External sector

Exercise 1. An open economy with **zero capital mobility** consists of the following components:

$C = 2000 + 0.6(Y - T)$
$I = 300 - 3000r$
$G = 300$
$T = 300$
$NX = 400 - 200e$
$M^s/p = 500$
$M^d/p = 0.2Y - 1000r$

Where Y is output, C is consumption, I is investment, r is the interest rate, T is the lump sum tax, G is government spending, NX is net exports, e in the nominal exchange rate (expressed in terms of foreign currency/domestic currency), M^s/p is the money supply and M^d/p is the demand for money.

a. For this economy derive the IS, LM and BP schedules

The IS curve:
$AD = C + I + G + NX$
$AD = 2000 + 0.6 *(Y - 300) + 300 - 3000r + 300 + 400 - 200e$
$AD = 2820 + 0.6Y - 3000r - 200e$

At equilibrium on the market for G&S, Y=AD, therefore
$Y = 2820 + 0.6Y - 3000r - 200e$
$Y(1 - 0.6) = 2820 - 3000r - 200e$

$Y = 7050 - 7500r - 500e$ or

$3000r = 2820 - 0.4Y - 200e$ => **$r = 0.94 - 0.00013333Y - 0.06667e$**

The LM curve:
At equilibrium on the money market, $M^s/p = M^d/p$, therefore

$500 = 0.2Y - 1000r$

$Y = 2500 + 5000r$ or

$1000r = 0.2Y - 500$ => **$r = 0.0002Y - 0.5$**

The BP curve (also called the BT curve- balance trade curve as we have zero capital mobility)**:**
At equilibrium on the external sector BP = 0 ⇔ NX = CF but since we have zero capital mobility => CF = 0 (vertical BP) =>

$NX = 400 - 200e = 0$ =>

400 = 200e

b. What are the equilibrium levels of income and interest rates?
Equilibrium is where IS, LM and BP curves intersect.
From the BP curve:

NX = 0⇒ **e = 2**
Substituting into the IS curve gives:

Y = 6050 − 7500r

At the intersection of IS with the LM curve we get

6050 − 7500r = 2500 + 5000r
3550 = 12500r
r* = 0.284 or 28.4%
Y = 6050 − 7500 * 0.284 = > **Y* = 3920 m.u.** from the IS curve

Exercise 2. Mundell- Fleming model. An open economy with **perfect capital mobility** is described by the following relations:

AD = 2000 + 0.75 (Y - T) + G -2000r – 400e

Where Y is output, T is lump sum tax, G is government spending, r is the interest rate and e the nominal exchange rate (foreign currency/domestic currency)

The money demand equation is $M^d/p = 0.5Y - 3000r$

Initially the government runs a balanced budget, so that G = T = 200

Finally, there is perfect capital mobility and world interest rates are rf = 0.2.

a. If the government decides to run a fixed exchange rate regime so that e = 2, what level of money supply is required?

The IS curve:
AD = 2000 + 0.75 *(Y − 200) + 200 − 2000r – 400e
AD = 2050 + 0.75Y – 2000r - 400e

At equilibrium on the market for G&S, Y=AD, therefore
Y = 2050 + 0.75Y – 2000r -400e
Y (1− 0.75) = 2050 − 2000r – 400e

Y = 8200 − 8000r – 1600e

Since e =2 and we have perfect capital mobility (r = rf = 0.2) we get:

Y = 8200 – 8000*0.2 – 1600*2 or **Y* = 3400 m.u.**

The LM curve:

At equilibrium on the money market, $M^s/p = M^d/p$. First, we calculate M^d/p at equilibrium, considering Y* = 3400 m.u. and r* = r = rf = 0.2

$M^d/p = 0.5Y^* - 3000r^* \Rightarrow M^d/p = 1100 \Rightarrow$ **$M^s/p = 1100$ m.u.**

b. Using your answers in part a, what will be the effects of an increase in government spending by 100%. Will the effect on output be greater under the fixed exchange regime (e=2) or if the government allows the exchange rate to float? Explain your answer.

An increase in government spending of 200 m.u.

b.1 Maintaining the fixed exchange rate at e = 2.

$Y = 2000 + 0.75 (Y - 200) + 400 - 2000r - 400e$

$Y = 2250 + 0.75Y - 2000r - 400e$

$Y(1 - 0.75) = 2250 - 2000r - 400e$

$Y = 9000 - 8000r - 1600e$

As e = 2 and r = rf =0.2=> **Y** = 4200 m.u.**

Money supply must accommodate fiscal policy so as to maintain r = rf = 0.2

M^s/p $= 0.5^* (4200) - 3000 * (0.2) \Rightarrow$ **$M^s/p = 1500$ m.u.**

Δ **M^s/p** $= 1500 - 1100 = 400$

b.2. Flexible exchange rate (if e is flexible, Y is fixed)

The exchange rate e will change to crowd out the fiscal expansion (Y will not change, $\Delta Y = 0$ so **Y*=3400 m.u.)**

$\Delta Y = \Delta C + \Delta I + \Delta G + \Delta NX$ but only ΔG and ΔNX are different than zero, therefore

$\Delta G = -\Delta NX$ and

$\Delta NX = -400 * \Delta e$ therefore

$200 = 400 * \Delta e$

$\Delta e = 0.5$

$e' = 2.5$

The exchange rate appreciates by 25%.