ECON 4330 Answers to exercise 2

April 30, 2010

A) Floating exchange rates in a portfolio model with money

1

In this model money always give a lower return than domestic currency bonds. Money therefore is inferior as an investment alternative and is held only for transaction purposes. Transaction needs do not depend on wealth, and, hence, money demand do not depend on wealth either. The amount of exchange rate risk that is taken does not depend on whether the kroner assets are bonds or money. Hence, the choice of currency composition of the portfolio can be separated from the choice of how liquid the domestic currency part of the portfolio should be. The alternative cost of holding money is the interest rate on domestic bonds, and the foreign interest rate has no direct effect on the money demand.

2

There are five potential decision variables. The model has 11 equations. However, equation (7) can be derived from equations (1), (6) and (8). Hence there are 10 independent equations. Since 7 variables are always endogenous, three of the potential decision variables have to be endogenous, while two can be chosen freely. By definition having a floating exchange rate means that E is endogenous and F_g is exogenous. In addition either i, M or B can be set exogenously by the policy maker.

3.

a)

Differentiate (6):

$$\frac{1}{p}dM = m_i d_i$$

$$\frac{di}{dM} = \frac{1}{Pm_i} < 0$$

The degree of capital mobility does not matter

b)

The equilibrium condition for the forex market is

$$F_p + F_y + F_* = 0$$

or

$$\frac{P}{E}f(i - i_* - \alpha\frac{\bar{E} - E}{E}, \frac{M_0 + B_0 + EF_{p0}}{P}) + F_g + F_* = 0 \tag{11}$$

This determines E for a given i and we already know the effect of M on i. Differentiating with respect to i and E we get

$$-\frac{P}{E^2}f(\cdot)dE + \frac{P}{E}f_r'[di + \alpha\frac{\bar{E}}{E^2}dE] + \frac{P}{E}f_w F_{p_0}dE\frac{1}{P} = 0$$

Replace $f(\cdot)$ by EF_{p0}/P (this means that we calculate the value of the derivative at the initial equilibrium) and multiply by E:

$$-F_{P_0}dE + f_r'di + \alpha\frac{P\bar{E}}{E^2}f_r'dE + f_w F_{p_0}dE = 0$$

Reorganize:

$$\left[-(1 - f_w)F_{p_0} + \alpha\frac{P\bar{E}}{E^2}f_r'\right]dE = -Pf_r'di$$

Hence,

$$\frac{dE}{di} = \frac{Pf_r'}{[(1 - f_w)F_{p_0} - \alpha\frac{P\bar{E}}{E^2}]f_r'}$$

Use result from a:

$$\frac{dE}{dM} = \frac{dE}{di}\frac{di}{dM} = \frac{\overbrace{\frac{f_r'}{m_i}}^{+}}{\underbrace{(1-f_w)F_{p_0} - \alpha\frac{P\bar{E}}{E^2}]f_r'}_{+}} > 0$$

$$\frac{dE}{dM} = \frac{1}{m_i}\frac{1}{\frac{(1-f_w)F_{p_0}}{f_r'} - \alpha\frac{P\bar{E}}{E^2}}$$

Effect of more capital mobility:

$$|f_r'| \uparrow \Rightarrow \text{denominator} \downarrow \Rightarrow \text{Fraction} \uparrow \Rightarrow \frac{dE}{dM} \uparrow$$

$$\lim_{|f_r'| \to \infty} \frac{dE}{dM} = -\frac{1}{m_i}\frac{1}{\alpha\frac{P\bar{E}}{E^2}}$$

c)

$$E \uparrow \Rightarrow e_e \downarrow$$

4)

a)

i unchanged

b)

Depreciation now!

See figure 1. Higher $\bar{E}$ means higher expected depreciation, more private demand for foreign currency and a leftward shift in the net supply curve for foreign currency to the central bank. (Uses (8), (4) and (5)). Exchange rate depreciates. The depreciation is less than one for one, since if it was 1:1 the left r would be constant and the left hand side of ( ) would have increased more than the right hand side.

Higher $|1f_r'|$ means a flatter supply curve (why?) and a bigger leftward shift in supply. Is the shift also greater measured vertically?

Suppose at F_g the upward shift in the two curves is the same. This cannot be the case because there will then be the same expected rate of depreciation and, hence, this means the supply of foreign currency will be lower with high capital mobility. Hence, the exchange rate has to depreciate more to bring balance when capital mobility is high.

For those who prefer calculus:

An equilibrium without interventions here means that $dF_p = 0$, which again implies

$$\frac{1}{P}F_p dE = f_r'\alpha\left[-\frac{1}{E}d\bar{E} + \frac{\bar{E}}{E^2}dE\right] + f_w\frac{F_{p_0}}{d}E$$

Calculate the derivatives at the initial equilibrium ($f_p = F_{p_0}$:

$$\frac{1}{P}(1-f_w)F_p dE - f_r\alpha\frac{\bar{E}}{E^2}dE = -f_r'\alpha\frac{1}{E}d\bar{E}$$

Solve this and you get

$$\frac{dE}{d\bar{E}} = \frac{-f'_r\frac{\alpha}{E}}{(1-f_w)\frac{F_p}{P} - f_r\alpha\frac{\bar{E}}{E^2}}$$

Reorganize:

$$\frac{dE}{d\bar{E}} = \frac{-f_r'\alpha}{(1-f_w)\frac{F_p}{P} - f_r\alpha\frac{\bar{E}}{E}} > 0$$

Reorganize again:

$$1 > \frac{\frac{dE}{E}}{\frac{d\bar{E}}{\bar{E}}} = \frac{-f_r'\alpha\frac{\bar{E}}{E}}{(1-f_w)\frac{F_p}{P} - f_r\alpha\frac{\bar{E}}{E}} > 0$$

$$|f_r| \uparrow \Rightarrow \frac{\frac{dE}{E}}{\frac{d\bar{E}}{\bar{E}}} \uparrow$$

c)

As already stated under b, e_e increases, but less than the initial impact of $\bar{E}$.

