Written Exam for the M.Sc. in Economics 2009

International Trade and Investment
Final Exam/ Elective Course/ Master's Course
Fall 2009

4-hour closed book exam

- There are pages in this exam paper, including this instruction page
- You need to answer all FOUR questions, so manage your time accordingly.
- If a question asks you to list three things, please underline the list with preceding numbers as exampled below.
  1. Thing number 1
  2. Thing number 2
  3. Thing number 3
- Make your math legible and easily followed, with the final answer boxed.
- Partial credit may be given.

Good Luck!

1. Exporters and non-exporters

   Identify whether these statements are true or false in the data.

   (a) Exporting firms, on average, pay higher wages than firms that do not export. A: True

   (b) Exporting firms, on average, sell less to the domestic market than firms that do not export. A False

   (c) Exporting firms, on average, pay higher wages than firms that both export and import: A: False

   (d) The Extensive margin accounts for most of the trade expansion of French firms across markets A: True

   (e) Firm-product-destination level export prices, on average, increase with distance. A: True

   (f) Most firms that export continue exporting for at least 3 years. A: False

   (g) Border effects are insignificant in free trade areas such as US-Canada. A: False

   (h) In the 1980's, the relative wage of US production workers increased relative to the wage of nonproduction workers. A: False

2. The Rybcynski Theorem.

   We know that GDP is the sum of the value of the I good outputs: $(GDP = \sum_{i=1}^{I} p_i y_i\ )$ and the sum of the value of the M factor inputs $\left(GDP = \sum_{m=1}^{M} w_m V_m\right)$. Suppose the GDP function of Denmark is translog in the I goods and M factors, i.e. it looks like:

$$\begin{aligned}\ln GDP = {} & \alpha_0 + \sum_{i=1}^{I} \alpha_i \ln p_i + \sum_{m=1}^{M} \beta_m \ln V_m \\ & + \frac{1}{2} \sum_{i=1}^{I} \sum_{j=1}^{I} \gamma_{ij} \ln p_i \ln p_j + \frac{1}{2} \sum_{m=1}^{M} \sum_{n=1}^{M} \delta_{mn} \ln V_m \ln V_n \\ & + \frac{1}{2} \sum_{i=1}^{I} \sum_{m=1}^{M} \varphi_{im} \ln p_i \ln V_m\end{aligned}$$

   where p_i is the exogenous world price of good i, V_m is the endowment of factor m, and the greek letters are unknown parameters. Endogenous good outputs

(a) What conditions do α_i and β_m have to satisfy in order for the GDP to fit the duality conditions? A : it has to be HD1 in prices so $\sum_{i=1}^{I} \alpha_i = \sum_{m=1}^{M} \beta_m = 1$.

(b) Given the translog GDP function, what is the expression for $\frac{d(\ln GDP)}{d \ln V_m}$? How is $\frac{d(\ln GDP)}{d \ln V_m}$ related to the value share of factor m in total GDP? A: By duality, $\frac{d(\ln GDP)}{d \ln V_m}$ is the value share of factor m in GDP.

$$\frac{d\left(\ln GDP\right)}{d \ln V_m} = \beta_m + \sum_{n=1}^{M} \delta_{mn} \ln V_n + \sum_{i=1}^{I} \varphi_{im} \ln p_i$$

(c) Given the translog GDP function, what is the expression for $\frac{d(\ln GDP)}{d \ln p_i}$? How is $\frac{d(\ln GDP)}{d \ln p_i}$ related to the value share of good i in total GDP? A: By duality, $\frac{d(\ln GDP)}{d \ln p_i}$ is the value share of good i in GDP.

$$\frac{d\left(\ln GDP\right)}{d \ln V_m} = \alpha_i + \sum_{j=1}^{I} \gamma_{ij} \ln p_j + \sum_{m=1}^{M} \varphi_{im} \ln V_m$$

(d) Suppose you had data on s_m (the value share of factor m in total GDP), s_i(the value shares of good i in total GDP), world prices p_i and factor endowments V_m for all goods i and m. How would you estimate the Rybcynski coefficient, i.e. the change in the output of any good i to a change in endowment of any factor $_m$:) (Hint: Deconstruct $\frac{d \ln y_i}{d \ln V_m}$).
A : With the following deconstruction, you can estimate $\frac{d \ln y_i}{d \ln V_m}$ by estimating the ϕ_{im} in the two previous equations.

$$\begin{aligned}
\frac{d \ln y_i}{d \ln V_m} = \frac{d \ln \left(\frac{s_i GDP}{p_i}\right)}{d \ln V_m} &= \frac{d \ln s_i}{d \ln V_m} + \frac{d \ln GDP}{d \ln V_m} - \frac{d \ln p_i}{d \ln V_m} \\
&= \frac{1}{s_i} \frac{d s_i}{d \ln V_m} + s_m + 0 \\
&= \frac{\phi_{im}}{s_i} + s_m
\end{aligned}$$

3. Consider a version of the Dornbusch, Fischer, Samuelson (1977) model:

- There are two countries, H and F (* denotes F variables) producing a continuum of goods $z \in (0, 1)$.

- The foreign country has 9 times the labor force of the home country.
- The constant unit labor requirements are $a(z) = z^2$ and $a^*(z) = 1 - z^2$
- The utility function is $u = \int_0^1 b(z) \ln x(z)\, dz$, where $b(z) = 2z$ and $x(z)$ denotes the quantity consumed of good z.

(a) Verify that $b(z) = 2z$ is a feasible Cobb-Douglas expenditure share
A: To be feasible, $b(z) \geq 0 \forall z$ and $\int_0^1 b(z)dz = 1$. It is straightforward to see that $b(z) = 2z$ satisfies those conditions

(b) Determine the range of goods that the home country produces. Determine the Home wage relative to the Foreign wage.
A: Our two equilibrium conditions are

$$\frac{w}{w^*} = \frac{1 - \bar{z}^2}{\bar{z}^2}$$
$$\frac{w}{w^*} = \frac{L^*}{L} \frac{\bar{z}^2}{1 - \bar{z}^2}$$

$\bar{z} = 1/2$ solves this system of equations. Therefore the Home produces goods $z \in (0, 1/2)$ and Foreign produces $z \in (1/2, 1)$. The relative wage at this equilibrium is $\frac{w}{w^*} = 3$.

(c) Draw the equilibrium graph relating the relative wage and set of goods produced in each country.

Solution: Something like this: