Written Exam for the B.Sc. in Economics
Winter 2011-2012

Macro B

January 16, 2012

(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.

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

Consider the utility-maximization problem

$$\max_{C_1,C_2} \quad U = u\left(C_1\right) + \frac{1}{1+\phi} u\left(C_2\right) \tag{A.1}$$

$$\text{s.t.} \quad C_1 + \frac{1}{1+r} C_2 = \left(Y_1^L - T_1 + \frac{1}{1+r}\left(Y_2^L - T_2\right) + V_1\right), \tag{A.2}$$

where V_i is initial financial wealth in period i, C_i is period-i consumption, Y_i^L is labour income in period i, and T_i are taxes paid in period i.

1. Explain equation (A.1) and (A.2).

If $u\left(C\right) = \frac{\sigma}{\sigma-1} C^{\frac{\sigma-1}{\sigma}}$, the solution for consumption in period 1 is

$$C_1 = \theta\left(Y_1^L - T_1 + \frac{1}{1+r}\left(Y_2^L - T_2\right) + V_1\right), \quad \theta \equiv \frac{1}{1 + \left(1+r\right)^{\sigma-1}\left(1+\phi\right)^{-\sigma}} \tag{A.3}$$

2. Derive (A.3). What does θ measure? What can be said about the size of θ? Explain.

3. Assume a person wins 100,000 \$ in a lottery in period 1. By how much is period-1 consumption going to increase? Explain.

The derivative of θ with respect to r is

$$\frac{\partial \theta}{\partial r} = -\frac{\left(\sigma - 1\right)\left(1+r\right)^{\sigma-2}}{\left[1 + \left(1+r\right)^{\sigma-1}\left(1+\phi\right)^{-\sigma}\right]^2}. \tag{A.5}$$

4. State whether an increase in the real interest rate will raise or lower period-1 consumption. Relate the result to the size of σ. Explain.

5. Discuss how financial wealth and the life-time value of labour incomes are likely to be affected by an increase in the real interest rate and how this might affect how consumption responds to a real interest rate increase.

Problem B

Consider the following description of an open economy (in usual notation).

$$\begin{aligned} y - \bar{y} &= \beta_1 e^r - \beta_2 (r - \bar{r}) + v, \quad \beta_1, \beta_2, \beta_3 > 0, && \text{(B.1)} \\ e^r &= e^r_{-1} + \triangle e + \pi^f - \pi && \text{(B.2)} \\ r &= i - \pi^e_{+1} && \text{(B.3)} \\ r^f &= i^f - \pi^f && \text{(B.4)} \\ i &= i^f + h\left(\pi - \pi^f\right), && \text{(B.5)} \\ \pi^e_{+1} &= \pi^e = \pi^f && \text{(B.6)} \\ i &= i^f + e^e_{+1} - e && \text{(B.7)} \\ e^e_{+1} - e &= -\theta (e - e_{-1}), \quad \theta > 0 && \text{(B.8)} \\ \bar{r} &= \bar{r}^f && \text{(B.9)} \\ \pi &= \pi^e + \gamma (y - \bar{y}) + s, \quad \gamma > 0, && \text{(B.10)} \end{aligned}$$

$v \equiv \beta_3 (g - \bar{g}) + \beta_4 \left(y^f - \bar{y}^f\right) + \beta_5 (\ln \varepsilon - \ln \bar{\varepsilon}), \ \beta_4, \beta_5 > 0.$

1. Explain (B.2), (B.5), (B.6), (B.7) and (B.8). Then assume $h, \theta > 0$ and describe the monetary policy regime in the model.

Equations (B.1) – (B.10) can be combined to the following AD and SRAS curves:

$$\begin{aligned} \text{AD} &: \ \pi = \pi^f + \frac{\beta_1}{\alpha} e^r_{-1} - \frac{1}{\alpha}(y - \bar{y}) + \frac{v}{\alpha} && \text{(B.12)} \\ \text{SRAS} &: \ \pi = \pi^f + \gamma (y - \bar{y}) + s, && \text{(B.13)} \end{aligned}$$

where

$$\alpha \equiv \beta_1 + h\left(\beta_1 \theta^{-1} + \beta_2\right) \tag{B.14}$$

2. Explain how (B.12) and (B.13), are obtained – you do *not* have to derive them. Explain why the AD curve is negatively sloped and why the SRAS curve is positively sloped.

The dynamics of the real exchange rate is given by

$$e^r = e^r_{-1} + \frac{1}{\theta} h\left(\pi^f - \pi\right) + \pi^f - \pi. \tag{B.15}$$

3. Derive (B.15) and explain it.

Assume that a one-period negative supply shock hits the economy.

4. Illustrate this negative supply shock and the economic mechanisms that bring the economy back to its long-run equilibrium. Explain.

Assume that $h = \theta = 0$.

5. Which implications does this assumption have for monetary policy? Re-illustrate the negative supply shock – how does the short-run (first-period responses) reactions in output and inflation differ from the case where $\theta, h > 0$? Explain.

Returning to the general case where $h, \theta \geq 0$, the dynamics of $\hat{y}_t$ can be solved to the following equation

$$\hat{y}_t = \psi^t \hat{y}_0, \quad \hat{y}_t \equiv y_t - \bar{y} \tag{B.16}$$

where

$$\psi \equiv \frac{1 + \gamma h \beta_2}{1 + \gamma \left[\beta_1 + h\left(\beta_2 + \theta^{-1}\beta_1\right)\right]}. \tag{B.17}$$

6. When is convergence fastest? When $h = \theta = 0$ or when $h, \theta > 0$? Explain.