

## Exercise session #2 - General Equilibrium model of GDP

### Problem 1 - Changes in supply of production factors

Predict the impact on the real wage and the real rental price of capital

- A wave of immigration increases the labor force
- Earthquake destroys some of the capital stock
- Technological advance improves the production function

### Problem 2 - Returns to scale

**Little theoretical introduction:** If we have initial level of capital  $K_1$  and labor  $L_1$ , that we can use to generate the product  $Y_1 = F(K_1, L_1)$  and we multiply the inputs by the same factor  $z$  s.t.  $K_2 = zK_1$ ,  $L_2 = zL_1$  and  $Y_2 = F(K_2, L_2)$  then the production function  $F$  has

- constant returns to scale if  $Y_2 = zY_1$
- increasing returns to scale if  $Y_2 > zY_1$
- decreasing returns to scale if  $Y_2 < zY_1$

**Question 1:** Tell me example when we can observe increasing / decreasing returns to scale in the real world?

**Question 2:** Determine whether production function has CRS/IRS/DRS.

1.  $F(K, L) = \sqrt{K} + \sqrt{L}$
2.  $F(K, L) = \sqrt{KL}$
3.  $F(K, L) = K^2 + L^2$
4.  $F(K, L) = \frac{K^2}{L}$

### Problem 3 - Effect of taxation on saving

**Question 1:** The government raises taxes by \$100 billion. If the marginal propensity to consume is 0.6, what happens to the following? Do they rise and fall, and by what amounts?

- public saving
- private saving
- national saving
- investment

**Question 2:** Suppose that government increases taxes and government purchases by equal amounts. What happens to the real interest rate and investment? Does the answer depend on marginal propensity to consume?

#### Problem 4 - Simple GE model of GDP

Consider an economy described by the following equations

$$Y = C + I + G$$

$$Y = 5000$$

$$G = 1000$$

$$T = 1000$$

$$C = 250 + 0.75(Y - T)$$

$$I = 1000 - 50r$$

- In this economy, compute private savings, public savings and national saving. Find the equilibrium interest rate.
- Now suppose that  $G$  rises to 1250. Again, compute private savings, public savings and national saving. Find the equilibrium interest rate.

#### Questions to Lecture 2

1. Write down the definition and assumptions behind the Walrasian concept of general equilibrium.
2. State and explain some (min 2) of the violations of the assumptions of Walrasian concept of general equilibrium that we observe in the real economy.
3. Name and define 2 basic factors of production.
4. Write down and explain the constant returns to scale assumption.
5. Write down and explain the assumption of positive and diminishing marginal product.
6. Write down and explain essentiality and Inada conditions.
7. Derive marginal product of labor from general Cobb-Douglas production function  $Y = AK^{\alpha}L^{1-\alpha}$ .
8. Write down and explain the profit maximization problem of a firm.

9. Explain how we derive the demand for labor and capital from profit maximization of a firm.
10. What are the necessary conditions for economic profit to be zero in the general equilibrium model of national economy.
11. How do we define marginal propensity to consume?
12. Why is investment a negative function of interest rate?
13. Write down the equilibrium equation for goods and services market.
14. Write down the equilibrium equation for loanable funds market.
15. What is the crowding out effect in the context of government expenditures?
16. How does an increase in government spending affect equilibrium on the loanable funds market?
17. How does a decrease in taxes affect equilibrium on the loanable funds market?
18. How does an increase in investment demand affect equilibrium on the loanable funds market?