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Blanchard # 2.

a)-

$$\begin{cases} Z = C + G + I \\ Z = Y \end{cases} \rightarrow \begin{cases} Z = co + c1*(Y-T) + G + I \\ Z = Y \end{cases} \rightarrow Y = co + c1*(Y-T) + G + I \rightarrow$$

Equilibrium output: $Y^* = \frac{1}{1-c1}[c0 - c1.T + G + I]$ ➔ Multiplier is 1/(1-c1)

b)-

$$\begin{cases} Z = C + G + I \\ Z = Y \end{cases} \rightarrow \begin{cases} Z = co + c1*(Y-T) + G + b0 + b1\ Y - b2\ i \\ Z = Y \end{cases} \rightarrow Y = co + c1*(Y-T) + G + b0 + b1\ Y - b2\ i \rightarrow$$

Equilibrium output: $Y = \frac{1}{1-c1-b1}[c0 + b0 - c1.T + G] - \frac{b2}{1-c1-b1} i$ ➔ Multiplier is 1/(1–c1–b1)

But 1/(1-c1) < 1/(1-c1-b1), therefore the multiplier is larger and autonomous spending has a higher effect on output (at the same level of interest rate). The reason is that in this case when output (income) goes up due to any increase in autonomous spending, investment does up too. The increase in investment, in turn, causes another round of expansion of output.

c)-

$$\begin{cases} \text{IS:} \quad Y = \frac{1}{1-c1-b1}[c0 + b0 - c1.T + G] - \frac{b2}{1-c1-b1} i \\ \text{LM:} \quad M/P = d1\ .Y - d2\ .\ i \rightarrow i = d1/d2\ Y - 1/d2\ M/P \end{cases}$$

$$\rightarrow \quad Y = \frac{1}{1-c1-b1}[c0 + b0 - c1.T + G] - \frac{b2}{1-c1-b1}[\frac{d1}{d2} Y - \frac{1}{d2}\frac{M}{P}]$$

$$\rightarrow \quad Y = \frac{1}{1-c1-b1}[c0 + b0 - c1.T + G] - \frac{b2}{1-c1-b1}[\frac{d1}{d2} Y - \frac{1}{d2}\frac{M}{P}]$$

➔ Equilibrium output: $$Y = \frac{1}{1-c1-[b1 - \frac{b2.d1}{d2}]}[c0 + b0 - c1.T + G + \frac{b2}{d2}\ \frac{M}{P}]$$

d)-

➔ so the Multiplier is $\frac{1}{1-c1-[b1 - \frac{b2.d1}{d2}]}$.

As it is seen the size of the multiplier depends on c1, b1, b2, d1, and d2 the parameters of the behavioral equations for consumption, investment, and the money demand. For example:

If d2 is very big, i.e. the demand for money is very sensitive to interest rate:
And/ or if d1 is very small, i.e. the demand for money is not sensitive to income:
And/or if b2 is very small, i.e. the investment is not sensitive to interest rate:
And/or if b1 is big, i.e. the investment is sensitive to income:

Such that $[b1 - \frac{b2.d1}{d2}] > 0$, Then: $\frac{1}{1 - c1 - [b1 - \frac{b2.d1}{d2}]} > \frac{1}{1 - c1}$ or multiplier in this case higher than the one in part (a).

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Blanchard # 3

A decrease in government spending, G, leads to decrease in demand for goods, output and income. The later, in turn, decreases the demand for money, thus, more demand for bonds, which leads to higher price of bonds, which is equivalent to decrease in interest rate. Increase in income and interest rate have opposite effects on investment, therefore, in general the overall direction of change is unclear.

a)- From question 3, we have:

