



Stockholm  
University

Department of Economics

**Course name:** Intermediate Macroeconomics  
**Course code:** EC2201  
**Type of exam:** RETAKE  
**Examiner:** Anna Seim  
**Number of credits:** 7,5 credits  
**Date of exam:** Saturday April 22 2017  
**Examination time:** 5 hours (09:00-14:00)

**Write your identification number on each answer sheet (the number stated in the upper right hand corner on your exam cover).**

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.**

Question 4 may be answered in English or Swedish. All other questions should be answered in English.

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The exam consists of 5 questions, worth 100 points in total. The maximum points on each question are stated within parenthesis. 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 NOT received course credit from the seminar exercises should answer Question 5. Students who have obtained course credit automatically receive 10 points on that question, and get no extra points from answering it.

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Your results will be made available on your "My Studies" account ([www.mitt.su.se](http://www.mitt.su.se)) on 12 May at the latest.

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**Good luck!**

### Question 1: Short questions (25 points in total)

Provide short answers to all of these questions. (5 points each)

- a. Consider an economy that is characterised by the following Phillips curve:

$$u = u^n - \theta(\pi - \pi^e),$$

where  $u$  is unemployment,  $u^n$  is the natural rate of unemployment,  $\pi$  is inflation,  $\pi^e$  is inflation expectations and  $\theta > 0$  is a parameter. Suppose that the loss function of the central bank is given by

$$L(u, \pi) = \gamma u + \frac{1}{2}\pi^2,$$

where  $\gamma > 0$  is a parameter. Agents are assumed to be rational and form their expectations prior to the central bank setting monetary policy. Compute optimal monetary policy under discretion. What is the unemployment rate under this policy?

- b. Explain what is meant by purchasing power parity (PPP). Briefly discuss whether PPP is a reasonable description of reality – should we expect PPP to hold empirically?
- c. Show how saving, investment and net exports are related in an open economy.
- d. Explain what is meant by Ricardian equivalence. What are the assumptions required for Ricardian equivalence to hold?
- e. Consider the bathtub model of unemployment. Let  $L$  denote the constant labour force, let  $E$  denote employment and let  $U$  denote unemployment. Assume that the job-finding rate is  $1/5$  and that the job-separation rate is  $1/20$ . Compute the unemployment rate, i.e.  $u \equiv U/L$ .

### Question 2: Economic growth (25 points)

Consider a version of the Solow model where there is population growth,  $n$ , but no technological progress. The capital depreciation rate is denoted  $\delta$  and a fraction  $s$  of income is invested in physical capital every period. Assume that the production function is given by

$$Y_t = AK_t^{1/4}L_t^{3/4},$$

where  $Y_t$  is output,  $K_t$  is capital and  $L_t$  is labour. Total factor productivity,  $A$ , is assumed to be constant.

- a. Show that the production function exhibits constant returns to scale, i.e. is homogenous of degree 1. (2 points)
- b. Derive an expression for the accumulation of capital per worker in this economy, i.e.  $\Delta k_{t+1}$  where  $k_t \equiv K_t/L_t$ . (6 points)
- c. What is the steady-state condition in this economy? Explain the intuition behind the equilibrium condition and illustrate the steady state in a diagram. (6 points)
- d. Solve for the steady-state level of capital per worker in this economy. (6 points)

- e. What happens to capital and output per worker if there is an increase in the saving rate? Illustrate your answer in a diagram. (5 points)

### Question 3: Consumption (20 points)

Consider a household living for two periods so that  $t = 1, 2$ . Letting  $c_t$  and  $y_t$  denote consumption and income, respectively, the following must hold:

$$c_1 = y_1 - s$$

and

$$c_2 = y_2 + (1 + r)s$$

where  $s$  is saving and  $r$  denotes the interest rate.

The household's preferences are characterised by the utility function

$$U(c_1, c_2) = u(c_1) + \beta u(c_2),$$

where  $\beta$  is a parameter.

- Interpret the parameter  $\beta$ . (1 point)
- Derive the household's intertemporal budget constraint. (2 points)
- Formulate the household's maximisation problem. (3 points)
- Derive the Euler equation. (4 points)
- Suppose that  $u(c_t) = \ln c_t$  and that  $r = 0$  and  $\beta = 1$ . Modify the Euler equation to fit these assumptions and interpret the result. (6 points)
- In recent decades, asset prices have played an increasingly important role in many households' consumption decisions. Explain why and briefly discuss whether this has any implications for monetary policy. (4 points)

### Question 4: Unemployment (20 points)

**This is an essay question. Please be brief and to the point. Write no more than 4 pages. Only legible answers will be considered.**

Your task is to discuss the following:

- What different types of unemployment are there? Should policy makers be more worried about some types of unemployment than others?
- Drawing on the insights from the models we have used in the course – what factors affect unemployment?

**Question 5: (10 points)**

**This question should only be answered by students who have not obtained credit by attending the seminar series.**

- a. Derive an expression for how the primary budget balance as a share of GDP and the existing debt-to-GDP ratio affect the change in the current debt-to-GDP ratio. (6 points)
- b. Use the expression obtained above to explain how so-called snowball effects may arise. (4 points)