

Homework 10

Exercise 1. Yuesei is a country characterized by the following parameters. Its annual depreciation rate is 4% and its annual population growth rate is 1%. The inhabitants always save 20% of their income. The elasticity of output w.r.t. capital is $\frac{1}{2}$. The economy starts its development in 1950 with 12 units of capital and one unit of labor.

- a) Calculate per capita income, capital and consumption in Yuesei in 1950.
- b) Determine the values of per capita income, capital and consumption towards which the economy is converging.
- c) Characterize the evolution of per capita capital, income and consumption of this economy between 1950 and 2000. Characterize the evolution of these variables graphically. Plot the three series in a graph with the values of the corresponding variables on the vertical axis and time on the horizontal axis. Do these variables grow or diminish over time?
- d) Calculate the annual growth rates of this economy between 1950 and 2000. What are the average growth rates over the 50 years?

Exercise 2. Suppose that Normandia is another country virtually identical to Yuesei. The differences between the two countries amount to different initial capital stocks and savings rates. Normandia's capital stock in 1950 is only 3 units. Furthermore, the residents of Normandia save only 16% of their income.

- a) Determine per capita income and consumption in Normandia in 1950. Which of the two countries is richer? Calculate Normandia's per capita income and consumption as a percentage of Yuesei's per capita income and consumption in 1950.
- b) Determine the values of per capita income, capital and consumption towards which the economy is converging.
- c) Characterize the evolution of per capita capital, income and consumption of Normandia between 1950 and 2000. Characterize the evolution of these variables graphically. Plot the three series in a graph with the values of the corresponding variables on the vertical axis and time on the horizontal axis. Do these variables grow or diminish over time?
- d) Calculate the annual growth rates of this economy between 1950 and 2000. What are the average growth rates over the 50 years?
- e) Characterize graphically the evolution of Normandia's per capita income as a percentage of Yuesei's per capita income.

Exercise 3. Suppose that Niponia is another country virtually identical to Normandia. The only difference between the two countries amounts to different initial capital stocks. Niponia's capital stock in 1950 is only 1 unit which is three times less than Normandia's.

- a) Determine per capita income and consumption in Niponia in 1950. Is this economy richer or poorer than that of Yuesei? Calculate Niponia's per capita income and consumption as a percentage of Yuesei's per capita income and consumption in 1950.
- b) Determine the values of per capita income, capital and consumption towards which the economy is converging.

- c) Characterize the evolution of per capita capital, income and consumption of Niponia between 1950 and 2000. Characterize the evolution of these variables graphically. Plot the three series in a graph with the values of the corresponding variables on the vertical axis and time on the horizontal axis. Do these variables grow or diminish over time?
- d) Calculate the annual growth rates of this economy between 1950 and 2000. What are the average growth rates over the 50 years?
- e) Characterize graphically the evolution of Niponia's per capita income as a percentage of Yuesei's per capita income.

Exercise 4. Suppose that Nueva Delia is another country with the same production function as Yuesei. However, this country differs from the rest in many respects. Its annual depreciation rate is 20% and its annual population growth rate is 5%. The inhabitants always save only 10% of their income. The economy starts its development in 1950 with barely 0.05 units of capital and one unit of labor.

- a) Determine per capita income and consumption in Nueva Delia in 1950. Is this economy richer or poorer than that of Yuesei? Calculate Nueva Delia's per capita income and consumption as a percentage of Yuesei's per capita income and consumption in 1950.
- b) Determine the values of per capita income, capital and consumption towards which the economy is converging.
- c) Characterize the evolution of per capita capital, income and consumption of Nueva Delia between 1950 and 2000. Characterize the evolution of these variables graphically. Plot the three series in a graph with the values of the corresponding variables on the vertical axis and time on the horizontal axis. Do these variables grow or diminish over time?
- d) Calculate the annual growth rates of this economy between 1950 and 2000. What are the average growth rates over the 50 years?
- e) Characterize graphically the evolution of Nueva Delia's per capita income as a percentage of Yuesei's per capita income.

Exercise 5. The file ex10data.xls contains a worksheet with data on income per worker in the US, France, Japan and India. Characterize graphically the evolution of income per worker of France, Japan and India as a percentage of US income per worker. Compare the resulting graph with those corresponding to questions e) of Exercises 2, 3 and 4.