IFEEK特別演習IIB: 2018年度

Problem Set 1: National Income and the Long-run Economy

Q1. Consider an economy with two goods, bread and cars, in the following table.

	Price of Cars	Price of Bread	Number of Cars	Number of Bread
2010	\$50,000	\$10	100 cars	500,000 loaves
2017	\$60,000	\$20	120 cars	400,000 loaves

(a) Compute the following statistics. Use the year 2010 as the base year for [ii]-[iv].
  [i] nominal GDP in 2010 and 2017
  [ii] real GDP
  [iii] GDP deflator
  [iv] CPI

(b) How much have prices risen between 2010 and 2017? Compare the answers given by the GDP deflator and the CPI. Explain the differences.

(c) Are GDP deflator and CPI the Laspeyres or Paache price indices?

Q2. Suppose that an economy's production function is given by the Cobb-Douglas production function $Y = AK^{\alpha}L^{1-\alpha}$ where $\alpha = 0.3$.

(a) What fractions of income do capital and labor receive under perfect competition?

(b) Suppse that the immigration raises the labor force by 10 percent. What happens to total output (in percent)? The rental rate of capital (in percent)? The real wage (in percent)?

(c) Suppose that a gift of capital from abroad raises the capital stock by 10 percent. What happends to total output (in percent)? The rental rate of capital (in percent)? The real wage (in percent)?

(d) Suppose that technological advance raises the value of A by 10 percent. What happends to total output (in percent)? The rental rate of capital (in percent)? The real wage (in percent)?

Q3. Suppse that an economy's production function is given by $Y = K^{1/3}L^{1/3}H^{1/3}$ where K is physical capital, L is labour and H is human capital.

(a) Derive an expression for the marginal product of labor (MP_L). How does an increase in the amount of human capital affect the MP_L?

(b) Derive an expression for the marginal product of human capital (MP_H). How does an increase in the amount of human capital affect the MP_H?

(c) What is the income share paid to labor? What is the income share paid to human capital? In the national income accounts of this economy, what share of total income do you think workers would apprear to receive? (Hint: Who own human capital?)

(d) An unskilled worker earns the MP_L, whereas a skilled worker earns the MP_L plus MP_H. Using your answers above, find the ratio of the skilled wage to the unskilled wage. How does an increase in the amount of human capital affect the ratio? Explain.

(e) Suppose that the government funds university scholarships to create a more egalitarian society. Does the policy help to achieve the goal? Or does it help only those who go to university?

Q4. $\bar{Y}$ is the national income which is constant, $\bar{G}$ is government expenditure, $\bar{T}$ is taxes, $\bar{I}$ is investment and $C(\bar{Y} - \bar{T})$ is consumption as a function of disposable income $\bar{Y} - \bar{T}$. (Barred variables like $\bar{Y}$ are constant, but $C(.)$ is endogenous.)

(a) Using those symbols, express public saving, private saving and national saving.

(b) Suppose that the government raises taxes by \$100 billion. Assuming that the marginal propensity to consume is 0.6, calculate changes in

[i] public saving

[ii] private saving

[iii] national saving

[iv] investment

Q5. Consider an economy described by the following equatins:

$$
\begin{aligned}
Y &= C + I + G \\
Y &= 5,000 \\
G &= 1,000 \\
T &= 1,000 \\
C &= 250 + 0.75(Y - T) \\
I &= 1,000 - 50r
\end{aligned}
$$

where r is the real interest rate.

(a) Compute private saving, public saving, and national saving.

(b) Find the equilibrium interest rate.

(c) Suppose that G rises to 1,250. Compute private saving, public saving, and national saving.

(d) Find the new equilibrium interest rate.