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ECON 313 - Macroeconomics

Question 1

IS => $Y = 1600 - 50r$

LM => $Y/50 - 12$

a) For slopes of curve:

(i) IS curve slope: $\frac{dr}{dy} = \frac{1}{dy/dr} \Rightarrow \frac{dy}{dr} = \frac{1}{-50} = -0.02$

This implies that there's a decrease in r by 0.02 per unit increase in y.

(ii) LM curve slope: $\frac{dr}{dy} = \frac{1}{50} \Rightarrow \frac{dr}{dy} = 0.02$

This implies that there's an increase in r by 0.02 per unit increase in y.

Due to an equal slope of 0.02, the IS curve is not flatter than the LM curve.

b) Solving for equilibrium levels of income (Y^*) and interest rate r^*

IS = LM at equilibrium.

IS => $Y = 1600 - 50r$ — (1)

LM => $r = \frac{Y}{50} - 12$ — (2)

Substituting the LM equation into the IS equation,

$$Y = 1600 - 50\left(\frac{Y}{50} - 12\right)$$
$$Y = 1600 - Y + 600$$
$$Y = 2200 - Y$$
$$Y + Y = 2200$$
$$\frac{2Y}{2} = \frac{2200}{2} \qquad Y = 1100$$

We now obtain equilibrium income Y^* as 1100.

For r, we substitute 1100 into the IS equation.

$$Y = 1600 - 50r$$
$$\Rightarrow 1100 = 1600 - 50r$$
$$1100 - 1600 = -50r$$
$$\frac{-500}{-50} = \frac{-50r}{-50}$$
$$r = 10$$

Therefore the equilibrium interest rate is 10%

Increase in expenditure by 700 units
Increase in lumpsum tax 500 units
Increase in money supply 200 units

$C = 700 + 0.8\,Y_d$ $\quad T = 120 + 0.25Y$

$I = 200 - 25r$ $\quad L = 2Y - 50r$

$$Y^e = \frac{1}{1 - C_1(1 - t_1) + \frac{b_1}{b_2} i} \left(C_0 + I_0 - C_1 T_0 + G + \frac{M}{P} \frac{i_1}{b_2}\right)$$

$C_1 = 0.8,\ b_2 = -50,\ i_1 = -25,\ t_1 = 0.25,\ b_1 = 2$

$$\frac{\Delta Y^e}{\Delta G} = \frac{1}{1 - C_1(1 - t_1) + \frac{b_1}{b_2} i_1}$$

$$\Delta Y^e = \frac{\Delta G}{1 - 0.8(1 - 0.25) + \frac{2}{-50}(-25)}$$

$$\Delta Y^e = \frac{\Delta G}{(1-0-0)+1} \Rightarrow \Delta Y^e = \frac{\Delta G}{0.4+1}$$

Government expenditure increases by 700 units ($\Delta G = 700$)

$$\Delta Y^e = \frac{700}{1.4} \Rightarrow \Delta Y = 500$$

$$\frac{\Delta Y^e}{\Delta T} = \frac{1}{1-C_1(1-t_1)+\frac{b_1}{b_2}i_1}\left(C_0+I_0-C_1T_0+G+\frac{M}{P_{b_2}}i\right)$$

$$\Delta Y^e = \frac{-C_1\Delta T}{1-C_1(1-t_1)+\frac{b_1}{b_2}i_1}$$

$\Delta T \Rightarrow$ increase in lump sum tax by 500

$$\Delta Y^e = \frac{-0.8(500)}{1-(0.8)(1-0.25)+\frac{2}{-50}(-25)}$$

$$\Delta Y^e = \frac{-400}{1.4} \Rightarrow \Delta Y^e = -285.71$$

Therefore the equilibrium level of income reduces with an increase in tax.

$$\frac{\Delta Y^e}{\Delta M_i} = \frac{i_1}{b_2(1-C_1(1-t_1)+b_1 i_1}\left(C_0+I_0-C_1T_0+C_0+\frac{M_i}{P_{b_2}}\right)$$