IS: $Y = \frac{1}{1 - c1 - b1}[c0 + b0 - c1.T + G] - \frac{b2}{1 - c1 - b1} i$

LM: $M/P = d1 .Y - d2 . i$ ➔ $i = d1/d2\ Y - 1/d2\ M/P$

➔ Equilibrium output: $Y = \frac{1}{1 - c1 - [b1 - \frac{b2.d1}{d2}]}[c0 + b0 - c1.T + G + \frac{b2}{d2}\ \frac{M}{P}]$

b)-

By substitution of equilibrium output in LM curve, you can pin down the equilibrium interest rate:

$$i = \frac{\frac{d1}{d2}}{1 - c1 - [b1 - \frac{b2.d1}{d2}]}[c0 + b0 - c1.T + G + \frac{b2}{d2}\ \frac{M}{P}] - \frac{1}{d2}\frac{M}{P}$$

c)-

$I = b0 + b1\ Y - b2\ i$ ➔ $I = b0 + (b1 - b2\ d1/d2)\ Y + b2/d2\ M/P$

Equilibrium investment: $I = b0 + \frac{[b1 - \frac{b2.d1}{d2}]}{1 - c1 - [b1 - \frac{b2.d1}{d2}]}[c0 + b0 - c1.T + G] + \frac{1 - c1}{1 - c1 - [b1 - \frac{b2.d1}{d2}]}\frac{b2}{d2}\ \frac{M}{P}$

d)-

From equilibrium investment formula, in above, it is clear that investment would be increasing in G if $[b1 - \frac{b2.d1}{d2}] > 0$, because denominator is positive. This is exactly the same condition for the size of multiplier in question 3, part (d).

e)-

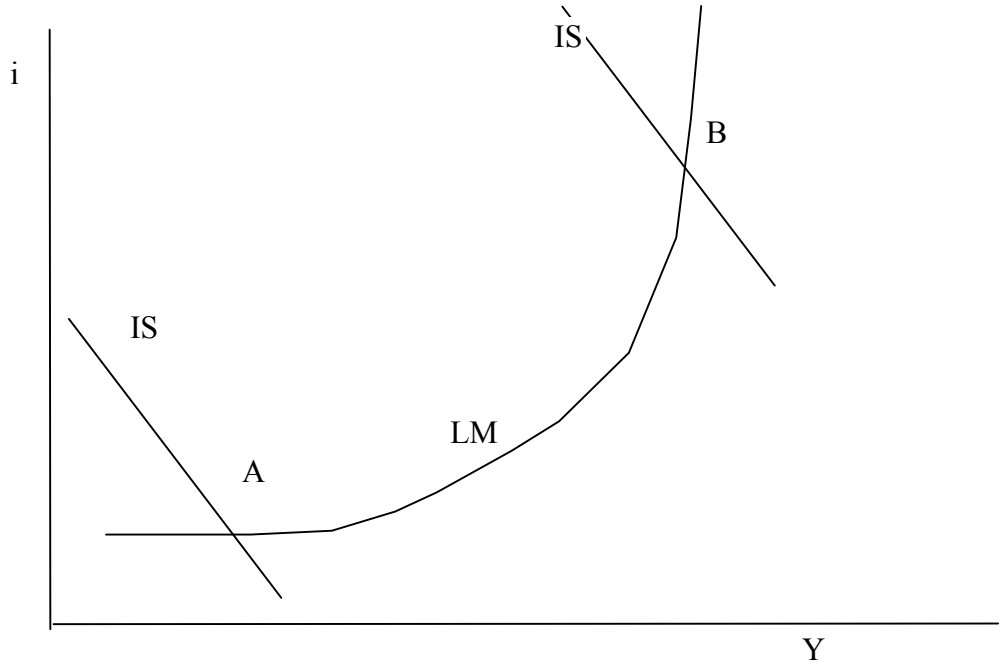
If $[b1 - \frac{b2.d1}{d2}] > 0$ ➔ Increase in G leads to an increase in I (like point A)

If $[b1 - \frac{b2.d1}{d2}] = 0$ ➔ Increase in G leads to no change in I

If $[b1 - \frac{b2.d1}{d2}] < 0$ ➔ Increase in G leads to a decrease in I (like point B)

Which means, when LM curve is flat, an increase in G would be translated to a bigger increase in output/income (so there would be bigger increase in investment), and to a smaller increase in interest rate, (so smaller decrease in investment). Overall, the former dominates the later, and investment would increase. (Point A)
The LM curve is flatter if demand for money is not very sensitive to income (small d1), or very sensitive to interest rate (big d2).

