Written Exam for the B.Sc. in Economics, Summer 2011

Makro B

Final Exam

August 23, 2011

(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

This problem focuses on understanding the firm's decision to invest.
Consider the arbitrage condition

$$(r+\varepsilon)V_t = D_t^e + V_{t+1}^e - V_t, \tag{A.1}$$

where r is the (constant) real interest rate on low-risk assets, e.g. bonds, ε is a risk premium, D_t^e is the expected real dividend from owning stocks during period t, while V_t is the actual real market value of the firm at the beginning of period t, and V_{t+1}^e is the expected real market value at the beginning of period $t+1$.

1. Explain equation (A.1) and show it can be written as

$$V_t = \frac{D_t^e + V_{t+1}^e}{1+r+\varepsilon} \tag{A.2}$$

Assuming that investors do not expect the real market value of the firm to grow persistently at a rate exceeding the risk-adjusted real interest rate, i.e.

$$\lim_{n\to\infty} \frac{V_{t+n}^e}{(1+r+\varepsilon)^n} = 0, \tag{A.3}$$

it is possible to recast (A.2) as

$$V_t = \frac{D_t^e}{1+r+\varepsilon} + \frac{D_{t+1}^e}{(1+r+\varepsilon)^2} + \frac{D_{t+2}^e}{(1+r+\varepsilon)^3} + ..., \tag{A.4}$$

which is the fundamental market value of the firm.

2. Derive (A.4). Give some reasons why stock prices can be very volatile. Are such swings in stock prices consistent with rational/sensible behaviour among investors?

Now consider the model consisting of (A.2) and equations (A.5)-(A.8) below:

$$q_t \equiv \frac{V_t}{K_t} \tag{A.5}$$

$$q_{t+1}^e = q_t \tag{A.6}$$

$$K_{t+1} = K_t(1-\delta) + I_t \tag{A.7}$$

$$D_t^e = \Pi_t^e - I_t - c(I_t), \quad c(0)=0, \quad c' \equiv \frac{dc(I_t)}{dI_t} > 0 \tag{A.8}$$

3. Describe (A.5)-(A.8) and use them together with (A.2) to derive (A.9):

$$V_t = \frac{\Pi_t^e - I_t - c(I_t) + q_t[K_t(1-\delta) + I_t]}{1+r+\varepsilon} \tag{A.9}$$

(A.9) links the decision variable of the firm, I_t, with the market value of the firm, V_t. The first-order condition that ensures maximization of the firm's value can be written as

$$q_t = 1 + c'(I_t). \tag{A.10}$$

4. Derive (A.10), illustrate it graphically and comment. What is the role of $c(I_t)$?

Now assume that a proportional tax on dividends are immediately introduced.

5. How will this affect stock prices today? And how will it affect today's stock prices if the tax is not immediately introduced but instead announced to be introduced in two years' time?
6. Discuss which consequences a tax on dividends might have on the capital stock in the economy, K, and the general wage level in the economy.

Problem B

This problem focuses on understanding aspects regarding the open economy. Assume perfect capital mobility and consider the equation

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

where i and i^f are the domestic and foreign levels of nominal interest rates, E is the nominal exchange rate and E_{+1}^e is the expected nominal exchange in the next period.

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

Now consider the model (with usual notation) describing a small open economy in which the central bank conducts a fixed-exchange rate policy

$$\begin{aligned}
\pi &= e^r_{-1} + \pi^f - \left(\frac{1}{\beta_1}\right)(y - \bar{y} - z) && \text{(B.2)}\\
\pi &= \pi^f + \gamma\,(y - \bar{y}) + s && \text{(B.3)}\\
e^r &= e^r_{-1} + \pi^f - \pi && \text{(B.4)}
\end{aligned}$$

where

$$\begin{aligned}
z &\equiv -\beta_2\left(r^f - \bar{r}^f\right) + \beta_3\,(g - \bar{g}) + \beta_4\left(y^f - \bar{y}^f\right) + \beta_5\,(\ln\varepsilon - \ln\bar{\varepsilon}) && \text{(B.5)}\\
\beta_i &> 0, \quad i = 1, 2, ..., 5.
\end{aligned}$$

2. Describe (B.2)-(B.4) and explain what z and s capture.

Suppose the economy is in long-run equilibrium in period 0 but in period 1 is hit by a one-period negative demand shock.

3. Illustrate what happens when the shock hits the economy as well as the transition back to the long-run equlibrium. Explain the economic mechanisms behind this. How does the convergence proces differ from that of the closed economy?

Now assume that the government wants to accomodate shocks to the economy by conducting a systematic fiscal policy described by

$$g - \bar{g} = a\,(\bar{y} - y)\,, \quad a \geq 0 \qquad \text{(B.6)}$$

This will replace (B.2) and (B.5) with (B.2*) and (B.5*);

$$\begin{aligned}
\pi &= \pi^f + e^r_{-1} - \left(\frac{1 + \beta_3 a}{\beta_1}\right)(\bar{y} - y) + \frac{\hat{z}}{\beta_1} && \text{(B.2*)}\\
\hat{z} &\equiv -\beta_2\left(r^f - \bar{r}^f\right) + \beta_4\left(y^f - \bar{y}^f\right) + \beta_5\,(\ln\varepsilon - \ln\bar{\varepsilon}) && \text{(B.5*)}
\end{aligned}$$

4. Explain (B.6) and illustrate the *short-run* consequences (it is not necessary to explain the transistion back to the long-run equilibrium) of a one-period negative supply shock ($s > 0$) when

    1. fiscal policy is passive ($a = 0$)
    2. fiscal policy is countercyclical ($a > 0$)

    Which short-run trade-off does the government face? Does the government face the same trade-off if the economy is instead hit by a demand shock? Illustrate and explain.