14.02 Principles of Macroeconomics
Problem Set 5
Fall 2004

Posted: Wednesday, November 10, 2004
Due in class: Wednesday, November17, 2004

Part I. True/False/Uncertain
Justify your answer with a short argument.

1. A higher saving rate alone can sustain higher growth of output forever.

2. The golden-rule level of capital tells us that the highest level of consumption in steady-state is achieved when the saving rate is equal to 0.

3. A flexible exchange rate regime is superior to a fixed exchange rate regime.

Part II.   Open-Economy AS-AD

Real exchange rate: $$\varepsilon = \frac{EP*}{P}$$

i- rate parity condition: $$i = i* + \left[\frac{E^e}{E} - 1 \right]$$

IS: $Y = C(Y, T) + I\,(Y,i) + G + NX\,(Y, Y*, \varepsilon)$
LM: $M^s = M^d\,(Y, r)P$

1.   Suppose the economy is at point A where $Y_0 < Y_N$. If $E = \overline{E}$, what happens to Y, NX, P, and ε over time? Explain the intuition and also show graphically using IS-LM, AS-AD, and i-parity curves.

2.   Now, suppose the central bank wants to intervene to speed up the adjustment process from point A to point C, the medium-run (long-run) equilibrium. What can it do? Explain with words and also show graphically.

3. Now, assume that this economy is where $P = P^e$ and $E = \overline{E}$. What happens to Y, i, and P if the government decreases G in the short-run and medium-run (long-run)? Explain with words and also show graphically.

Part III.   Solow Model of Growth

Suppose that the production function is given by $Y = 0.5 \sqrt{K} \sqrt{N}$.
Assume that the size of the population, the participation rate, and the unemployment rate are all constant.

1.   Is this production function characterized by constant returns to scale? Explain.

2.   Transform the production function into a relationship between output per worker and capital per worker.

3.   Derive the steady state level of capital per worker in terms of the saving rate (s) and the depreciation rate (δ).

4.   Derive the equations for steady-state output per worker and steady-state consumption per worker in terms of s and δ .

5.   Let $\delta = 0.08$ and s $= 0.16$. Calculate the steady-state output per worker, capital per worker, and consumption per worker.

6.   Let $\delta = 0.08$ and s $= 0.32$. Calculate the steady-state output per worker, capital per worker, and consumption per worker.

7.   What is the effect of an increase in the saving rate on output per worker over time? Show the transition from s_0 to s_1 graphically.

8.   Explain what happens to the level of output per worker and the growth of output per worker when the saving rate increases from s_0 to s_1.