On the other hand, when LM curve is steep, an increase in G would be translated to a smaller in increase in output/income (so would be smaller increase in investment), and a bigger increase in interest rate, (so bigger decrease in investment). Overall, the later dominates the former, and investment would decrease. (Point B)



Blanchard #4.

a)- As we know all points along the IS curve represent the equilibrium points in the goods market, so to derive the algebraic equation for IS curve, we need to apply equilibrium condition, i.e. Z=Y:

$$\begin{cases} Z = C+ G + I \\ Z = Y \end{cases} \rightarrow \begin{cases} Z = co + c1*(Y-T) + G + I \\ Z = Y \end{cases} \rightarrow Y = \underbrace{[200 + 0.25*(Y-200)]}_{C} + \underbrace{[250]}_{G} + \underbrace{[150 + 0.25Y - 1000i]}_{I} \rightarrow$$

$$\rightarrow Y = 550 + 0.5Y - 1000i \rightarrow \quad IS: \quad Y = 1100 - 2000i$$

b)- As we know all points along the LM curve represent the equilibrium points in the financial market, so to derive the algebraic equation for LM curve, we need to apply equilibrium condition, i.e. $\left(\frac{M}{P}\right)^d = \left(\frac{M}{P}\right)^s$:

$$\begin{cases} \left(\frac{M}{P}\right)^d = 2Y - 8000i \\ \left(\frac{M}{P}\right)^s = 1600 \end{cases} \rightarrow \quad \left(\frac{M}{P}\right)^d = \left(\frac{M}{P}\right)^s \rightarrow \quad 2Y - 8000i = 1600 \rightarrow \text{LM: } i = -0.2 + Y/4000$$

c, d)-

$$\begin{cases} \text{IS:} \quad Y = 1100 - 2000i \\ \text{LM:} \quad i = -0.2 + Y/4000 \end{cases} \rightarrow Y = 1100 - 2000*(-0.2 + Y/4000) \rightarrow Y^* = 1000, \; i^* = 5\%$$

e)- C = 200 + 0.25 * (1000 – 200) = 400, I= 150+ 0.25 *1000 – 1000 * 0.05 = 350.
Y= C+ G + I = 400 + 250 + 350 = 1000 confirmed!

f- $2Y - 8000i = 1840 \rightarrow$ LM: $i = -0.23 + Y/4000$

$$\begin{cases} \text{IS:} \quad Y = 1100 - 2000i \\ \text{LM} \quad : i = -0.23 + Y/4000 \end{cases} \rightarrow Y = 1100 - 2000*(-0.23 + Y/4000) \rightarrow Y^* = 1040, \; i^* = 3\%$$

C = 200 + 0.25 * (1040 – 200) = 410, I= 150+ 0.25 *1040 – 1000 * 0.03 = 380.
Y= C+ G + I = 410 + 250 + 380 = 1040 confirmed!
Central Bank can impose expansionary monetary policy by buying bonds, which leads to higher bonds prices, and in turn lower interest rate. Lower interest rate increases investment, demand for goods, and finally output and income. Higher income, given the fixed tax rate, increases disposable income and private consumption.

g-

$$Y = \underbrace{[200 + 0.25*(Y-200)]}_{C} + \underbrace{[400]}_{G} + \underbrace{[150 + 0.25Y - 1000i]}_{I} \rightarrow Y = 700 + 0.5Y - 1000i$$

$\rightarrow$ IS: $Y = 1400 - 2000i$

$$\begin{cases} \text{IS:} \quad Y = 1400 - 2000i \\ \text{LM:} \quad i = -0.2 + Y/4000 \end{cases} \rightarrow Y = 1400 - 2000*(-0.2 + Y/4000) \rightarrow Y^* = 1200, \; i^* = 10\%$$

e)- C = 200 + 0.25 * (1200 – 200) = 450, I= 150+ 0.25 *1200 – 1000 * 0.1 = 350.
Y= C+ G + I = 400 + 450 + 350 = 1200 confirmed!

f)- if we use the condition $[b1 - \frac{b2.d1}{d2}]$, and plug the parameters of the behavioral functions that we have, then

$[b1 - \frac{b2.d1}{d2}]$= 0.25- (1000*2/8000)=0 ➔ Therefore, increase in G does not have any effect on investment.
From all parts in above, it is seen that investment is always 350. If G=100, then Y=800, i=0%, C=350, I=350.

