STOCKHOLM UNIVERSITY
Department of Economics

Course name	**Macroeconomics**
Course code	**EC7210**
Examiner	**Johan Söderberg**
Number of credits	**7.5 credits**
Date of exam	**18 February 2017**
Examination time	**3 hours (14.00-17.00)**

Write your identification number on each answer sheet. Use the printed answer sheets for all your answers.

Do not write more than one question at the same sheet. Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked. No aids are allowed.

The exam consists of 4 questions. Each question is worth 25 points, 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

Only students who have <u>NOT</u> received credits from the seminar series should answer question 4.

Results will be posted on mitt.su.se three weeks after the exam, at the latest

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Good luck!

Question 1 (25 p)

Consider an economy where the representative household solves

$$\max_{\{C_t, B_{t+1}, H_t\}_{t=0}^{\infty}} E_0 \sum_{t=0}^{\infty} \beta^t \left\{ \Phi_t^c \ln C_t - \frac{H_t^{1+\varphi}}{1+\varphi} \right\}, \tag{1}$$

where $\varphi \geq 0$ and Φ_t^c is a consumption preference shock, subject to the real budget constraint

$$C_t + A_{t+1} = w_t H_t + (1 + r_{t-1}) A_t. \tag{2}$$

Firms in the economy are price takers, operating on a perfectly competitive market. The representative firm's profit maximization problem is

$$\max_{Y_t, H_t} \{Y_t - w_t H_t\}, \tag{3}$$

subject to the production function

$$Y_t = \Phi_t H_t, \tag{4}$$

where Φ_t is labor productivity.

a) Derive the household's Euler equation and the optimal condition for labor supply, and the first-order condition for the firm's profit maximization problem.

b) Solve for the equilibrium level of output and the equilibrium interest rate in the economy.

c) Explain intuitively how output and the real interest rate are affected by a temporary increase (that only lasts for one period) in Φ_t and Φ_t^c.

Question 2 (25 p)

Suppose that the world consists of one large and one small country. The countries trade with each other in the single homogeneous good that sells for the same real price in both countries (PPP holds). The initial net asset position is zero. There are no taxes and no government expenditures. Suppose that income in the large country is constant.

The representative household in both countries maximize a lifetime utility function of the form

$$\sum_{t=0}^{\infty} \beta^t \ln C_t, \tag{5}$$

subject to the real budget constraint

$$C_t + A_{t+1} = Y_t + (1+r) A_t, \tag{6}$$

where r is the world interest rate.

a) Let C_t^L denote period t per capita consumption in the large country, and C_t^S period t per capita consumption in the small country. Write down the Euler equation for both countries.

b) Solve for the equilibrium world interest rate.

c) Assume that income in the small country evolves according to the process

$$Y_t^S = (1+\gamma) Y_{t-1}^S, \tag{7}$$

where $-1 < \gamma < r$ and $Y_0 > 0$. Solve for the small country's consumption level. Explain intuitively how it is affected by r. Distinguish between the cases when γ is positive, negative and zero.

d) Assuming the same income process as in (b), solve for the small country's current account and its net foreign asset position in periods 0 and 1. Discuss intuitively, relating to your answer in (b). Distinguish between the cases when γ is positive, negative, and zero.
   Hint: Remember that $CA_t = NFA_{t+1} - NFA_t$.

Question 3 (25 p)

Consider a *two-period* economy where the Phillips curve in period 0 is given by

$$\pi_0 = \kappa x_0 + \beta E_0 \pi_1 + u_0, \tag{8}$$

and the Phillips curve in period 1 by

$$\pi_1 = \kappa x_1 + u_1, \tag{9}$$

where u_0 and u_1 are cost-push shocks,

The central bank's problem is choose $x_0, \pi_0, x_1,$ and π_1 to minimize the welfare loss

$$E_0 \left\{ \left(\pi_0^2 + \lambda x_0^2 \right) + \beta \left(\pi_1^2 + \lambda x_1^2 \right) \right\}. \tag{10}$$

Assume that $u_1 = u_0$ and that $\kappa = \beta = \lambda = 1$.

a) Solve for $x_0, \pi_0, x_1,$ and π_1 in terms of u_0 for each of the following policies:

   (i) The cental bank acts with discretion.

   (ii) The central bank commits to zero inflation in period 1

   (iii) The central bank commits to zero output gap in period 1

b) Solve for the welfare loss under each policy. Discuss intuitively the ranking of the policies.

Question 4 (25p)

Consider an economy where the government's real budget constraint is given by

$$G_t + (1 + r) D_t = T_t + D_{t+1}, \tag{11}$$

where T_t is the government's period t tax revenue. For each scenario below, and given that everything else is constant, calculate the change in T_3 necessary for the government's present value budget constraint to hold.

   (i) There is a one unit increase in G_0.

   (ii) There is a $1/(1+r)$ unit increase in G_0 and a one unit decrease in G_1.

   (iii) There is a $(1+r)$ unit increase in G_0 and $(1+r)^2$ unit increase in T_2.

   (iv) There is a one unit increase in G_0 and a one unit decrease in D_0.