

Whitman College
Econ 308
Exam 2
March 5, 2010

Write all answers in your blue book. Show all of your work. The exam ends at 2:20.

1. Consider the labor-augmenting technology version of the Solow Growth Model, with a Cobb-Douglas production function for the economy. The savings rate is 50%. Assume that the population grows at the rate n , capital depreciates at the rate δ , and that the effectiveness of workers grows at the rate g . Read parts (a) through (e) below, before you work any of them.

(a) (15pts) Draw a graph with capital per effective worker on the horizontal axis, and output per effective worker on the vertical axis. On your graph, indicate the steady-state level of capital per effective worker (k^*), output per effective worker (y^*), and consumption per effective worker (c^*).

(b) (5pts) In this steady state, at what rate does consumption per worker change?

(c) (10pts) Suppose that the population growth rate falls from n to n' , with all else constant. Indicate on your graph the new steady-state level of capital per effective worker ($k^{*'}$), output per effective worker ($y^{*'}$), and consumption per effective worker ($c^{*'}$) now that the growth rate of the population is lower than it was before.

(d) (5pts) In the steady state with the population growth rate of n' , at what rate would consumption per worker change?

(e) (10pts) Would these people be better off in the steady state with the higher population growth rate or the steady state with the lower population growth rate? Explain how you found your answer.

2. Consider the labor-augmenting technology version of the Solow Growth Model, with a Cobb-Douglas production function for the economy.

(a) (5pts) Define the golden rule savings rate.

(b) (10pts) Thoroughly explain how to find the golden rule savings rate.

3. (5pts) Why do macroeconomists use the Cobb-Douglas production function to describe the United States economy?

4. (15pts) Consider the Cobb-Douglas production function $Y = A K^\alpha L^{1-\alpha}$, where Y is real aggregate output, $A > 0$ is a parameter measuring the productivity of the available technology, K is the amount of capital employed, L is the amount of labor employed, and α is a fraction between 0 and 1. Suppose Economies A, B and C each has a Cobb-Douglas production function. Which economy has experienced the most technological innovation? Explain how you found your answer.

Economy	α	Average annual percentage change in Y	Average annual percentage change in K	Average annual percentage change in L
A	0.4	3.5%	2.0%	2.0%
B	0.3	4.0%	1.6%	3.0%
C	0.2	3.6%	1.0%	4.0%

5. (10pts) Our guest, Dr. Inder Sud, described how World Bank economists work to help countries achieve higher standards of living. What are the factors, discussed in class by Dr. Sud, that allow economies to develop by making people more productive?

6. (a) (5pts) Define the natural rate of unemployment.

(b) (5pts) Suppose that you know the rate of job separation, s , and the rate of job finding, f , for an economy. Show how to derive the formula for the natural rate of unemployment for this economy. Explain your work.