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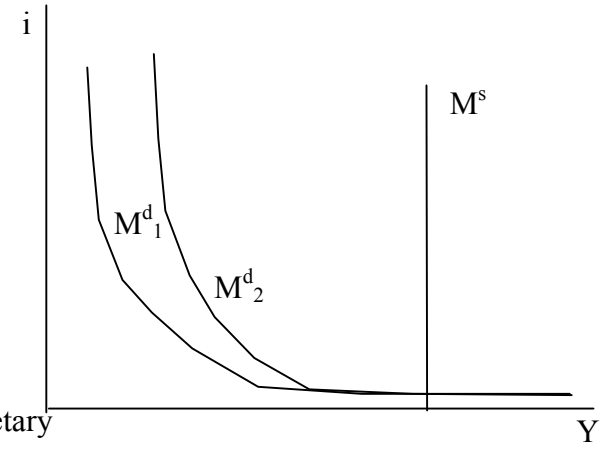
Blanchard #6:

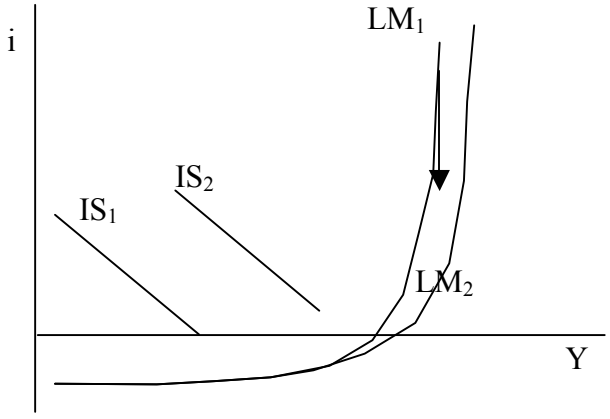
a)- Liquidity trap is the situation that interest rate is very low, perhaps close to zero (but not negative). In that case nobody wants to keep bonds, because the price of bonds is very high, and people expect the price of bonds to fall, so they tend to keep money.

b)- As it is seen in the graph, at low levels of interest rate demand for money is perfectly flat, and people keep any level of money, no matter what interest rate is.




c)- The LM curve will be flat, when interest rate is around zero, because the curves of demand for money share the same flat part.

d)- For the economy which is working in the flat part of the LM curve, or liquidity Trap part, expansionary monetary policy does not lead to any decrease in interest rate, and increase in output, because people do not demand for bonds and interest rate cannot go further down (LM1 to LM2).




g)- Obviously, expansionary fiscal policies can be more effective in this situation. (See the graph IS1 to IS2).

Blanchard #1:

a)- True b)- True c)- False. The downward sloping property of IS curve is due to negative relationship between investment and interest rate. Change in tax levels shifts the IS curve.
d)- False. The balanced budget multiplier is positive (equal 1), so IS curve shifts to the right.
e)- False. The reason is that demand for real money balances is increasing in income. Change in money supply cases shifts of LM curve.
f)- Uncertain. Any increase in G leads to increase in output, (in turn upward pressure to increase investment) and increase interest rate (and in turn downward pressure to decrease investment). But the overall effect is unclear and depends on relationships of investment and demand for money. (See below for rigorous analysis)
g)- True.

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Blanchard #5:

Even if firms use their own resources for investment, by increasing interest rate, the opportunity cost of the resources that they have goes up, and it may be even more profitable to buy bonds instead of investing it in their own business.

