Written Exam at the Department of Economics August 2018

Monetary Policy

Final Exam

August 8

(3-hour closed book exam)

Answers only in English.

This exam question consists of 4 pages in total

NB: If you fall ill during an examination at Peter Bangs Vej, you must contact an invigilator in order to be registered as having fallen ill. In this connection, you must complete a form. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

Be careful not to cheat at exams!

- You cheat at an exam, if during the exam, you:
- Make use of exam aids that are not allowed
- Communicate with or otherwise receive help from other people
- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
- Or if you otherwise violate the rules that apply to the exam

Questions 1, 2 and 3 each weigh 1/3. These weights, however, are only indicative for the overall evaluation.

QUESTION 1:

Evaluate whether the following statements are true or false. Explain your answers.

(i) Consider a dynamic general equilibrium model where infinitely lived individuals have per-period utility functions $u(c_t, m_t, l_t)$, where c_t is consumption, m_t denotes real money balances, l_t denotes leisure, and where output y_t is produced according to $y_t = f(k_{t-1}, 1 - l_t)$, where k_{t-1} is the capital stock. In this setting money is always superneutral.

(ii) Assume that empirical analyses show that country A follows a monetary policy rule $i_A = 1.5\pi_A$, and country B follows $i_B = 1.5\pi_B + 0.5x_B$, where i, π and x denote, respectively, the nominal interest rate, the inflation rate and the output gap. Subscripts distinguish countries. From these analyses, it follows that country B has preference for output gap stability while country A has not.

(iii) In the simple New-Keynesian model with monopolistic competition and sticky prices, a monetary policy implementing the Friedman rule is optimal as it eliminates any relative demand distortions.

QUESTION 2:

Consider the following static, log-linear IS/LM-style model:

$$y = -\alpha i + u, \qquad \alpha > 0 \tag{1}$$

$$m = -ci + y + v, \qquad c > 0, \tag{2}$$

where y is output, i is the nominal interest rate (in deviations from some steady state), m is the nominal money supply, and u and v are mean-zero, independent shocks with variances σ_u^2 and σ_v^2, respectively. The objective of monetary policy is to minimize output variance, and policy is conducted before the shocks hit the economy.

(i) Discuss briefly (1) and (2), and derive optimal monetary policy when m is the policy instrument and when i is the instrument. Then show that i is the preferable instrument when

$$\left(1 + \frac{2c}{\alpha}\right)\sigma_u^2 < \sigma_v^2. \tag{3}$$

Provide the intuition for condition (3) with particular focus on the variance terms.

(ii) Consider an extension where

$$m = b + hi + \omega, \qquad h > 0, \tag{4}$$

is added to the model. In equation (4), b is the money base, which is now a possible monetary policy instrument, and ω is a mean-zero shock with variance σ_ω^2. The variable m is now interpreted as an endogenous broad measure of money. Is the case for using a nominal interest rate operating procedure strengthened or weakened relative to condition (3) in this extended version of the model? A thorough verbal discussion is sufficient.

(iii) Assume that monetary policymaking takes the form of a money base rule of the form $b = \mu i$. If there are no shocks to the monetary side of the model, $\sigma_v^2 = \sigma_\omega^2 = 0$, will a "pure" money base rule, $\mu = 0$, be optimal? Explain.

QUESTION 3:

Consider the following log-linear model of a closed economy:

$$x_t = \mathrm{E}_t x_{t+1} - \sigma^{-1}\left(i_t - \mathrm{E}_t \pi_{t+1} - \rho - r_t^n\right), \qquad \sigma > 0, \qquad \rho > 0 \tag{1}$$

$$\pi_t = \beta \mathrm{E}_t \pi_{t+1} + \kappa x_t, \qquad 0 < \beta < 1, \quad \kappa > 0, \tag{2}$$

where x_t is the output gap, i_t is the nominal interest rate (the monetary policy instrument), π_t is goods price inflation and $r_t^n \equiv \rho + e_t$ is the natural rate of interest, with e_t assumed to be a mean-zero, serially uncorrelated shock. E_t is the rational expectations operator conditional on all information up to and including period t.

(i) Discuss the micro-economic foundations behind equations (1) and (2).

(ii) Assume that the monetary authority minimizes the loss function

$$L = \frac{1}{2}\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\lambda x_t^2 + \pi_t^2\right], \qquad \lambda > 0. \tag{3}$$

Discuss the micro-economic foundations for this loss function.

(iii) Derive the optimal values of x_t and π_t under discretionary policymaking [Hint: Consider x_t the policy instrument, and acknowledge that under discretion the optimization problem becomes a sequence of static problems as expected values can be taken as given]. Discuss the solutions, and describe how the nominal interest rate will move with the natural rate of interest in equilibrium.