the distribution of household expenditures (as perhaps the result of a consumption/expenditure survey). Think of this distribution as an S shaped cumulative density function, with expenditure on the horizontal axis, and the proportion of households on the vertical so that a coordinate point tells you the percent of households living on $z$ dollars per day or less. Given your answer in (i), speculate as to how this distribution is likely to shift over time.