B) Fixed exchange rates: Some consequences of capital mobility

1)

Buying or selling domestic currency bonds to neutralize the effect of foreign exchange market interventions on the money supply.

2)

Behind slope of IS: $C_s, I_s < 0$
Behind slope of BB $f_r, m_i < 0$

3)

See the shift in Figure 2.

$$Y \uparrow, i \uparrow$$

$$F_p \downarrow, F_g \uparrow$$

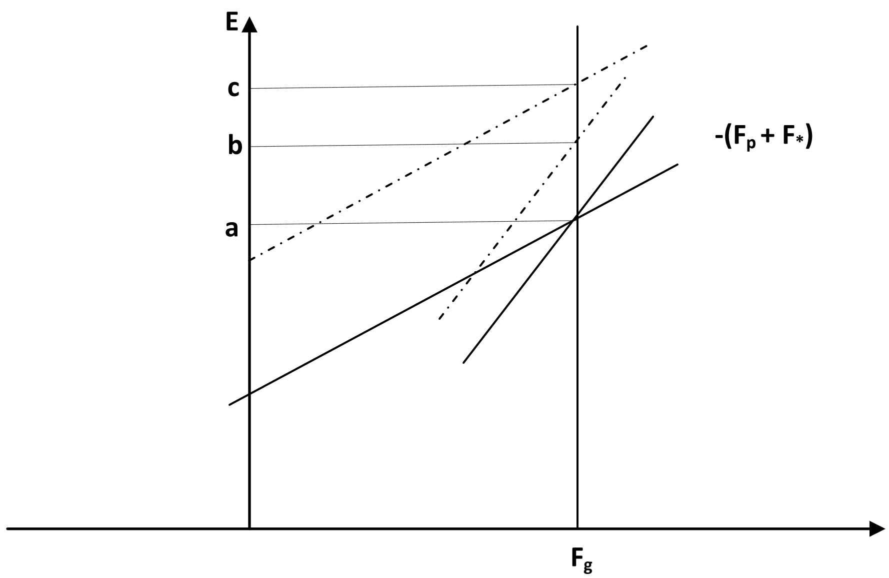
Since B is constant and $F_g \uparrow$, $M \uparrow$.

High capital mobility: $\begin{cases} \text{More effect on Y, less on i.} \\ \text{More on M and} F_y. \end{cases}$

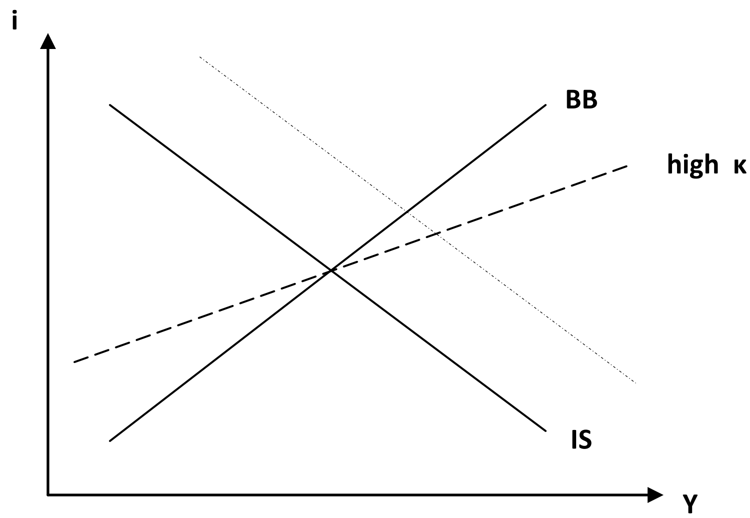
4)

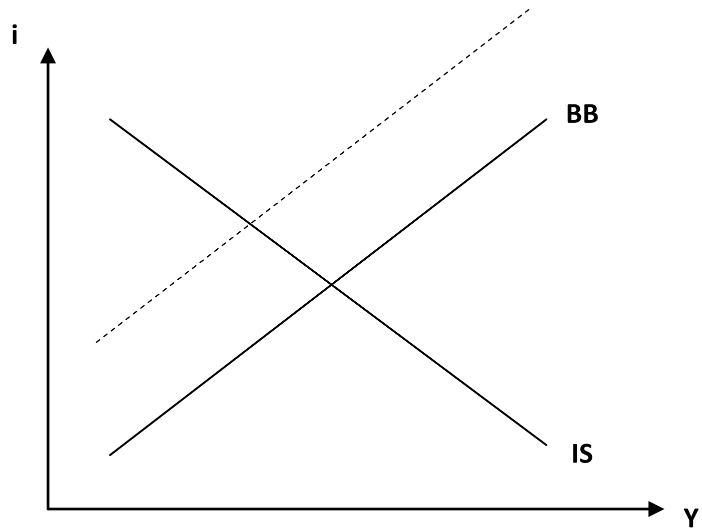
See the shift in Figure 3.

$$i \uparrow, Y \downarrow, F_y \downarrow$$



E
c
b
a
-(F_p + F_*)
F_g


i
BB
high κ
IS
Y


i
BB
IS
Y