

IS-LM-BP exercise

Exercise Consider an open economy with **fixed prices**, **flexible exchange rates**, and **imperfect capital mobility**. This economy is characterized by the following behavioral equations:

$$C = 60 + 0.8YD$$

$$I = 200 - 20r + 0.1Y$$

$$G = 300$$

$$TA = 0.25Y$$

$$TR = 50$$

$$X = 250 + 100 eP^f/P$$

$$IM = 400 - 50 eP^f/P + 0.1Y$$

$$P^f = 2$$

$$P = 1$$

$$L = 0.2Y - 10r$$

$$M/P = 200$$

$$CF = 25 (r - r^*)$$

$$r^* = 9$$

a) What is the equation for the IS curve in this model?

$$C = 60 + 0.8YD$$

$$= 60 + 0.8 (Y - TA + TR)$$

$$= 60 + 0.8 (Y - 0.25Y + 50)$$

$$= 60 + 0.6Y + 40$$

$$C = 100 + 0.6Y$$

$$NX = X - Im$$

$$= 250 + 200e - 400 + 100e - 0.1Y$$

$$NX = -150 + 300e - 0.1Y$$

$$AE = C + I + G + NX$$

$$= 100 + 0.6Y + 200 - 20r + 0.1Y + 300 - 150 + 300e - 0.1Y$$

$$AE = 450 + 300e + 0.6Y - 20r$$

$$Y = AE$$

$$Y = 450 + 300e + 0.6Y - 20r$$

$$450 + 300e - 0.4Y - 20r = 0$$

$$r = 22.5 + 15e - 0.02Y$$

b) What is the equation for the LM curve in this model?

$$L = M/P$$

$$0.2Y - 10r = 200$$

$$10r = -200 + 0.2Y$$

$$r = -20 + 0.02Y$$

c) What is the equation for the BP curve in this model?

$$NX + CF = 0$$

$$-150 + 300e - 0.1Y + 25(r - 9) = 0$$

$$-150 + 300e - 0.1Y + 25r - 225 = 0$$

$$-375 + 300e - 0.1Y + 25r = 0$$

$$25r = 375 - 300e + 0.1Y$$

$$r = 15 - 12e + 0.004Y$$

d) What are the values of Y , r and e at which the goods market, the money market, and the external sector are simultaneously in equilibrium?

$$IS: r = 22.5 + 15e - 0.02Y \quad (1)$$

$$LM: r = -20 + 0.02Y \quad (2)$$

$$BP: r = 15 - 12e + 0.004Y \quad (3)$$

$$\text{Din (1) - (2) rezultă } 42.5 + 15e - 0.04Y = 0 \quad (4)$$

$$\text{Din (1) - (3) rezultă } 7.5 + 27e - 0.024Y = 0 \quad (5)$$

$$15(5) - 27(4) \text{ rezultă } 112.5 + 405e - 0.36Y - 1147.5 - 405e + 1.08Y = 0.72Y - 1035 = 0$$

$$Y = 1035/0.72 \quad Y = 1437.5$$

$$(2) \quad r = -20 + 0.02Y = -20 + 0.02(1437.5) = -20 + 28.75 = 8.75 \quad r = 8.75$$

$$(3) \quad r = 15 - 12e + 0.004Y \quad 8.75 = 15 - 12e + 0.004(1437.5)$$

$$12e = 15 + 5.75 - 8.75 = 12 \quad e = 1$$

e) What are the balances in the current account and the capital account in this equilibrium?

$$NX = -150 + 300e - 0.1Y = -150 + 300 - 0.1(1437.5) = 150 - 143.75 = 6.25 \text{ (trade surplus)}$$

$$CF = 25(r - r^*) = 25(8.75 - 9) = -6.25 \text{ (net capital outflow of 6.25 or net capital inflow of -6.25)}$$

f) Suppose now that the nominal supply of money increases to 250. What are the new equilibrium values of Y , i and e ?

$$IS: \quad r = 22.5 + 15e - 0.02Y \quad (1)$$

$$LM \text{ new:} \quad r = -25 + 0.02Y \quad (2)$$

$$\text{BP: } r = 15 - 12e + 0.004Y \quad (3)$$

$$\text{Din (1) - (2) rezultă } 47.5 + 15e - 0.04Y = 0 \quad (4)$$

$$\text{Din (1) - (3) rezultă } 7.5 + 27e - 0.024Y = 0 \quad (5)$$

$$\text{Din } 15(5) - 27(4) \text{ rezultă } 112.5 + 405e - 0.36Y - 1282.5 - 405e + 1.08Y = 0.72Y - 1170 = 0$$

$$Y = 1170/0.72Y = 1625$$

$$\text{Din (2) } r = -25 + 0.02Y = -25 + 0.02(1625) = -25 + 32.5 = 7.5 \quad r = 7.5$$

$$\text{Din (3) } r = 15 - 12e + 0.004Y \quad 7.5 = 15 - 12e + 0.004(1625)$$

$$12e = 15 + 6.5 - 7.5 = 14$$

$$e = 7/6 = 1.167$$

g) What are the balances in the current account and the capital account in this new equilibrium?

$$NX = -150 + 300e - 0.1Y = -150 + 300(7/6) - 0.1(1625) = 200 - 162.5 = 37.5 \text{ (trade surplus)}$$

$$CF = 25(r - r^*) = 25(7.5 - 9) = -37.5 \text{ (net capital outflow of 37.5 or net capital inflow of -37.5)}$$

To represent the equilibrium on a graph with output/income (Y) on the horizontal axis and interest (r) on the vertical axis we do as follows:

- We first take $e=1$ to show the initial equilibrium $(y^*, r^*) = (1437.5, 8.75)$

$$\text{IS: } r = 22.5 + 15e - 0.02Y \quad r = 37.5 - 0.02Y$$

$$\text{LM: } r = -20 + 0.02Y$$

$$\text{BP: } r = 15 - 12e + 0.004Y \quad r = 3 + 0.004Y$$

- We then take $e=7/6$ to show the new equilibrium $(y^*, r^*) = (1625, 7.5)$

$$\text{IS: } r = 22.5 + 15e - 0.02Y \quad r = 40 - 0.02Y$$

$$\text{LM new: } r = -25 + 0.02Y$$

$$\text{BP: } r = 15 - 12e + 0.004Y \quad r = 1 + 0.004Y$$

