

Homework 3

Spring 2009 ECON 410
Macroeconomic Theory

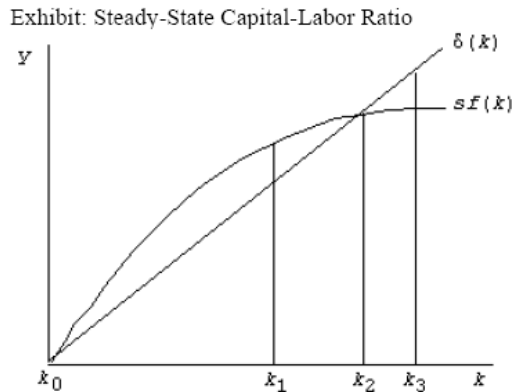
Professor Li Gan
Due 03/10 in class

(A) Multiple Choice Questions: (3 points per multiple choice problem) 25 questions

1. In the Solow growth model, if investment exceeds depreciation, the capital stock will _____ and output will _____ until the steady state is attained.
A) increase; increase
B) increase; decrease
C) decrease; decrease
D) decrease; increase
2. With a per-worker production function $y = k^{1/2}$, the steady-state capital stock per worker (k^*) as a function of the saving rate (s) is given by:
A) $k^* = (s/\delta)^2$.
B) $k^* = (\delta/\sigma)^2$.
C) $k^* = s/\delta$.
D) $k^* = \delta/s$.
3. If an economy with no population growth or technological change has a steady-state *MPK* of 0.125, a depreciation rate of 0.1, and a saving rate of 0.225, then the steady-state capital stock:
A) is greater than the Golden Rule level.
B) is less than the Golden Rule level.
C) equals the Golden Rule level.
D) could be either above or below the Golden Rule level.
4. According to the Solow model, persistently rising living standards can only be explained by:
A) population growth.
B) capital accumulation.
C) saving rates.
D) technological progress.
5. Data from states within United States suggest that economies of states will converge to:
A) the same steady state.
B) their own steady state.
C) The Golden Rule steady state.
D) Steady states that are higher than Golden Rule level.

6. Data from both rich countries and poor countries suggest that economies of countries with different steady states will converge to:
- A) the same steady state.
 - B) their own steady state.
 - C) the Golden Rule steady state.
 - D) steady states below the Golden Rule level.
7. In the Solow model with technological progress, by increasing the efficiency of labor at rate g :
- A) the real wage and the real rental price of capital both grow at rate g .
 - B) the real wage grows at rate g but the real rental price of capital is constant.
 - C) the real wage is constant but the real rental price of capital grows at rate g .
 - D) both the real wage and the real rental price of capital are constant.
8. According to the Solow model, which of the following variables are exogenous?
- A) k and y .
 - B) L , δ and g .
 - C) n , g and K .
 - D) E and K .
9. In a Solow model with technological change, if population grows at a 2 percent rate and the efficiency of labor grows at a 3 percent rate, then in the steady state total output grows at a _____ percent rate.
- A) 0
 - B) 2
 - C) 3
 - D) 5
10. In a case of negative technology shock (g is negative):
- A) total output will fall.
 - B) per-labor capital stock will fall.
 - C) per efficient-labor capital stock will fall.
 - D) total capital stock will fall.
11. In a steady state with population growth and technological progress:
- A) the real rental price of capital is constant and the real wage grows at the rate of technological progress.
 - B) the real rental price of capital grows at the rate of technological progress and the real wage is constant.
 - C) both the real rental price of capital and the real wage grow at the rate of technological progress.
 - D) both the real rental price of capital and the real wage are constant.

12. (Exhibit: Steady-State Capital-Labor Ratio) In this graph, the capital-labor ratio that represents the steady-state capital-labor ratio is:
- A) k_0 .
 - B) k_1 .
 - C) k_2 .
 - D) k_3 .



13. In the Solow model with technological progress, the steady-state growth rate of output per (actual) worker is:
- A) 0.
 - B) g .
 - C) n .
 - D) $n + g$.
14. The Solow cannot explain the following phenomena:
- A) A country with a lower population growth has a higher per-capita output growth.
 - B) A country with a lower saving rate has a lower per-capita output growth.
 - C) Germany grew faster than US after the World War II.
 - D) Per-capita output in the US is 17 times as much as that of Pakistan.
15. The steady-state level of capital occurs when the change in the capital stock(k) equals:
- A) 0.
 - B) the saving rate.
 - C) the depreciation rate.
 - D) the population growth rate.
16. If the per-worker production function is $y = Ak$, where A is a positive constant, then the marginal product of capital:
- A) increases as k increases.
 - B) is constant as k increases.
 - C) decreases as k increases.
 - D) cannot be measured in this case.

