WRITTEN PRELIMINARY Ph.D EXAMINATION

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

For students electing
Macro (8701/Prof. Roe) & Macro (8702/Prof. Smith) 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. 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.
II. Growth Theory

Consider the three sector growth model in which there are two traded goods sectors, industry and agriculture, and a non-internationally traded good, services. Index these goods as \( j = m \) (industry), \( a \) (agriculture), \( s \) (service). Households own the economy’s factor endowments, labor, \( L(t) \), capital \( K(t) \), and land \( H \). Households rent out the services of these resources in exchange for factor payments \( w(t) \), \( r^k(t) \) and \( H \), respectively, which they in turn allocate to savings and expenditures on industrial \( Q_m(t) \), food \( Q_a(t) \) and service goods \( Q_s(t) \).

The representative household seeks to maximize

\[
\int_0^\infty \frac{q^{1-\theta} - 1}{1-\theta} e^{\left(n-\rho\right)t} \, dt
\]

subject to the flow budget constraint

\[
\dot{k} = w + k (r - n) + \pi H - \epsilon
\]

where expenditures

\[
\epsilon = E(p_a, p_m, p_s) q \equiv \min_{q_a, q_m, q_s} \{ p_a q_a + p_m q_m + p_s q_s : q \leq u(q_a, q_m, q_s) \}
\]

and \( p_m = 1 \).

The behavioral rule (the Euler equation) for households, in effective labor units, is

\[
\frac{\dot{\epsilon}}{\hat{\epsilon}} = \frac{1}{\Theta} \left( r^k - \rho - \delta - \theta x + \lambda_s \frac{\hat{p}_s}{p_s} (\theta - 1) \right)
\]

where expenditures per effective worker are

\[
\hat{\epsilon} = E(p_m, p_a, p_s) \hat{q}
\]

The behavioral rules for firms in the manufacturing and the service sector are

\[
C^j (\hat{w}, r^k) \gamma_j \equiv \min_{l_j, k_j} \left\{ \hat{w} l_j + w^k k_j : \gamma_j \leq f^j(l_j, k_j) \right\}, \quad j = m, s
\]

and agriculture (in units per effective worker) they are

\[
\pi^a (p_a, \hat{w}, r^k) H \equiv \max_{l_a, k_a} \{ p_a f^a(l_a, k_a, H) - \hat{w} l_a - r^k k \}
\]
Questions
State any necessary additional assumptions and conditions that may be necessary, then

1. Characterize intra-temporal equilibrium
2. Show/discuss how you derive the reduced form functions for \( \{\hat{w}, r^k, \hat{y}_m, \hat{y}_s\} \).
3. Show "how" you solve for the model’s steady-state values \( \{\hat{k}^{ss}, \hat{y}_s^{ss}\} \).
4. Derive the models two differential equations

SET TWO:

Answer THREE of the following four questions (III to VI)

III. 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.
IV. 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 effect 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.
V. Characterizing Economic Growth

Countries experiencing long-run trend growth in real income per capita almost always experience the type of structural transformation shown in Figure 1.a and 1.b.

\[ \text{Figure 1.a} \quad \text{Figure 1.b} \]

Source: Herrendorf, B., R. Roberson and A. Valentinyi (2013). *Growth and Structural Transformation*, NBER Working Paper 18996. **Figure 1.a** On the "y" axes: Share of labor in agriculture (top panel), manufacturing (middle panel) and service (bottom panel) to Log GDP per capita; **Figure 1.b**. On the "y" axes: Share of agriculture GDP (top panel), manufacturing GDP (middle panel) and service GDP (bottom panel) to Log GDP per capita.

Questions

Use your knowledge of the three-sector "platform" growth model to explain the underlying economics of this transition process. More specifically

1. First,

   (a) Specify you assumptions for each sector on labor and capital factor shares (you can use hypothetical numbers to be explicit).
(b) Indicate which sectors are internationally tradeable, and state other assumptions necessary for guiding your reasoning on transition growth.

2. Explain the basic economic forces (e.g., capital deepening, changes in the marginal value product of labor, growth in income) causing the share of labor in agriculture to fall, and the share of labor in manufacturing and services to rise.

3. Consider a transition path where growth in GDP is expressed as a function of growth in sectoral GDP as follows.

\[ \frac{\dot{GDP}(t)}{GDP(t)} = S_a(t) \frac{\dot{GDP}_{ag}(t)}{GDP_{ag}(t)} + S_m(t) \frac{\dot{GDP}_{mnf}(t)}{GDP_{mnf}(t)} + S_s(t) \frac{\dot{GDP}_{ser}(t)}{GDP_{ser}(t)} \]

Also, suppose a long-run steady state equilibrium is one where

\[ \left( \frac{\dot{GDP}}{GDP} \right)^{ss} = S_{a}^{ss}(x + n) + S_{m}^{ss}(x + n) + S_{s}^{ss}(x + n) = x + n \]

and \( x, n \) denote Harrod technical change and \( n \) growth in the labor force. **Question:** Explain agriculture’s contribution to economic growth as a country transitions from low to higher income as depicted in the above diagrams.
VI. Policy Application: Financial crises

Imbalances in the world economy have received increased attention since the recession that struck many countries beginning in 2007. A typical feature can be seen from the imbalances in Europe (attached figure). The negative bar includes the countries of Ireland, Greece, Spain and Portugal. The positive includes Germany, Netherlands and France.


**Question**
Consider the case of Greece; start with the supposition that:

- The country has accumulated a large stock of government debt for some extended period
- As a member of the European Union, it cannot devalue its currency (the Euro) (if it cannot devalue the Euro, adjustments must come in terms of home good prices, wages and other variables rather than the nominal value of the currency)
- Assume debt repayment implies the need for $Taxes > Gov\ spending$ for some extended period into the future
- For simplicity, presume the rate of return to capital $r^k$ is determined by the productivity of capital in Greece only.
- Make the necessary assumption and answer the following two questions
1. Provide a graphical depiction and accompanying explanation of the adjustments brought about by a "financial collapse" and the need to accommodate payments on principle and interest for the case of \( \text{Taxes} > \text{Gov spending} \). In this depiction, you should also discuss briefly the likely dynamic effects on saving, investment and transition growth.

2. Now, for the purpose of this question, narrow your focus to agriculture. Be more analytical, and explain/show the adjustment in agricultural factor (labor, capital) allocations associated with readjustment \( (\text{Taxes} > \text{Gov spending}) \). To answer this question, you need to take into account the links between the evolution of the price of home goods, wages, and returns to capital \( r_k \).