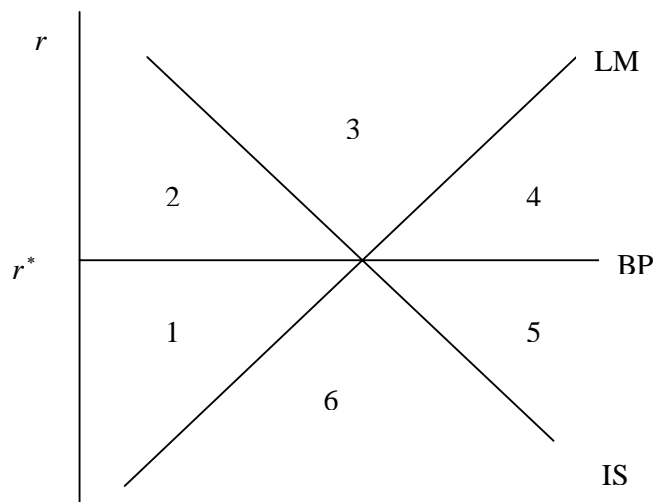## Chapter 12 Review Questions

1. The IS-LM-BP model defines six regions, each corresponding to disequilibrium in the money market, goods market and/or the balance of payments. Identify and describe each of these when capital is perfectly mobile, and when capital is perfectly immobile.

Under conditions of perfect capital mobility

| Zone	BP: Balance of payments	IS: Goods market	LM: Money market
1	Deficit $(r < r^*)$	Excess demand (Expenditure>output)	Excess supply $(M^S > M^D)$
2	Surplus $(r > r^*)$	Excess demand (Expenditure>output)	Excess supply $(M^S > M^D)$
3	Surplus $(r > r^*)$	Excess supply (Expenditure<output)	Excess supply $(M^S > M^D)$
4	Surplus $(r > r^*)$	Excess supply (Expenditure<output)	Excess demand $(M^S < M^D)$
5	Deficit $(r < r^*)$	Excess supply (Expenditure<output)	Excess demand $(M^S < M^D)$
6	Deficit $(r < r^*)$	Excess demand (Expenditure>output)	Excess demand $(M^S < M^D)$
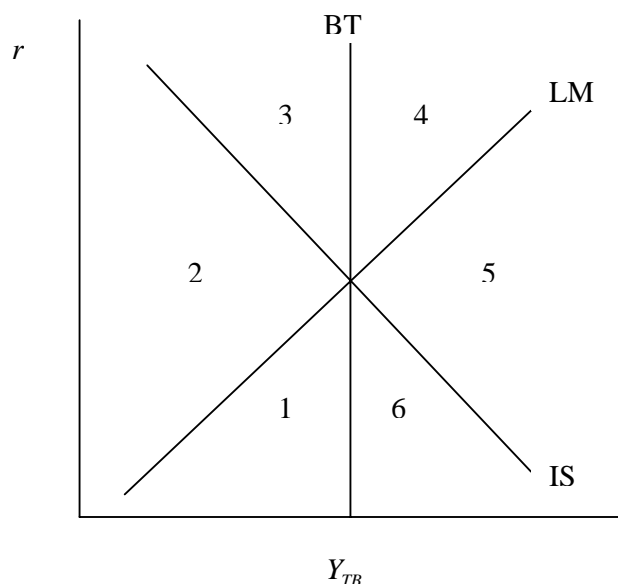
Zone	BP: Balance of payments	IS: Goods market	LM: Money market
1	Surplus $(Y < Y_{TB})$	Excess demand (Expenditure>output)	Excess demand $(M^S<M^D)$
2	Surplus $(Y < Y_{TB})$	Excess demand (Expenditure>output)	Excess supply $(M^S>M^D)$
3	Surplus $(Y < Y_{TB})$	Excess supply (Expenditure<output)	Excess supply $(M^S>M^D)$
4	Deficit $(Y > Y_{TB})$	Excess supply (Expenditure<output)	Excess supply $(M^S>M^D)$
5	Deficit $(Y > Y_{TB})$	Excess supply (Expenditure<output)	Excess demand $(M^S<M^D)$
6	Deficit $(Y > Y_{TB})$	Excess demand (Expenditure>output)	Excess demand $(M^S<M^D)$

