Written Exam for the B.Sc. in Economics spring 2012-2013

Macro B

Final Exam

June 24 2013
(3 hours 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 including this page.

All questions of both problems should be answered

Problem A

Consider the following model of a closed economy

$$
\begin{aligned}
y_t &= \bar{y} + \alpha_1 (g_t - \bar{g}) - \alpha_2 (r_t - \bar{r}) + v_t, \quad \alpha_1 > 0, \quad \alpha_2 > 0 && \text{(A.1)} \\
r_t &\equiv i_t^p + \rho_t - \pi_{t+1}^e && \text{(A.2)} \\
i_t^p &= \bar{r}^* + \pi_{t+1}^e + h (\pi_t - \pi^*) + b (y_t - \bar{y}), \quad h, b > 0 && \text{(A.3)} \\
\pi_t &= \pi_t^e + \gamma (y_t - \bar{y}) + s_t, \quad \gamma > 0 && \text{(A.4)} \\
\pi_t^e &= \pi_{t-1} && \text{(A.5)}
\end{aligned}
$$

where variables being as in the textbook and unless otherwise stated, both s_t and v_t are zero. (Remember that $\bar{r} = \bar{r}^* + \bar{\rho}$, $i = i^p + \rho$ and $i_t^p = \bar{r}^* + \bar{\rho}$ where $\bar{\rho}$ is the average long-term risk premium).

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:

$$
\begin{aligned}
\text{AD} &: \quad y_t = \bar{y} - \alpha (\pi_t - \pi^*) + z_t && \text{(A.6)} \\
\text{SRAS} &: \quad \pi_t = \pi_{t-1} + \gamma (y_t - \bar{y}) + s_t && \text{(A.7)}
\end{aligned}
$$

   where

$$
\alpha \equiv \frac{\alpha_2 h}{1 + \alpha_2 b}, \quad z_t \equiv \frac{v_t + \alpha_1 (g_t - \bar{g}) - \alpha_2 (\rho_t - \bar{\rho})}{1 + \alpha_2 b}
$$

   Explain why the AD curve is downward sloping and the SRAS curve is upward sloping in a diagram where you have y on the first axis and π on the second axis.

3. Show graphically that the long run equilibrium is stable, i.e. that over time y_t and π_t will converge towards their long-run values, but that deviations from the long-run equilibrium will show persistence. Explain the economic mechanisms behind this.

4. Assume that the economy has been in a long-run equilibrium for some time. Then, in a single period a negative supply shock, $s_t > 0$ occurs. Analyse and describe how this affects the economy initially and until the economy is back in long run equilibrium. Explain the importance of the values of the parameters h and b and how they affect y_t and π_t in the short run, *i.e.* the period where the shock hits the economy. Illustrate. Comment and compare briefly with the case of a negative demand shock, $v_t < 0$.

We now analyze how the economy's long-run equilibrium is affected by permanent shocks. These shocks will change the equilibrium real interest rate which enters the central banks policy rule (A.3) and hence the interest setting by the central bank. Moreover the economy's natural rate of output may be affected. Let $\bar{r}_0$ and $\bar{y}_0$ denote, respectively, the real market interest rate and the level of output in the initial long-run equilibrium prevailing before the economy is hit by a permanent shock.
When describing the economy around the initial long-run equilibrium the goods markets equilibrium condition (A.2) may be written as

$$y_t - \bar{y}_0 = v_t - \alpha_2 (r_t - \bar{r}_0) \tag{A.8}$$

and the SRAS curve becomes

$$\pi_t = \pi_{t-1} + \gamma (y_t - \bar{y}_0) + s_t \tag{A.9}$$

where $v_t = s_t = 0$ in the initial equilibrium.

5. Now assume that the economy is hit by a permanent supply shock, $s \neq 0$ for all future periods $t = 1, 2, ...$ Show that the new long-run equilibrium level of output can be found as

$$\bar{y} = \bar{y}_0 - \frac{s}{\gamma} \tag{A.10}$$

and that the new equilibrium real interest rate which ensures that the goods market clears is

$$\bar{r} = \bar{r}_0 + \frac{s}{\gamma \alpha_2} \tag{A.11}$$

(Remember that in a long-run equilibrium $y_t = \bar{y}$ and expectations are fulfilled so that $\pi_t^e = \pi_{t-1} = \pi_t$).

Explain the intuition behind (A.11). In particular comment on why the central bank has to change the risk-free equilibrium real interest rate, $\bar{r}^* = \bar{r} - \bar{\rho}$, that enters the monetary policy rule (A.3). Illustrate this in the case of a permanent negative supply schock, $s > 0$.

6. Referring to *i.a.* that estimates from international institutions such as the EC, OECD and IMF show a marked upward trend in structural unemployment in euro area countries the European Central Bank has pointed out that the current economic crisis (which is a severe negative demand shock) will have negative structural effects on the supply side of the economy. In our model we may interpret this as a permanent negative supply shock, $s > 0$. Based on the above analysis, how does such a mindset affect the ECB interest rate setting when the negative demand shock dissapears/fades? In your answer compare to a sitiation where there are perceived to be no supply side effects. Is the policy rate lifted:

   a. to the exact same level

   b. more

   c. less.

   Explain your answer.

7. Now define $\tilde{v} = v_t + \alpha_1 (g_t - \bar{g})$ and assume the economy is hit by permanent demand shock, $\tilde{v} \neq 0$. No supply shocks occure ($s = 0$). Also, how is natural output affected? Show that the new long run equilibrium real interest rate is given by $\bar{r} = \bar{r}_0 + \frac{\tilde{v}}{\alpha_2}$. What is the intuition behind this?

Problem B

1. Consider the equation

$$i = i^f + e^e - e, \quad e = \ln E, \quad e^e_{+1} = \ln E^e_{+1} \tag{B.1}$$

where i and i^f are the domestic and foreign levels of nominal interest rates respectively, E is the nominal exchange rate and E^e_{+1} is the expected nominal exchange in the next period. Assume capital mobility is perfect.

Explain the economic intuition in (B.1). How does (B.1) look for an economy where the central bank conducts a fixed exchange rate policy which is perceived as fully credible by market participants? Which opportunities does the central bank have to stabilize business cycles?

2. Explain why the AD curve is flatter under a flexible exchange rate system than under a fixed exchange rate system.

3. Consider a small open economy where wage formation is chacterised by relative wage resistance (the open economy model used in the textbook). Suppose domestic productivity increases permanently. Illustrate and explain the long run effects on output, competitiveness (the real exchange rate) and the terms of trade.