

Economics 614: Macroeconomics

Spring, 2010

Cornell University

Problem Set #2

Due: Wednesday, February 17, 2010

1.

$$Y = C + Z = 23K^{1/4}L^{3/4}$$

$$\dot{K} = Z - \frac{K}{15}$$

$$\frac{\dot{L}}{L} = 0.01$$

a. Write down the law of motion in terms of $k = \frac{K}{L}$, $c = \frac{C}{L}$, and $f(k) = F(K, 1)$.

b. Carefully plot steady-state consumption per head c against steady-state k .

c. Precisely compute the golden-rule values of k , c , z , and y .

d. Carefully plot the modified golden-rule value of k and c against the discount rate δ (include all positive values of δ and the relevant negative values of δ).

2. Close the model in question 1 with the Solow-Keynes consumption function:

$$C = (1 - s)Y \quad (\text{i.e. } Z = sY)$$

a. Calculate the steady-state values of k , y , c , z , and r when $s = 1/10$.

b. Plot the steady-state values of c against the fraction s ($0 \leq s \leq 1$).

c. Solve for the savings rate s consistent with the golden-rule steady-state.

d. Show that the steady-states are locally and globally stable.

3. Replace the production function in question 1 with the fixed-coefficient function

$$Y = \min\{2K, 3L\}$$

Close the model as in question 2 with

$$C = (1 - s)Y \quad (\text{i.e. } Z = sY)$$

a. Calculate the steady-state values of k , y , c , z , and r when $s = 1/10$. Is this steady-state stable? Is it efficient?

b. Calculate the steady-state values of k , y , c , z , and r when $s = 23/600$. Is this steady-state stable? Is it efficient?

c. Calculate the steady-state values of k , y , c , z , and r when $s = 1/40$. Is this steady-state stable? Is it efficient?

d. When is there over-saving ?