2. In a floating exchange rate regime- to what extent does the effectiveness of fiscal policy depend on the degree of capital mobility?
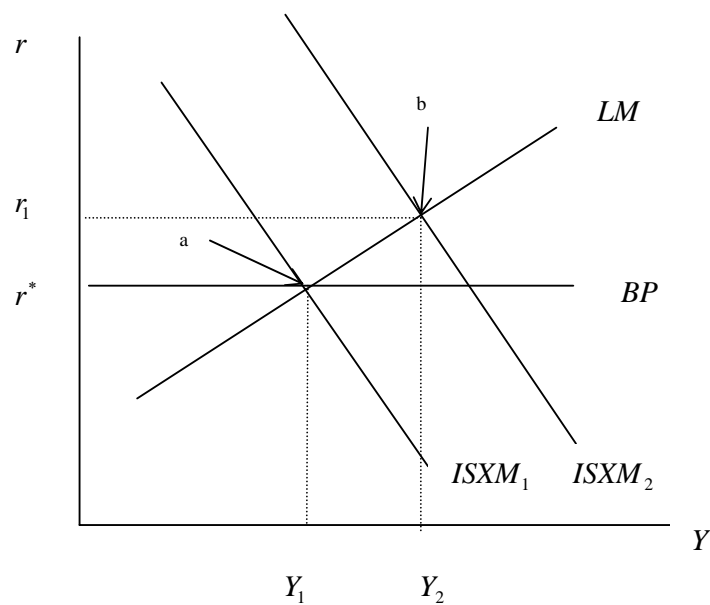
When capital is immobile, the balance of payments position is accounted for by the balance of trade. Because exports are determined by overseas demand, and imports by domestic demand, there is a level of income Y_{TB} where the trade balance is in equilibrium.

The economy starts off at point a, a fiscal expansion shifts the IS curve to the right and as a result the economy moves to point b, but because $Y_2 > Y_{TB} = Y_1$ the trade balance has now moved into deficit. This represents an increase in the relative demand for foreign currency and an increase in the supply of domestic currency-

hence the exchange rate depreciates. This however improves competitiveness, leading to a rise in exports and a fall in imports. The ISD curve and the BT curve will therefore shift to the right and the economy will settle at point c.
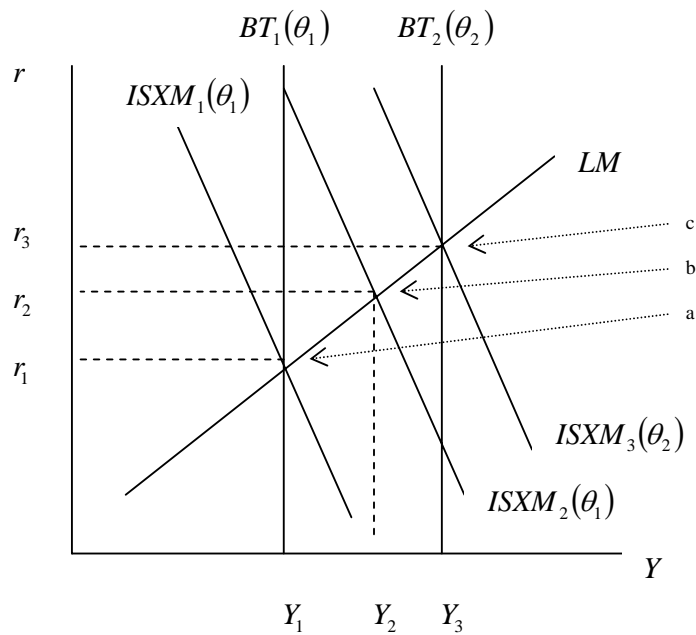
When capital is perfect mobile, the balance of payments is in equilibrium when the domestic interest rate equals that overseas. Any deviation would lead to large scale capital flows in and out of the country..


In this case a fiscal expansion moves the balance of payments into surplus. By raising the domestic interest rate international investors will purchase domestic bonds and the

capital account will improve. However, as a result the domestic exchange rate will appreciate, which then crowds out net trade returning the economy to its original position.

