Brock University

Department of Economics

Econ2P22 Intermediate Macroeconomics I

Fall, 2015

Assignment #4

Solutions

Consider an hypothetical economy in the short-run with fixed prices (including foreign prices) and characterized by the following equations (all variables as defined in class).

$$C = 700 + 0.8Y$$

$$I = 500 - 40i$$

$$G = T = 0$$

$$X = 5 + 2E$$

$$Q = 0.1Y - 4E$$

$$M^s/P = 200$$

$$L(i, Y) = 0.6Y - 90i$$

$$i = i^* + \frac{E^e - E}{E}$$

i) What is the equation for the IS curve? (*4 marks*)

Goods Market Eq'm $Y = AE = C + I + G + X - \epsilon Q$ → correct form Bonus!

for simplicity $Y = AE = C + I + G + X - Q$

$$Y = 700 + 0.8Y + 500 - 40i + 0 + 5 + 2E - 0.1Y + 4E$$

$$(1 - 0.8 + 0.1)Y = 1205 - 40i + 6E$$

$$Y = \frac{1}{0.3}\{1205 - 40i + 6E\} = 4017 - 133.3i + 20E$$

ii) What is the equation for the LM curve? (*4 marks*)

Asset/Money Market Equilibrium

$$\frac{M^s}{P} = L(i, Y)$$

$$200 = 0.6Y - 90i$$

$$Y = 333.3 + 150i$$

iii) Given $i^* = 0.03$ and $E^e = 1.0$, solve for the equilibrium values of income (Y), interest rates (i) and the exchange rate (E). (*4 marks*) (HINT: Using the quadratic formula will give you two possible solutions. Pick either the positive or lowest positive value.)

Equating the right-hand sides of the IS & LM relations above yields $283.3i = 368.3 + 20E$

Substitute for i from I.R.P, $i = 0.03 + \frac{1-E}{E}$

and we obtain the following quadratic in E.

$$20E^2 + 3958.4E - 283.3 = 0$$

Employing the quadratic formula $(-b \pm \sqrt{b^2 - 4ac})/2a$

$a = 20$, $b = 3958.4$, $c = -283.3$ we obtain

$E = \frac{2.9}{40}$ or $-\frac{7919.7}{40}$. Using the positive solution $E = 0.0725$

we have $i = 0.03 + \frac{1 - 0.0725}{0.0725} = 12.82$ (1282%!)

and then $Y = 4017 - 133.3i + 20E = 2309.55$

iv) Is the domestic economy's exchange rate expected to appreciate or to depreciate? *(2 marks)*

The expected percentage change of the exchange rate is $(E^e - E)/E$, here this is $(1 - 0.0725)/0.0725$ $= +12.79$. E is expected to rise from 0.0725 to 1.0. This is an expected depreciation of the domestic currency.

v) Is the domestic economy running a trade surplus or trade deficit? *(4 marks)*

Net exports will be $NX = X - Q$ (Simplified)

$\Rightarrow 5 + 2(0.0725) - 0.1(2309.55) + 4(0.0725)$

$= -225.52$ a trade deficit $(NX < 0)$

vi) Assume that the government engages in *expansionary fiscal policy* by increasing expenditure to $G = 50$. Solve for the new equilibrium values of income (Y), interest rates (i), and exchange rate (E). Illustrate your answer in a graph. *(4 marks)*