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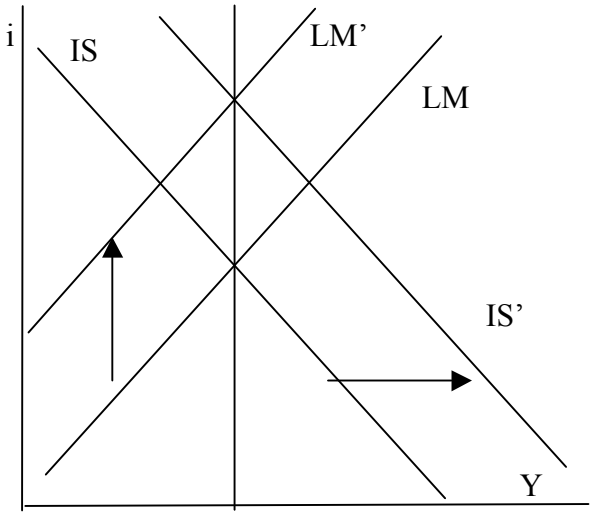
7-

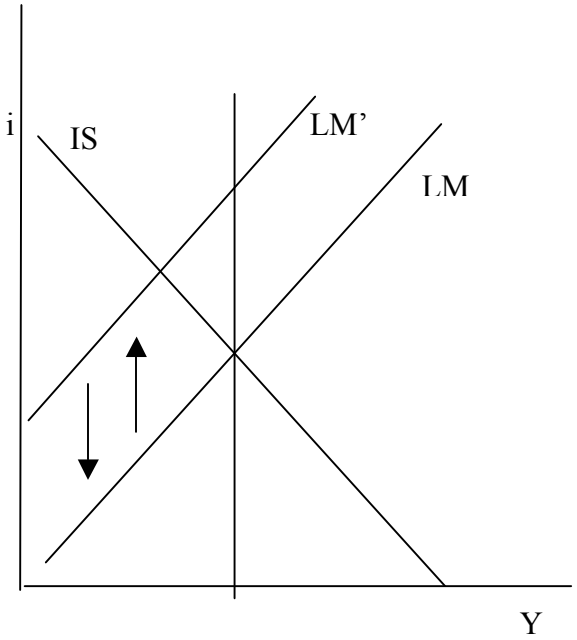
a)- I goes up ➔ IS shifts to the right




I goes up ➔ Y increases ➔ demand for money goes up ➔ attempt to sell bonds ➔ Price of bonds goes down ➔ interest rate jumps up
Also, consumption increases, because income, Y has gone up.
As far as investment concern, even though, investors tend to increase investment, the increase will be partly offset by the higher interest rate.
So the sectoral structure of investment may be different too.

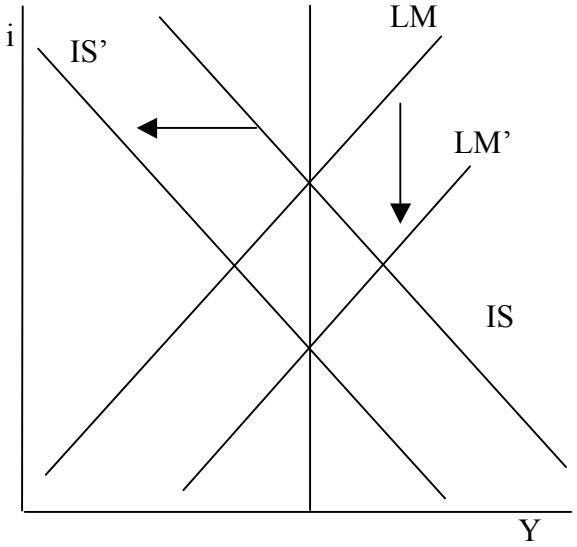
For bringing the output back to its original level, the Bank of Canada should decrease the money supply, which leads to further increase of interest rate, which leads to decrease of investment.

b)- Increase in fraud ➔ LM shifts up.




