You are not allowed to consult any notes or books. You have to write your answers in the blue book that the persons proctoring the exam give you. Your answers should reflect only your knowledge. Attempting to consult with others or to look at someone else's work constitutes academic misconduct.
Please return this page with your blue book.

Econ 475 Spring 2007
M. Muniagurria

Exam 3 (Total Points: 95)

(I) Natural Resources

Solow Model with Land and without technological change

Assume that a fixed amount of land, T, is available to the economy for production in each period and that output is produced according to

$$Y = B K^{\alpha} T^{\beta} L^{1-\alpha-\beta}$$

where α and β are positive and their sum is less than one. We assume that B is constant (i.e. there is no technological change), the population (or labor force) L grows at a constant rate n and the law of motion of the capital stock is

$$\dot{K} = s Y - \delta K$$

(1) (9 pts) Calculate the growth rate of output (Y) and output per worker (Y/L) along the BGP (balanced growth path).
(2) (4 pts) What happens to the level of output per worker over time along a BGP?
(3) (4 pts) Give an intuitive explanation of your results in (1) and (2) above and compare them with the equivalent results for the Solow model without land and without technological change (no equations needed).

Solow Model with Energy (non renewable resource) and exogenous technological change

Output is produced according to

$$Y = B K^{\alpha} E^{\gamma} L^{1-\alpha-\gamma}$$

where α and γ are positive and their sum is less than one and E represents the energy input into production. We assume that B grows at a constant rate g_B and the population (or labor force) L grows at a constant rate n. We further assume that a constant fraction of the remaining energy stock is used in production each period. We denote this fraction by s_E (i.e. If R is the remaining stock of energy $E = s_E R$).
In this model, the growth rate of output per worked along a BGP is:

$$\hat{y} = [g_B / (1-\alpha)] - [\gamma / (1-\alpha)] (s_E + n)$$

(4) (6 pts) Do you think that it is a good idea for a government to try to set s_E as close to zero as possible in order to make the growth rate of y as large as possible? Justify briefly.

(II) AK Model

Consider the simplest version of the "AK" Model:

$$Y = AK\ L^{1-\alpha}$$

$$\dot{K} = s\,Y - d\,K$$

where A is a positive and s and d are between zero and one. Assume further that the total amount of labor available is one (i.e. L=1) and that there is no population growth. In this case the aggregate production function can be written as:

$$Y = AK.$$

(1) (4 pts) Derive the growth rate of output per worker (show your work).
(1) (4 pts) Identify the key assumption used in the model to generate sustained growth.
(2) (8 pts) Analyze the effect of a permanent increase in the savings rate at time $\bar{t}$. What happens to the growth rate of output and output per worker ? Use a diagram to show the time path of output (Y) and output per worker (Y/L) (you want to use the logs of these two variables)**.**

(III) Eaton- Kortum

(1) (14) Describe the Static Model presented in Eaton-Kortum (assumptions about countries, technology, transport costs, factors, etc).
(2) (8 pts) Calculate the relative price of the capital good in terms of the consumption good in the North and South under free trade?
(3) (4 pts) Consider their growth model. Write down the law of motion of capital stock.
(4) (8 pts) What determines the growth rate of output along the BGP? (no equations needed) How do relative prices of capital goods affect the level of output per worker along a BGP? (no equations needed)

(IV) Mixed Questions

Education (Krueger and Lindahl)
(1) (8 pts) What is the Mincer equation? Why is it useful?

Institutions (Acemoglu, Johnson, Robinson/ Albouy)
(3) (8 pts) What is the main question these authors want to answer? What is the theory they propose?
(4) (6 pts) What is Albouy's main point?