When capital is immobile, a fiscal expansion (contraction) generates a balance of payments deficit (surplus), whereas when capital is perfect mobile a fiscal expansion (contraction) moves the balance of payments into surplus (deficit). Under a floating exchange rate regime, the exchange rate will adjust to restore balance of payments equilibrium. Therefore, fiscal policy has a larger impact on the domestic economy when capital is immobile, because the policy is reinforced rather than offset by exchange rate movements.

3. Using the IS-LM-BP model with a low degree of capital mobility, what will be the effects of the following?

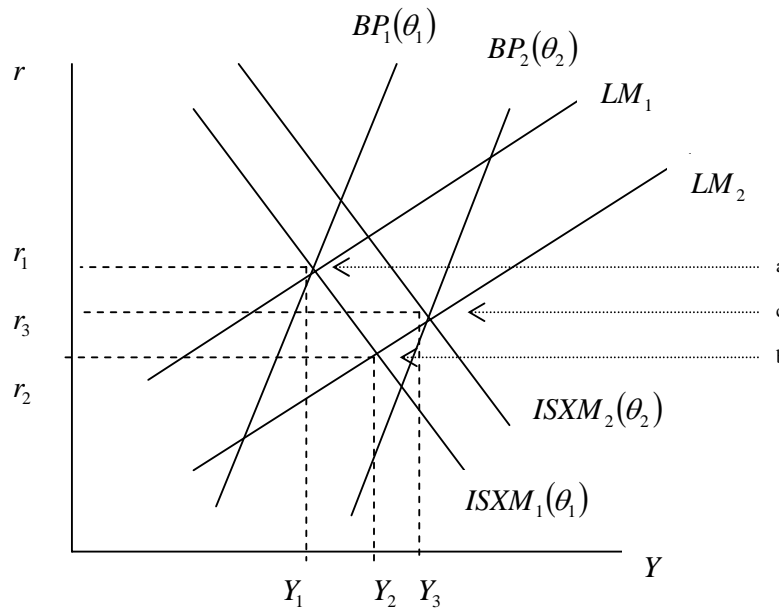*a. A deterioration in business optimism with fixed exchange rates*
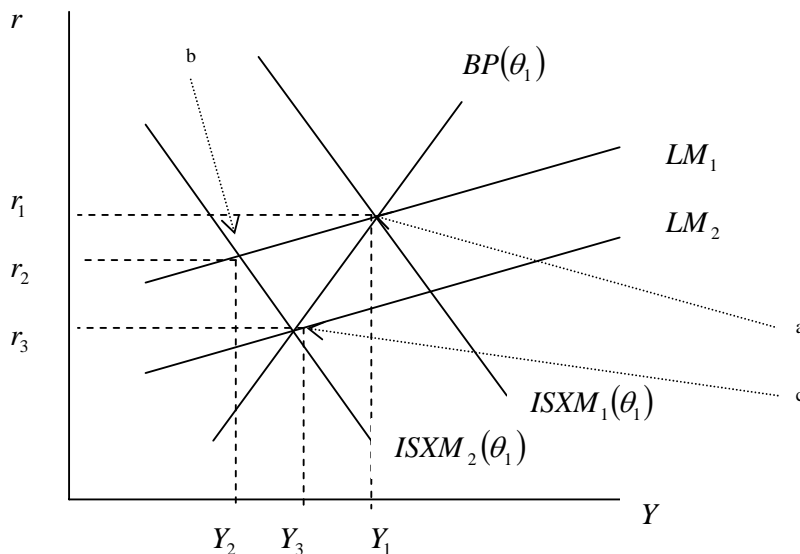
A fall in business optimism sees a contraction in investment and an inward shift in the IS curve.

At point b the balance of payments has moved into surplus. Although the domestic interest rate has fallen, which encourages capital outflows; these have a small effect because capital mobility is low. The fall in income on the overhand reduces the level of imports, and this is relatively more important.