Increase in fraud ➔ demand for money goes up ➔ so demand for bonds goes down ➔ selling bonds ➔ price of bonds goes down, which means interest rate goes up ➔ investment goes down ➔ Y goes down ➔ C, consumption goes down
To return the output to its original level, the Bank of Canada should increase the money supply, which brings back the economy to the original point.

c)- C goes down ➔ IS shifts to the left




C goes down ➔ Y decreases ➔ transaction demand for money goes down ➔ demand for bonds goes up ➔ buying bonds ➔ price of bonds goes up ➔ interest rate goes down

As far as investment concern, because Y is lower and i is lower too, the overall direction is ambiguous.
To return the output to its original level, the Bank of Canada should increase the money supply, which leads to further decrease of interest rate, which leads to increase of investment.

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8-

a)-

IS: $Y= 200 + 0.75\ Y – 75 + 100 + 200 – 25\ i$ ➔ $0.25\ Y= 425 –25\ i$ ➔ $Y= 1700 – 100i$

b)-

$(M/P)^s = 1000/2 =500$

LM: $(M/P)^s=(M/P)^d$ ➔ $500 = Y –100i$ ➔ $Y=500+100i$

c)-

$Y= 1700 – 100i$

$Y=500+100i$ ➔ $1700 – 100i = 500+100i$ ➔ i= 6, Y=1100.

d)-

IS curve shifts to the right by 200 units horizontally:

$Y= 200 + 0.75\ Y – 75 + 150 + 200 – 25\ i$ ➔ $0.25\ Y= 475 –25\ i$ ➔ $Y= 1900 – 100i$

$Y= 1900 – 100i$

$Y=500+100i$ ➔ $1900 – 100i = 500+100i$ ➔ i = 7, Y=1200.

e)-

$(M/P)^s = 1200/2 =600$

LM: $(M/P)^s=(M/P)^d$ ➔ $600 = Y –100i$ ➔ $Y=600+100i$

LM curve shifts down by 1 unit vertically:

$Y= 1700 – 100i$

$Y=600+100i$ ➔ $1700 – 100i = 600+100i$ ➔ i= 5.5, Y=1150

f)-

$(M/P)^s = 1000/4 =250$

LM: $(M/P)^s=(M/P)^d$ ➔ $250 = Y –100i$ ➔ $Y=250+100i$

LM curve shifts up by 2.5 units vertically:

$Y= 1700 – 100i$

$Y=250+100i$ ➔ $1700 – 100i = 250+100i$ ➔ i= 7.25, Y=975

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9)-
The investors' pessimism causes a downward shift in investment function, so investment, then demand for goods and finally output/income, and consumption go down. In financial market, decrease in income leads to reduction and demand for money. People tend to buy bonds, which leads to higher price of bonds, and decrease in interest rate. In terms of IS/LM curves, the IS curve shifts to the left. (Figure 1)
In terms of dynamics, there would not be any jump in interest rate, and the economy gradually marches along the LM curve from point A to B.
The central Bank can impose expansionary monetary policy to bring back the economy to its output capacity (or potential output) level. This policy shifts the LM curve from LM1 to LM2. In this scenario interest rate falls even further. The output/income, consumption, investment go back to their before shock levels. Notice that because of the investors' pessimism at the lower level of interest rate, investors invest the same, because investment function has shifted down.

It is possible to go back to potential output level, Ybar, using expansionary policies. For example increasing G shifts IS curve back the IS curve from IS2 to IS1 (See graph 2). Equilibrium point goes back from B to A. So output/income, consumption go back to their before shock level. Also, interest rate goes up, therefore investment falls. Obviously, G is higher by decision.
Therefore, while monetary policy bring back investment to its before shock level, using lower interest rate, the fiscal policy compensate the fall in investment by increase in government expenditure, G.

