

**UNIVERSITY OF OSLO**  
**DEPARTMENT OF ECONOMICS**

Exam: **ECON4325 – Monetary Policy and Business Fluctuations**

Date of exam: Monday, May 31, 2010

**Grades will be given: June 16, 2010**

Time for exam: 2:30 p.m. – 5:30 p.m.

The problem set covers 3 pages

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.

**The exam consists of three parts: A, B and C. Part A and B have weight 0.3, and part C has weight 0.4. You should answer all parts.**

**Part A consists of four questions. They should be answered briefly, intuitively and precisely.**

**Part B and C consist of one question each. Answer in depth and in detail.**

## **Problem A**

### **Question 1**

Much of our understanding of the empirical effects of monetary policy on real economic activity has come from the use of structural vector autoregression (SVAR) frameworks. Briefly explain the three different approaches typically used to achieve identification.

### **Question 2**

#### ***The external finance premium***

Describe the capital cost function, or capital supply, in a model with an external finance premium. It is enough to indicate the sign of the slope of capital cost as a function of the amount of capital invested, and explain briefly why it has that slope.

Describe a factor that causes the capital cost function, or capital supply, to shift. Why might the external finance premium be higher for a given amount of capital investment in a recession than in an expansion?

### Question 3

Kenneth Rogoff proposed that the government should delegate monetary policy to a “conservative” central bank. What is meant by “conservative”? What is the rationale of this suggestion? Are there any costs of delegating monetary policy to a “conservative” central bank?

### Question 4

Discuss how a change from an inflation target to membership in a monetary union may affect the wage setting in a country with large wage setters.

## Problem B

Consider the following New Keynesian model:

$$y_t = E_t y_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1}) + u_t$$

$$\pi_t = \beta E_t \pi_{t+1} + \kappa v_t + e_t$$

where  $y_t$  is the output gap,  $\pi_t$  is the rate of inflation,  $E_t u_{t+1} = E_t e_{t+1} = 0$  and  $\text{var}(u_t) = \sigma_u^2$ ,  $\text{var}(e_t) = \sigma_e^2$ . Let the (per period) loss function be given by

$$L_t = \pi_t^2 + \lambda y_t^2$$

Assume that the central bank minimizes the loss function under discretion. Find the (reduced-form) solutions for the output gap and inflation. Show that

$$E(L_t) = \frac{\lambda}{\lambda + \sigma^2} \sigma_e^2$$

where  $E$  is the unconditional expectations operator. [Hint:  $E(e_t^2) = \text{var}(e_t) + (Ee_t)^2$  ]

## Problem C

The representative firm is perfectly competitive and has access to a technology described by

$$y_t = a_t + n_t$$

where  $y_t$ ,  $n_t$  and  $a_t$  denote the logs of output, employment and productivity, respectively. We neglect investment and the government sector, so goods market equilibrium is given by

$$y_t = c_t$$

where  $c_t$  is private consumption. Prices are assumed to be flexible. Technology follows an AR(1) process:

$$a_t = \rho_a a_{t-1} + \varepsilon_t^a \quad 0 < \rho_a < 1$$

where the noise term  $\varepsilon_t^a$  has zero expectation. The optimal labor supply is given by

$$w_t - p_t = \sigma c_t \quad \sigma > 0.$$

Aggregate demand satisfies the dynamic IS equation

$$y_t = -\frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - \rho) + E_t\{y_{t+1}\}$$

where  $i_t$  denotes the nominal interest rate and  $\pi_t = p_t - p_{t-1}$  is the rate of inflation.

- a) Derive the equilibrium behavior of employment, output and the real interest rate under the assumption of flexible wages and prices. Is it possible to determine the corresponding equilibrium values for the nominal rate of inflation? Explain.
- b) Assume now that nominal wages are sticky, in the sense that they are set at the end of the previous period, according to the rule

$$w_t = E_{t-1}\{p_t\} + \sigma E_{t-1}\{c_t\}$$

Explain briefly why the wage setters might choose this specific rule. Employment is given by firm's demand for labour.

Furthermore, assume that the central bank follows the simple rule

$$i_t = \rho + \Phi_\pi \pi_t$$

Show that  $E_{t-1}\{y_t\} = E_{t-1}\{\frac{1}{\sigma}a_t\} = \frac{\rho_a}{\sigma}a_{t-1}$  and  $\pi_t = d_1a_t + d_2a_{t-1}$  where  $d_1 = -1$  and  $d_2$  is an unknown coefficient to be determined.

Derive the equilibrium behavior of output, inflation and the real wage. Interpret your results.