

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Exam: **ECON2915 – Growth and business structure**

Date of exam: Friday, December 1, 2006 **Grades will be given: December 21, 2006**

Time for exam: 02:30 p.m. – 05:30 p.m.

The problem set covers 8 pages including cover sheet and two answer sheets

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

NOTE: **Problems 3-11 are multiple-choice problems. Your answer to these problems are to be handed in on a separate answer sheet, enclosed the problem set. You are supposed to hand in the sheet marked “original”, and keep the sheet marked “copy”.**

Problem 1 (30 per cent):

Consider the Solow-model for a closed economy:

$$Y(t) = K(t)^\alpha L(t)^{1-\alpha} \quad (1)$$

$$\frac{dK(t)}{dt} = \gamma Y(t) - \delta K(t) \quad (2)$$

$$\frac{dL(t)}{dt} = nL(t) \quad (3)$$

Here $Y(t)$ is production at time t . The inputs to production are capital and labor, and are denoted by K and L respectively. The investment rate (γ), the rate of depreciation (δ), and the growth-rate of population (n) are all exogenous parameters.

a) Show and explain why $y = Y/L$ will approach a given level y^{ss} (steady-state).

b) Assume that the country initially has $y < y^{ss}$. Why does the growth rate of y fall as y approaches its steady-state?

c) Assume now that the country has reached its steady-state. At a given point in time it receives a gift of capital from abroad. This leads to an increase in the capital intensity, $k = K/L$. The gift is only received once. What happens to the level of y and the growth rate of y . Consider both the short run and the long run.

d) Discuss briefly whether the model should lead us to expect that poor countries have higher growth-rates than rich countries.

Problem 2 (20 per cent):

This problem is to be solved within the context of a two-sector model. Let Y_1 and Y_2 denote the quantities of the two produced goods. Their respective prices are denoted P_1 and P_2 . The total quantities of the two inputs to production, L and K , are given exogenously. The prices of the two inputs are denoted w and q respectively. The production functions satisfy the neo-classical conditions. Preferences are homothetic, so the relative demand (Y_1/Y_2) only depends on relative prices P_1/P_2 . All the other conditions required to ensure an internal solution are also satisfied. Production of good 1 is always the most intensive in its use of the input K .

Below you will be given two central results pertaining to this model under the given assumptions. When answering this problem you can take these two results as given. You do *not need* to go through the underlying model, nor do you have to provide proofs of the two results.

When considering the equilibrium in a closed economy (autarky), the following result holds:

Result 1: An increase in L , holding K constant, will reduce the relative price P_2/P_1

If we instead consider a situation where the prices P_1 and P_2 are exogenous, and where Y_1 and Y_2 can both be freely traded between countries, the following result holds:

Result 2: A reduction in P_2 (holding P_1 constant) will lead to a decline in w and an increase in q

- a) Explain how world-market prices are affected by China's increased integration into the world economy
- b) What effects do China's increased integration into the world economy have on factor prices in Norway?

Multiple-choice problems (50 per cent)

Use the answer-sheet for questions 3-11.

3. Consider a production function $F(K, L)$. Which of the following properties *must* hold in order for $F(K, L)$ to be called a neo-classical production function?

1. Constant returns to scale
2. The production function is Cobb-Douglas
3. Diminishing marginal product of capital (K)
4. No changes in technology over time

A: 1 and 3

B: 2 and 3

C: 1, 2 and 3

D: 1, 2, 3 and 4

4. Consider the effect of an increase in the rate of depreciation, δ , within the Solow-model in problem 1. Assume that the economy was in its steady state before the change occurred. Which statements are correct?

1. The capital intensity will gradually decline towards a new steady state
2. The growth rate of y instantaneously falls to a negative level
3. The capital stock instantaneously falls to a lower level
4. The growth rate of y will decline, but still be positive

A: 1 and 3 only

B: 1 and 2 only

C: 1, 2 and 3 only

D: 1, 2, 3 and 4

5. In the period 1960-2000 the average yearly growth rate of GDP per capita (fixed prices) in Norway was:

A: Around 1 per cent

B: Around 3 per cent

C: Around 5 per cent

D: Around 7 per cent

6. In this problem we consider two measures of productivity: production per worker (Y/L), and total factor productivity (TFP). Which of the following affects production per worker only (i.e. it does not affect TFP)?

A: Efficient use of resources

B: Level of technology

C: Public infrastructure

D: The capital intensity

7. What/which statements are in agreement with the two-country model of innovation and imitation (leader-imitator model)?

1. In the long run, the *growth-rate* of technology will be the same in both the leader-country and the imitator-country
2. The *growth-rate* of technology will never be highest in the imitator-country
3. In the long run, the *level* of technology will be higher in the leader-country than in the imitator-country

A: 1 only

B: 3 only

C: 1 and 2 only

D: 1 and 3 only

8. Which of the following statements gives the *most* appropriate description of the theorem of factor price equalization?

A: The prices of different types of inputs are becoming more and more equal

B: Wage-levels are being equalized across countries

C: The prices of inputs are equalized across countries which are facing the same world-market prices, and which share the same technology

D: Input prices are being equalized across countries due to free flow of inputs across country borders

9. Which of the following determine the sectoral composition of a closed economy (autarky)?

1. Available inputs to production

2. Technology

3. Domestic demand

4. World market prices

A: 1, 2 and 3 only

B: 1 and 2 only

C: 2 and 3 only

D: All of the above

10. Which of the following determine the sectoral composition of a small open economy with free flow of all produced goods and services (i.e. no protected sectors)?

1. Available inputs to production
2. Technology
3. Domestic demand
4. World market prices

A: 1, 2 and 3 only

B: 1 and 4 only

C: 1, 2 and 4 only

D: All of the above

11. What/which of the following statements about comparative advantages are correct?

1. A country has its comparative advantage in the production of the good which requires the least resources per unit produced
2. A country will *always* produce only the good which it can produce with a comparative advantage
3. A country has a comparative advantage in the production of a good if it is able to produce this good more efficiently than other countries

A: 2 and 3 only

B: 1 only

C: 3 only

D: None of the above