The IS curve becomes $Y = \frac{1}{0.3}\{1255 - 40i + 6E\}$

The IRP and LM relations are unchanged

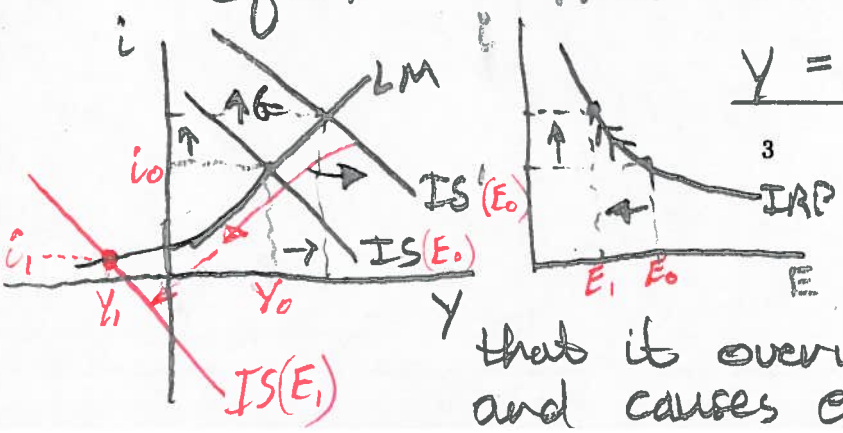
Solving simultaneously we obtain a new quadratic;

$$20E^2 + 4124.83E - 285.33 = 0$$

From which we obtain $E = 0.006868$ as the positive solution from the quadratic equation. Then $i = 0.03 + \frac{1 - 0.006868}{0.006868} = 144.6$

$$Y = \frac{1}{0.3}\{1255 - 40(144.6) + 6(0.006868)\}$$

$$Y = -4529 !$$



The appreciation of the domestic currency is so large that it overwhelms the expansion of G and causes equilibrium Y to decline!

vii) How does this expansionary fiscal policy impact the domestic economy's trade balance? *(4 marks)*

$NX = 5 + 2(0.006868) - 0.1(-4529) + 4(0.006868)$

$\simeq +458$ a surplus (Negative Y is non-sense. For $Y = 0$, still a surplus)

viii) Now, assume that for the economy as in part iii) the foreign interest rate rises to $i^* = 0.04$. Solve for the new equilibrium (Y,i,E) combination. How does the higher foreign interest rate affect the domestic economy's trade balance compared to the situation in parts iii)? *(4 marks)*

Using the IS from part i), the LM from part ii) and $i = 0.03 + \frac{E^e - E}{E}$ as the new IRP we obtain the following

$20E^2 + 3955.7E - 285.33 = 0$

$E = 0.0716$, $Y = 2283.33$, $i = 13.0$

$NX = 5 + 6(0.0716) - 0.1(2283.33) \simeq -233$

a larger deficit due to appreciated currency.

ix) Now, assume that a trade agreement between this economy with $G = 0$ and the "foreign" economy with $i^* = 0.03$ establishes a *fixed exchange-rate regime* with $E = \bar{E} = 1.5$. What would the equilibrium values of (Y,i,E) be in this example? *(4 marks)*.

Now $i = i^*$ since $\frac{E^e - E}{E} = 0$

This also means that the LM curve as previously worked out NO LONGER APPLIES since the money supply must be set to maintain $i = i^*$ under the fixed E regime.

From the IS schedule $Y = 4017 - (133.33 \cdot 0.03) + 20(1.5)$

$Y = 4043$, $i = 0.03$, $E = 1.5$

x) Is the domestic economy's exchange rate expected to appreciate or to depreciate? *(2 marks)*

With fixed exchange rates there is no expected appreciation or depreciation of either currency.

$$\frac{E^e - E}{E} = 0.$$

x) What would the effects of the expansionary fiscal policy of part v) be under the fixed exchange-rate regime? *(4 marks)*.

Since there can be no crowding out due to higher interest rates ($i = i^*$) and no crowding out due to exchange rate appreciation ($\bar{E} = 1.5$), the fiscal policy would be expansionary overall which is an increase in its effectiveness.

We would have $Y = \frac{1}{0.3}\{1255 - 40i + 6E\}$

as in part v.) $Y = 4183.33 - 133.33(0.05) + 20(1.5)$

$Y = 4209.33$ an expansion of 166.33 compared to the case with $G=0$.