

***UNIVERSITETET I OSLO
ØKONOMISK INSTITUTT***

Exam: ECON2915 – Economic Growth

Date of exam: 08.12.2017

Grades will be given: 05.01.2018

Time for exam: 14:30 – 17:30

The problem set covers 2 pages

Resources allowed:

- No resources allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences).

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

Problem 1 (60%)

Assume that countries have the following macro production function:

$$Y_i = A_i K_i^\alpha (h_i L_i)^{1-\alpha},$$

where Y_i is output, A_i is productivity, L_i is employment, h_i is human capital, K_i is capital stock, α is a parameter, and i denotes country $i = \{1, 2\}$.

1. What is the interpretation of α ? What kind of data would you use to estimate α ? For now, you can assume that $\alpha = 0.3$.
2. Show mathematically that this production function has the following properties: (1) constant returns to scale and (2) positive and diminishing marginal product of labor and capital (MPL and MPK).
3. Derive mathematically the intensive form of the production function, $y_i \equiv Y_i/L_i$.
4. Derive mathematically the expression for relative productivity, A_1/A_2 .
5. Assume that the capital stock per capita $k_i = K_i/L_i$ and human capital h_i are identical in countries 1 and 2. At the same time GDP per capita in country 1 is double that of country 2. What is A_1/A_2 ?
6. What are the main determinants of human capital and what can policymakers do to increase the stock of human capital?
7. Imagine that policymakers in country 1 successfully increase human capital by 10%. What is the % increase in GDP per capita?
8. Now assume that a constant share of output is invested, $I_i = \gamma Y_i$, and that a constant share of the capital stock depreciates, $D_i = \delta K_i$. There is no productivity or population growth (i.e., A_i and L_i are constant).

- (a) Describe and derive how capital per capita will grow over time (the expression for \dot{k}_i).
- (b) What is the steady state capital stock per capita k_i^{SS} and GDP per capita y_i^{SS} ?
- (c) Revisit question 7) above. What is the effect of a 10% increase in h_i on y_i^{SS} ?
- (d) Explain why, or why not, your answer in 8c) is different from the answer in 7).

Problem 2 (40%)

Among developed countries, Japan, Norway and Switzerland have the highest tariffs on agricultural goods in the world. Discuss the short run effect of these tariffs on (i) industry structure, (ii) exports and imports, (iii) prices and (iv) living standards for different groups in these countries. To guide the discussion, you can assume that:

- there are two goods produced, agricultural and other goods.
- there are two factors of production, land and labor.
- there are two countries, Norway and the rest of the world (RoW).
- the land to labor ratio is lower in Norway than in RoW.
- agricultural production is relatively land intensive.

Discuss briefly whether the long-run effects are different from the short-run effects. You should explain the economic mechanisms and intuition with words and diagrams. You may also refer to, and explain, theorems that we have reviewed in class. You can use math, but it is not required for this exercise.