Money supply increases by 200 units ($\Delta M = 200$)

$$\Delta Y^e = \frac{i_1 \Delta M}{b_2(1-C_1(1-t_1)+b_1 i_1}$$

$$\Rightarrow \frac{-25(200)}{-50(1-0.8)(1-0.25)+2(-25)}$$

$$\Rightarrow \frac{-25(200)}{-50(0.2)(0.75)-50}$$

$$\Rightarrow \frac{-5000}{-70}$$

$$\Delta Y^e = 71.43$$

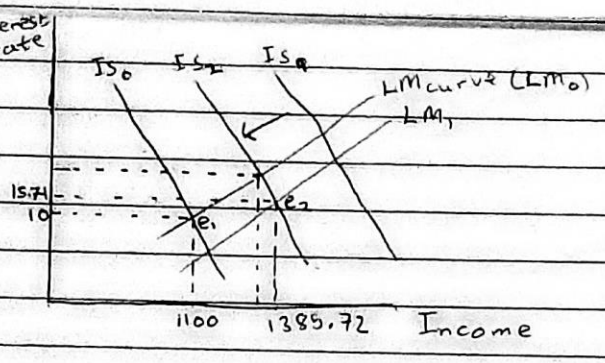
Total change in income => 500 - 285.71 + 71.43 = 285.72

New equilibrium Income
=> 1100 + 285.72 = 1385.72

New interest rate
=> $\frac{4}{50} - 12$

=> $\frac{1385.72}{50} - 12$ => 15.71%

d.



When the initial interest rate is at 10, income is at 1100. The IS curve then shifts from IS0 to IS1 due to an increase in goverament spending. However due to an increase in tax, investments falls resulting in a fall of income at IS2.

An increase in money supply causes a shift in the LM curve. from LM0 to LM1. This results in an interest rate of 15.71 and an income of 1385.72 at the new equillibrium.

Question 2

$C = ¢400m + 0.75(Y-T)$, $I = ¢400m - 20r$, $G = 200m$, $T = ¢200m$

$M^s = ¢250m$, $M^d = 0.25Y - 10r$

(a) $Y = C + I + G$

$Y_0 = 400 + 0.75(Y-T) + 400 - 20r + 200$

Since $T = 200$,

$Y_0 = 400 + 0.75(Y-200) + 400 - 20r + 200$

$Y = 400 + 0.75Y - 150 + 400 - 20r + 200$

$Y_0 = 850 + 0.75Y - 20r$

$Y_0 = 0.75Y - 20r + 850$

$Y_0 = 0.75Y = -20r + 850$

$\frac{1}{4}Y = -20r + 850$

$Y = 4(-20r + 850)$

$Y = -80r + 3400$

$Y = 3400 - 80r$

∴ IS curve equation = $3400 - 80r$

IS curve has a negative slope since increase in interest rate causes decrease in investment and also investments increases with fall in interest rates.

At equilibrium $IS = LM$, $M^s = M^d$

Finding the LM curve equation

$M^s = M^d$

$P = 1$

$\frac{250}{1} = 0.25Y - 10r$

$10r = 0.25Y - 250$

$r = \frac{0.25Y}{10} - \frac{250}{10}$

$r = 0.025Y - 25$

From the above, the LM curve has a positive slope. This implies that an increase in income causes interest rates to increase. Consequently, a fall in income decreases interest rate. This is because higher income results in higher demand for money.

Tax reduced by 10%

$\Delta T = \frac{10}{100} \times 200$

$= 20$

∴ Tax was reduced by 20m

$b = 0.75, \quad c_2 = 10, \quad c_1 = 0.25, \quad i = 20$

$\frac{\Delta Y}{\Delta T} \rightarrow (1)$

$\Delta Y = \frac{-b \times \Delta T}{1 - b + c_1/c_2 \, i}$

$= \frac{0.75 (-20)}{(1 - 0.75 + (\frac{0.25}{10} (20))}$

$= \frac{15}{0.75}$

$\Delta Y = 20$

$\frac{\Delta Y}{\Delta G} \rightarrow 2)$

$\Delta Y = \frac{\Delta G}{(1 - 0.75) + (\frac{0.25}{10} (20))}$

$= \frac{\$50}{0.75}$

$\Delta = 66.66$

The total output $= \Delta Y$

$20 + 66.66 = 86.66$

$Y^a = 1800 + 86.66$

$Y^* = 1886.66$

New equilibrium output = 1886.66

d. Effect on the interest rate

$r = 0.025Y - 25$

$r = 0.025(1886.66) - 25$

$r = 47.1665 - 25$

$r = 47.17 - 25$

$r = 22.17$

Interest rate increase to 22.17%.

e. Fiscal deficit = Government spending − decline in

$= 50 - (-20)$

$= 50 + 20$

$= 70$ //