Written Exam for the B.Sc. in Economics summer 2012

Macro B

Final Exam

August 21 2012
(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.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

All questions of both problems should be answered

Problem A

This exercise asks you to analyze the design of monetary policy when monetary policy authorities are seeking to stabilize the economy with respect to both output y and inflation π.

For a closed economy the condition for goods market equilibrium may be stated by the log-linearized equation

$$y - \bar{y} = \alpha_1(g - \bar{g}) - \alpha_2(r - \bar{r}) + v \tag{A.1}$$

The parameters $\alpha_1$and α_2 are positive stating that aggregate demand varies negatively withe the real interest rate r and positively with government spending g and expectations to future income ν. The real interest rate is given by $r = i^p - \pi^e_{+1} + \rho$ where i^p is the monetary policy rate and ρ is a risk premium.

Conditions for monetary policy are said to be ideal if the central bank is

- perfectly informed
- perceived fully credible by economic agents and
- able to adjust interest rates instantaneously.

1. Explain why the above mentioned 3 conditions constitute ideal conditions for monetary policy?

In the text book it is shown that the optimal monetary policy for a central bank under ideal conditions is described by the equation

$$\begin{aligned} i^p &= \bar{r}^* + \pi^* - (\rho - \bar{\rho}) + \frac{v + \alpha_1(g - \bar{g})}{\alpha_2} - \frac{1 - \alpha}{\alpha_2(a_l + \alpha\gamma a_\pi)} a_d \\ &+ \frac{\alpha\gamma a_\pi}{\alpha_2(a_l + \alpha\gamma a_\pi)}(1 - \alpha)(m - \bar{m}) - \frac{a_l + \gamma a_\pi}{\alpha_2(a_l + \alpha\gamma a_\pi)}(b - \bar{b}) \end{aligned} \tag{A.2}$$

where $\bar{r}^*$ is the risk free equilibrium real interest rate and π^* is the fully credible inflation target for the central bank. The notation follows the text book so that

the trend/normal value of variable is denote by "-". We will not go into detail with respect to the parameters $a_d, a_l, a_\pi, \alpha, \alpha_1, \alpha_2$ and γ other than noticing that they all are positive and that a_d, a_l, a_π are weights in the social loss function attached to market distortions, fluctuations in employment and fluctuations in inflation respectively.

The economy may be hit by:

- Demand shocks: v, g and ρ (risk premium)
- Supply shocks: m (mark up factors in case of imperfections on product and labor markets) and b (productivity shocks)

2. Describe how monetary policy should react to shocks. Should demand shocks be perfectly stabilized? Should supply shocks? Why should the ideal monetary policy rate i^p not respond to gaps in inflation and output?

As mentioned v reflects expectations with respect to future output and income. Now assume that economic agents in period t form expectations on all future output and income. More precisely we assume that

$$v_{t+i} = y^e_{t+i,t} - \bar{y} \quad \text{for } i = 0, 1, 2, \ ... \tag{A.3}$$

where $y^e_{t+i,t}$ is the expected income in period $t+i$ formed in period t and $\bar{y}$ is trend (or normal) output. (Accordingly we have an infinite sequence $v_t = y^e_{t+1,t} - \bar{y}$, $v_{t+1} = y^e_{t+2,t} - \bar{y}, v_{t+2} = y^e_{t+3,t} - \bar{y}, ..$).
Assuming that both the risk premium and public spending is at the trend level ($\rho = \bar{\rho}$ and $g = \bar{g}$ respectively) and noticing that $\pi^e_{t+1} = \pi^e_{t+1,t}$ as the inflation expectations for period $t+1$ are formed in period t we may rewrite the goods market equilibrium condition for period t as

$$y_t - \bar{y} = -\alpha_2(i_t - \pi^e_{t+1} - \bar{r}) + v_t \tag{A.1'}$$

Also, in period t the economic agents form expectation for the output gap for each of the subsequent periods $t+i$, $i = 1, 2, ...$

$$y^e_{t+i,t} - \bar{y} = -\alpha_2(i^e_{t+i,t} - \pi^e_{t+1+i,t} - \bar{r}) + v_{t+i} \tag{A.1"}$$

3. Show that the next periods expected output gap (period $t+1$) may be written as

$$y^e_{t+1,t} - \bar{y} = y^e_{t+2,t} - \bar{y} - \alpha_2(i^e_{t+i,t} - \pi^e_{t+2,t} - \bar{r}) \tag{A.4}$$

Use this to show that the output gap in the current period (period t) may be written as

$$y_t - \bar{y} = y^e_{t+2,t} - \bar{y} - \alpha_2(i^e_{t+1,t} - \pi^e_{t+1+1,t} - \bar{r}) - \alpha_2(i_t - \pi^e_{t+1,t} - \bar{r}) \tag{A.5}$$

Finally, show that

$$y_t - \bar{y} = -\alpha_2 \left[(i_t - \pi^e_{t+1,t} - \bar{r}) + \sum_{i=1}^{\infty} (i^e_{t+i,t} - \pi^e_{t+1+i,t} - \bar{r}) \right] \tag{A.6}$$

4. Based on $(A.6)$ rank the following 3 situations in a declining order so that the one you think will contribute the most to an increase in economic activity is ranked first and the one that contributes the least is ranked third:

   a. The central bank reduces the monetary policy rate by 0.25 %-point

   b. The central bank reduces the monetary policy rate by 0.25 %-point and announces that it intends to keep the policy rate low for a prolonged period.

   c. The central bank reduces the monetary policy rate by 0.25 %-point and announces that it intends to *raise* the policy rate as fast as possible

   Explain your ranking.

Now assume the economy is hit by a severe negative demand shock resulting in a large drop in output and driving inflation close to zero.

5. Explain why monetary policy may become impotent in such a situation. If anything what can policy makers do in order to stimulate the economy? Does it help to promise to create higher future inflation? Does such an announcement pose a threat to the credibility of central banks inflation targets?

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. In the text book the uncovered interest parity which may be stated (by the approximation): $i = i^f + e^e_{+1} - e$. Use the the uncovered interest parity 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. Discuss the relationship between the short term interest rate and the long term interest rate.