

# Written Exam for the B.Sc. in Economics, Summer 2014

Macro B

Final Exam

August 19, 2014

(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 5 pages in total**

**All questions of both problems should be answered**

**Problem A**

Consider the following model of a closed economy

$$y_t - \bar{y} = \alpha_1 (g_t - \bar{g}) - \alpha_2 (r_t - \bar{r}) + v_t, \quad \alpha_1 > 0, \quad \alpha_2 > 0 \quad (\text{A.1})$$

$$r_t = i_t - \pi_{t+1}^e \quad (\text{A.2})$$

$$i_t = \bar{r} + \pi_{t+1}^e + h (\pi_t - \pi^*) + b (y_t - \bar{y}), \quad h, b > 0 \quad (\text{A.3})$$

$$\pi_t = \pi_t^e + \gamma (y_t - \bar{y}) + s_t, \quad \gamma > 0 \quad (\text{A.4})$$

$$\pi_t^e = \pi_{t-1} \quad (\text{A.5})$$

with the notation being as in the textbook and unless otherwise stated, both  $s_t$  and  $v_t$  are zero.

1. Explain equations (A.1) – (A.5).
2. Show that equations (A.1) – (A.5) may be combined to yield the following AD and SRAS curves:

$$\text{AD} : y_t = \bar{y} - \alpha (\pi_t - \pi^*) + z_t \quad (\text{A.6})$$

$$\text{SRAS} : \pi_t = \pi_{t-1} + \gamma (y_t - \bar{y}) + s_t \quad (\text{A.7})$$

where

$$\alpha \equiv \frac{\alpha_2 h}{1 + \alpha_1 b}, \quad z_t \equiv \frac{1}{1 + \alpha_2 b} [\alpha_1 (g - \bar{g}) + v] \quad (\text{A.8})$$

Also, explain that the long-run equilibrium (where  $\pi_t^e = \pi_t$ ) is given by  $(\bar{y}, \pi^*)$  which is the point where the AD curve and the vertical LRAS curve intersect.

3. Show graphically and formally that the long-run equilibrium is stable, *i.e.* that over time  $y_t$  and  $\pi_t$  will converge towards their long-run values. Explain the economic mechanisms behind this. Also explain that deviations from the long-run equilibrium will show persistence. How does the speed of convergence depend on  $\beta$ ?

*Hint:* In order to show stability formally you may find it useful to define  $\hat{y}_t = y_t - \bar{y}$ ,  $\hat{\pi}_t = \pi_t - \pi^*$  and then – assuming  $z_t = s_t = 0$  – use equations (A.6) and (A.7) to show that

$$\hat{y}_t = \beta \hat{y}_{t-1} \quad \text{and} \quad \hat{\pi}_t = \beta \hat{\pi}_{t-1} \quad \text{where} \quad \beta \equiv \frac{1}{1 + \alpha\gamma}$$

4. Assume that for some time the economy has been in long-run equilibrium. Then, in a single period – period 1 – there is a negative supply shock,  $s_1 > 0$ . Afterwards  $s_t = 0, t = 2, 3, \dots$ . Analyse the effects of this until the economy is back in long-run equilibrium. How is the economy initially affected by the shock? Is it possible to cancel out the initial effect from the shock on  $y$  and  $\pi$  completely through economic policy initiatives? Also, analyse the case of a temporary negative demand shock,  $v_1 < 0, v_0 = v_t = 0, t = 2, 3, \dots$

Now consider a situation where the economy for some time has been in a long-run equilibrium. Then, in period 1 a new board with a stronger commitment to inflation targeting takes office. We model this by assuming  $h_{New} > h_{Old} > 0$  and  $b_{New} = b_{Old}$ , so that  $h$  is increased relatively to  $b$ .

5. How does the change in policy affect the economy's response to a given temporary supply shock. Is the initial effect on activity larger or smaller under the new set of policy parameters than under the old parameters? Illustrate. Is it possible to cancel out the effect from a temporary supply shock on  $y$  and  $\pi$  under the new policy? How is the speed of convergence affected? Explain. Also, compare response of  $y$  and  $\pi$  of a given temporary demand shock under the new and the old set of policy rule parameters.
6. Assume that an analysis of the social losses concludes that fluctuations in activity undesirable whereas social cost associated with deviations in inflation from  $\pi^*$  are negligible. Based on the above analysis, explain how the parameters  $h$  and  $b$  in the monetary policy function should be set to minimise the immediate social losses in case economic shocks are:
  - a. Entirely a supply side phenomenon ( $z_t = 0, \forall t$ ),
  - b. Entirely a demand side phenomenon, *i.e.* ( $s_t = 0, \forall t$ ).

How are your answers changed in case there is a significant cost associated with *both* fluctuations in inflation and activity?

7. Now assume the new board not only introduces a new set of policy parameters  $h$  and  $b$  but also implements a lower target for inflation;  $0 < \pi_{New}^* < \pi_{Old}^*$ . How is the AD curve affected? Explain that the AS curve is not affected given inflation expectations are static. Illustrate the initial effect on  $y$  and  $\pi$  to this change in policy (assuming the economy initially was in a long-run equilibrium). Explain that policymakers could mitigate the effect on activity by announcing the new lower inflation target before implementation.

## Problem B

1. When analyzing the open economy we have assumed that the economy is small and specialized. Explain what is meant by “small” and “specialized”.
2. Use the uncovered interest parity  $i = i^f + e_{+1}^e - e$  to explain the so-called “Impossible Trinity”: A macroeconomic policy regime can include at most two of the following three policy goals simultaneously:
  - a. Free cross-border capital flows
  - b. A fixed exchange rate
  - c. Independent monetary policy
3. In the textbook a two-period model is used when describing private consumption. It is shown that the first-order condition for solving the consumers’ maximization problem is

$$\frac{u'(C_1)}{u'(C_2)/(1 + \phi)} = 1 + r \quad (\text{B.1})$$

where  $u(C_t)$  is the consumer’s utility from consumption in period  $t$ ,  $\phi$  is the consumer’s rate of time preference, and  $r$  is the real interest rate.

Interpret this condition and illustrate the solution in a diagram where  $C_1$  is depicted along the first axis and  $C_2$  is depicted along the second axis. In the particular case where  $\phi = r$ , describe and illustrate why the existence of capital markets in general makes it possible for the consumers to enjoy welfare gains compared to a situation without capital markets.