

Course in Macroeconomics and Global Economics
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Practice 8

Exercise 1

Suppose that the production function is given by

$$Y_t = K^\alpha N^{1-\alpha}$$

and assume that $\alpha = 1/3$. Furthermore, the capital accumulation equation is

$$K_{t+1} = (1 - \delta)K_t + I_t$$

where δ denotes the depreciation rate.

1. Transform the production function into a relation between output per worker and capital per worker.
2. Derive the equation describing the change in capital per worker from year t to year $t + 1$.
3. Suppose that $s = 0.32$ and $\delta = 0.08$. Find the steady-state values of capital per worker, output per worker and consumption per worker.
4. Suppose that the depreciation rate remains constant at $\delta = 0.08$, while the saving rate is reduced by half, to $s = 0.16$. What is the new steady-state output per worker?
5. Represent the scenario described in point 4. with a graph.

Exercise 2

Suppose that the economy's production function is

$$Y = \sqrt{K}\sqrt{AN}$$

that the saving rate, s , is equal to 16%, and that the rate of depreciation, δ , is equal to 10%. Suppose further that the number of workers grows at 2% per year and that the rate of technological progress is 4% per year.

1. Find the steady-state values of the variables listed in (a) through (e).
 - (a) The capital stock per effective worker.
 - (b) Output per effective worker.
 - (c) The growth rate of output per effective worker.
 - (d) The growth rate of output per worker.
 - (e) The growth rate of output.
2. Suppose that the rate of technological progress doubles to 8% per year. Recompute the answers to point 1. Explain.
3. Now suppose that the rate of technological progress is still equal to 4% per year, but the number of workers now grows at 6% per year. Re-compute the answers to point 1. Is consumption per effective worker higher in point 1 or in point 3? Explain.