17. The benefits of the computer revolution had a lagged impact on productivity growth because:
- the government restricted which new computer technologies could be implemented.
 - international competition limited the speed at which new computer technologies could be put into use.
 - the computer industry initially represented only a small part of real GDP.
 - military computer applications took precedence over commercial applications.
18. To determine whether an economy is operating at its Golden Rule level of capital stock, a policymaker must determine the steady-state saving rate that produces the:
- largest MPK .
 - smallest depreciation rate.
 - largest consumption per worker.
 - largest output per worker.
19. In an economy with population growth at rate n , technology growth rate at g . Let $k=K/(EL)$. The change in capital stock per worker ($K/L=k_1$) is given by the equation:
- $sY/L - (\delta + n)k_1$.
 - $s f(k) - \delta k$.
 - $s f(k_1) - (\delta + n)k_1$.
 - $s f(k) - (\delta + n)k$.
20. If an economy moves from a steady state with positive population growth to a zero population growth rate, then in the new steady state total output growth will be _____ and growth of output per person will be _____.
- lower; lower
 - lower; the same as it was before
 - higher; higher than it was before
 - higher; lower
21. When an economy begins above the Golden Rule, reaching the Golden Rule:
- produces lower consumption at all times in the future.
 - produces higher consumption at all times in the future.
 - requires initially reducing consumption to increase consumption in the future.
 - requires initially increasing consumption to decrease consumption in the future.
22. In the Solow growth model of an economy with population growth but no technological change, the break-even level of investment must do all of the following *except*:
- offset the depreciation of existing capital.
 - provide capital for new workers.
 - equal the marginal productivity of capital (MPK).
 - keep the level of capital per worker constant.

23. A reduction in the saving rate starting from a steady state with more capital than the Golden Rule causes investment to _____ in the transition to the new steady state.
- increase
 - decrease
 - first increase, then decrease
 - first decrease, then increase
24. Assume two economies are identical in every way except that one has a higher saving rate. According to the Solow growth model, in the steady state the country with the higher saving rate will have _____ level of total output and _____ rate of growth of output per worker as/than the country with the lower saving rate.
- the same; the same
 - the same; a higher
 - a higher; the same
 - a higher; a higher
25. If an economy is in a steady state with no population growth or technological change and the capital stock is above the Golden Rule level and the saving rate falls:
- output, consumption, investment, and depreciation will all decrease.
 - output and investment will decrease, and consumption and depreciation will increase.
 - output and investment will decrease, and consumption and depreciation will increase and then decrease but finally approach levels above their initial state.
 - output, investment, and depreciation will decrease, and consumption will increase and then decrease but finally approach a level above its initial state.

(B) Essay Questions

1. (15 points)

(Solow Model) Suppose U.S. and Mexico both have the Cobb-Douglas production function $Y=F(K, L)=K^{1/2}L^{1/2}$. Technology growth is zero in both countries. Given the following information,

	US	Mexico
n	0.01	0.025
δ	0.04	0.04
s	0.22	0.16
The actual per capita income: $y_{us}/y_{mexico}=4$		

- What is the ratio of the per capita output for these two countries based on the Solow model? (i.e. What is the value of y_{us}/y_{mexico} at the steady states using the Solow model)
- Does the ratio derived from a) satisfy the data provided ($y_{us}/y_{mexico}=4$)? If not, what is the value of β_{mexico} (β_{mexico} is the parameter for Mexico's production function $Y=F(K, L)=K^{\beta}L^{1-\beta}$ such that $y_{us}/y_{mexico}=4$)?
- If technology growth is different in both countries, $g_{us} = 0.04$ and $g_{mexico} = 0.01$, what is y_{us}/y_{mexico} based on the Solow model? Note here $y_{us} = Y_{us}/L_{us}$, and use production function in part a). Suppose that $E_{us} \neq E_{Mexico}$, i.e., the efficiency of labor is different between these two countries. What is the ratio of E_{us}/E_{Mexico} such that the per capita income $y_{us}/y_{mexico} = 4$?

2. (10 points) Mankiw textbook, pages 242, #2.