The surplus on the balance of payments highlights demand and supply movements in currency markets that will lead to an exchange rate appreciation. To prevent this, policy makers must expand the money supply until the balance of payments has been

returned to equilibrium at point c. The expansion in the money supply reduces interest rates so encourages capital outflows, but also raises domestic output increasing imports- both effects offset the surplus and the pressure for appreciation.

*b. An increase in the money supply with floating exchange rates*

A monetary expansion shifts the LM curve outwards- this reduces interest rates and increases income- both of which lead to balance of payments deficit.

Given the deficit the exchange rate depreciates, the improvement in competitiveness shifts both the BP and IS curves outwards. The new equilibrium of the economy is at point c.
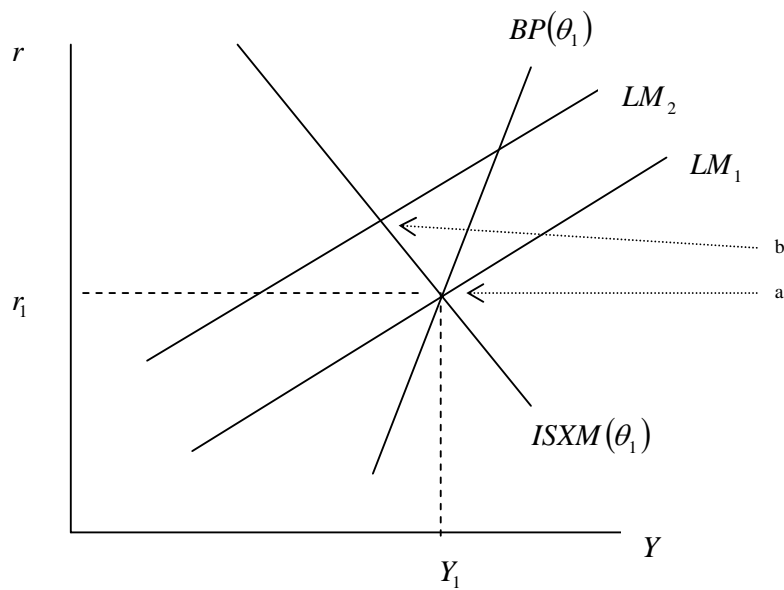
c. A rise in taxes with floating exchange rates

The rise in taxes reduces disposable incomes and leads to a fall in consumption. Consequently, the IS curve shifts inwards and output and interest rates fall. The fall in output lowers imports and the balance of payments moves into surplus.

This surplus position reflects a fall in the demand for overseas currency, and also a fall in the supply of domestic currency. Both these movements lead to an exchange rate appreciation, the competitiveness effects of which shift both the IS and BP curves inwards. Therefore, output falls further and the economy moves to point c.
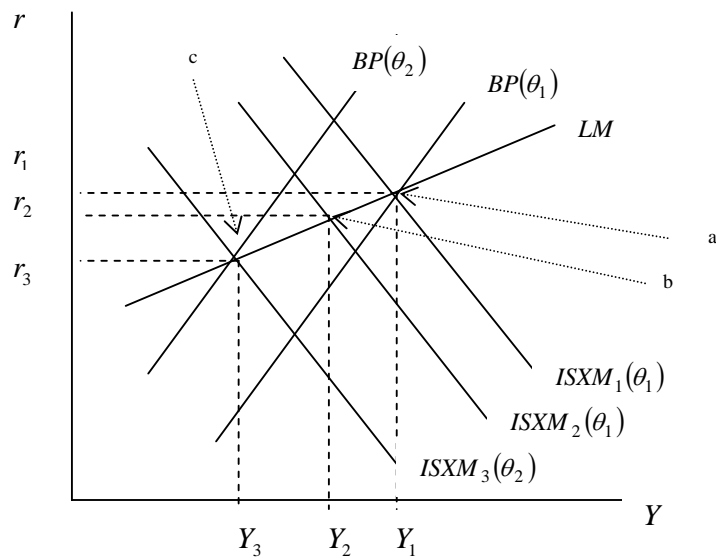
d. a fall in the money supply with fixed exchange rates

A contraction in the money supply, through a combination of raising the domestic interest rate and reducing income moves the balance of payments into surplus and creating pressure for an exchange rate appreciation. This however, cannot be allowed to persist if the fixed exchange rate is to be maintained, therefore an offsetting monetary expansion is required to return the economy to its original position.

