

ECON 405

Economic Growth and Development

10 April 2014

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Midterm Exam
The Solow Model of Economic Growth

1. (50 Points) Suppose the production function of an economy is characterized by $Y = F(K, L) = K^\alpha \cdot L^{1-\alpha}$, $L = L(0) \cdot e^{nt}$, $L(0) = 1$.

a. (10 Points) Find the steady state values of k , y , and c by using the fundamental equation of growth of Solow.

b. (10 Points) Analyze the transitional dynamics of the model by graphical approach.

c. (10 Points) Suppose $s = 0.20$, $\alpha = 0.5$, $\delta = 0.05$, and $n = 0.01$. Find k_{SS} , y_{SS} , and c_{SS} .

d. (10 Points) What is the “golden rule of saving rate”?

e. (10 Points) Analyze the response of y_{SS} obtained in (a) to changes in s , n , and α .

2. (10 Points) Suppose that aggregate production function of an economy is characterized by $Y = \left[a \cdot K^{-\alpha/(1-\alpha)} + b \cdot E^{-\alpha/(1-\alpha)} + c \cdot Z^{-\alpha/(1-\alpha)} + (1-a-b-c) \cdot L^{-\alpha/(1-\alpha)} \right]^{\alpha-1/\alpha}$, where Y is output, K is capital, L is labor, Z is land, E is energy and a , b , c and $1-a-b-c$ are share parameters. Determine whether this production function features constant, increasing or decreasing returns to scale.

3. (20 Points) Suppose that aggregate production function of an economy is characterized by $Y = K^\alpha \cdot L^\beta$, $\alpha, \beta > 0$, $L = L(0) \cdot e^{nt}$, $L(0) = 1$. Show the role of β in the long-run behavior of capital per capita in the Solow framework. Hint: You must be able to compare β with $\alpha - 1$.

4. (20 Points) Let the law of motion for A be given by $\dot{A} = M - N$, where $M(t) = e^{mt}$, $N(t) = e^{nt}$ and $m = 2 \cdot n$. Find the growth rate of A in the steady state in terms of n , if there is one.