Written Exam Economics August 2016

Monetary Policy

August 19

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

This exam question consists of 4 pages in total

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) In the simple cash-in-advance model with only consumption in the utility function, there is no unique optimal monetary policy.

(ii) In the Lucas "islands" model, an unanticipated aggregate money shock has no real effects as agents have rational expectations.

(iii) Under a nominal interest-rate targeting procedure, monetary policymaking performed without knowledge of the realizations of current shocks can be improved by using the money stock as an intermediate target whenever money-market shocks are predominant in the economy.

QUESTION 2:

Strict inflation targeting and nominal interest-rate rules

Consider the following model for output and inflation determination in a closed economy:

$$y_t = \theta y_{t-1} - \sigma\left(i_{t-1} - \mathrm{E}_{t-1}\pi_t\right) + u_t, \qquad 0 < \theta < 1, \quad \sigma > 0, \tag{1}$$

$$\pi_t = \pi_{t-1} + \kappa y_t + e_t, \qquad \kappa > 0, \tag{2}$$

where y_t is log of output in period t, i_t is the nominal interest rate (the monetary policy instrument), π_t is the inflation rate, u_t and e_t are independent, mean-zero, serially uncorrelated shocks. E_j is the rational expectations operator conditional on information up to and including period j. It is assumed that $\sigma\kappa < 1$. The objective of the central bank is to conduct monetary policy so as to maximize

$$U = -\frac{1}{2}\mathrm{E}_t \sum_{j=1}^{\infty} \beta^j \pi_{t+j}^2, \qquad 0 < \beta < 1.$$

(i) Derive the optimal interest rate rule for i_t as a function of π_t and y_t. (Hint: Treat $\mathrm{E}_t y_{t+1} \equiv y_{t+1} - u_{t+1}$ as the policy instrument, and solve the maximization problem by dynamic programming treating π_t as the state variable; i.e., we have $v(\pi_t) = \max_{\mathrm{E}_t y_{t+1}} \mathrm{E}_t \left\{ -\frac{1}{2}(\pi_{t+1})^2 + \beta v(\pi_{t+1}) \right\}$. Then find the optimal policy as $\mathrm{E}_t y_{t+1} = -B\pi_t$, where B is a parameter to be found, and use (1) and (2) to derive the associated nominal interest rate.)

(ii) Comment on the coefficient on π_t in the optimal interest rate rule, with special emphasis on how its value affects the stability properties of the model.

(iii) Discuss how the coefficients on π_t and y_t in the optimal interest-rate rule depend on the underlying parameters of the model. Discuss in particular what the parameters reveal about the strict inflation-targeting preferences of the central bank.

QUESTION 3:

Rogoff conservativeness in a New-Keynesian Model?

Consider a one-equation variant of a New-Keynesian model of inflation determination:

$$\pi_t = \beta \mathrm{E}_t \pi_{t+1} + \kappa x_t + e_t, \tag{1}$$

where π_t is inflation, $0 < \beta < 1$ is a discount factor, E_t is the rational expectations operator, $\kappa > 0$ is a parameter, x_t is the output gap, and e_t is a "cost-push" shock that follows the process

$$e_t = \rho e_{t-1} + \widehat{e}_t, \qquad 0 < \rho < 1,$$

where $\widehat{e}_t$ is a mean-zero i.i.d. disturbance. It is assumed that the monetary policymaker controls x_t with the aim of maximizing the discounted sum of

$$U_t = -\frac{\lambda}{2} x_t^2 - \frac{1}{2}\pi_t^2, \qquad \lambda > 0. \tag{2}$$

(i) Show that under discretionary policymaking, optimal policy is characterized by

$$-\lambda x_t = \kappa \pi_t. \tag{3}$$

Explain the result intuitively, and describe (in words) how inflation and the output gap will respond to a positive "cost-push" shock.

(ii) Assume now that the policymaker can commit to a policy of the form

$$x_t^c = -\omega e_t, \tag{4}$$

where ω is a policy-rule parameter. Derive the optimal relationship between x_t^c and π_t^c. [Hint: Combine (4) with (1) to show that $\pi_t^c = [\kappa/(1-\beta\rho)]\, x_t^c + [1/(1-\beta\rho)]\, e_t$ and maximize U_t w.r.t. x_t^c subject to this expression for π_t^c.]

(iii) Discuss, based on the result of (ii), whether appointing a "conservative" policymaker, one characterized by $\lambda^c < \lambda$, is beneficial. Comment on whether $\rho > 0$ is crucial for the answer.