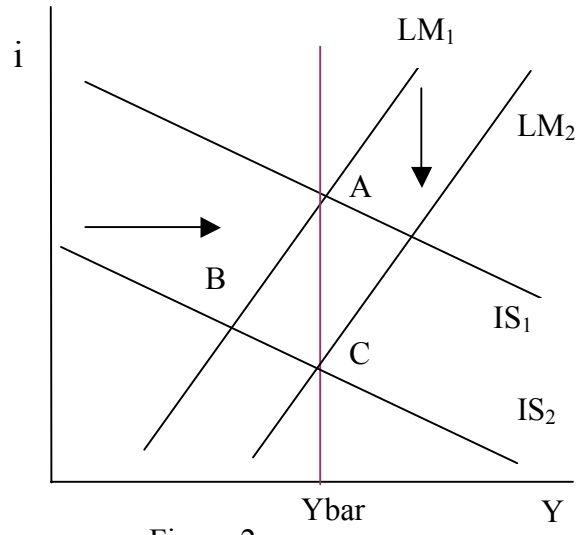

Figure 2

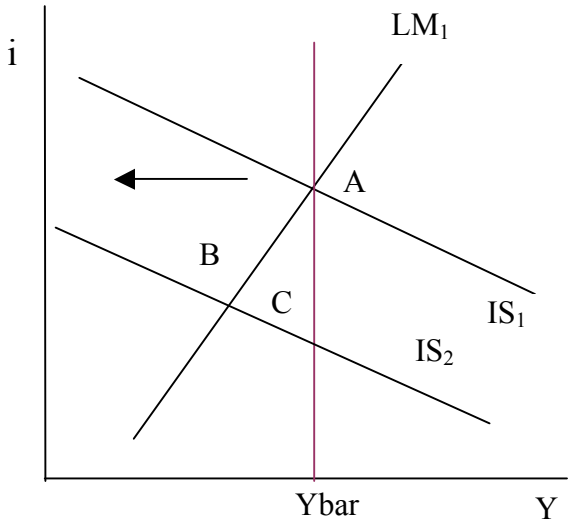

Figure 1

By the way, it is easily that the investors' pessimism is self-fulfilling, because it could start without a reason, however the actual recession which is caused by this pessimism can apparently support the unwarranted pessimism.

**10)**

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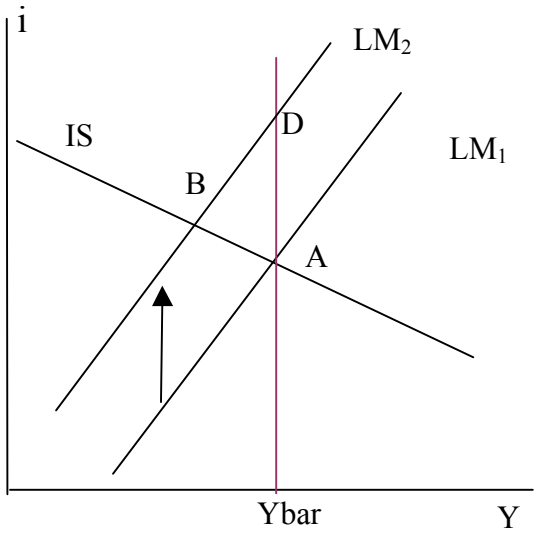
An increase in the oil price causes a jump in the price level.




LM curve shifts up from LM1 to LM2 due to the increase in price level ( equilibrium moves from A to B). As a result the interest rate goes up, because when price goes up supply of real balances (real money), goes down, and people sell their bonds to collect more money, which leads to lower price of bonds, or higher interest rate. Given higher interest rate, investment goes down, and so does demand, and finally income/output, and consumption.
At point B, output is below Ybar, so economy is in recession.

As far as the dynamics of the movements concern, the economy jumps from point A to point D first, then goes down gradually along the new LM curve to point B. So there would be an overshoot in interest rate, then a partial recovery.
It is possible to bring back to output to its capacity level, Ybar, by expansionary fiscal policies. Increase in G can shift the IS curve from IS1 to IS2, then equilibrium point goes from B to C (See the graph below). So interest rate goes up even further and investment falls more. On the other hand, using expansionary monetary policy, the money supply can go up, i.e. LM curve shifts from LM2 to LM3. This policy reduces the interest rate, and in turn increases the investment. Thus the new equilibrium would be located at point A, again.
Therefore, while the fiscal policy increases the G and decreases the investment, the monetary policy restores the original levels of the variables. Consumption would be the same in both scenarios. It would be also interesting to consider if government uses tax cuts, as expansionary fiscal policy to restore Ybar.