4. Using the Mundell-Fleming model what will be the effects of the following:

*a. A boom in stock market prices with fixed exchange rates*
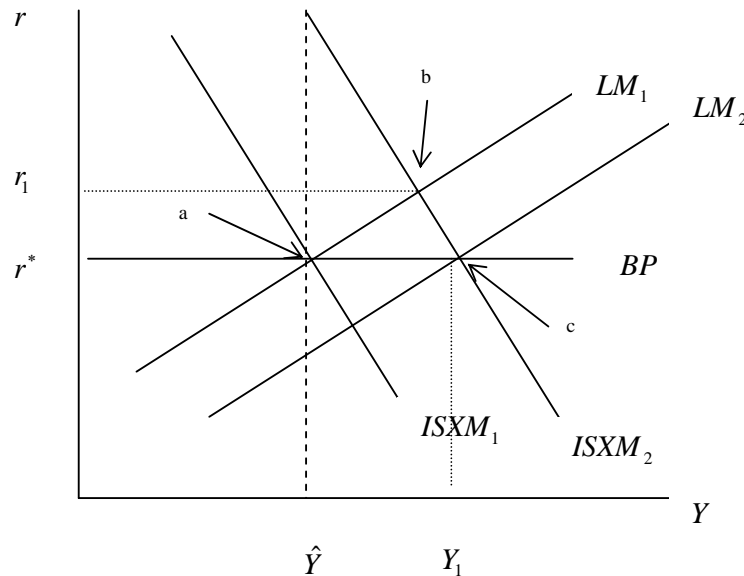
An increase in stock market prices will shift the IS curve outwards. This is because it implies rising household wealth and consumption, and also a higher implicit valuation of firm investment opportunities. As a result, the domestic interest rate rises moving the economy into a position of balance of payments surplus.

To prevent the exchange rate from appreciating, the interest rate rise has to be accommodated by an expansion in monetary policy. Hence the economy will expand even further. If we assume that the economy was originally at its full employment level, there is now a significant positive output gap. Through upward pressure on prices the economy will eventually return to its full employment level of output, but only in the long run.

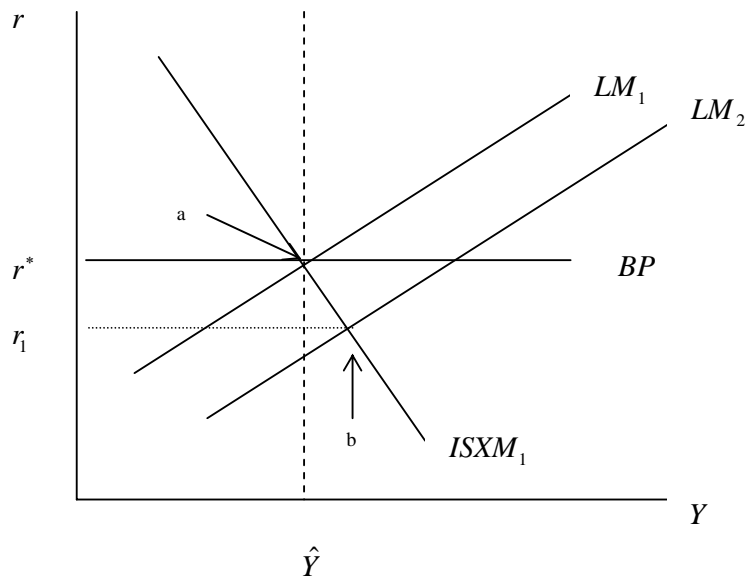*b. an increase in ATM charges with floating exchange rates*

This represents an increase in the cost of liquidating financial assets (assuming that bank accounts pay positive interest rates). Therefore, the demand for money at each level of income will increase putting upward pressure on interest rates. The LM curve will shift upwards.

Upward pressure on domestic interest rates would move the balance of payments into surplus by attracting inflows of foreign capital. The exchange rate will then appreciate crowding out net-trade, hence the IS curve falls and the economy moves to point c.
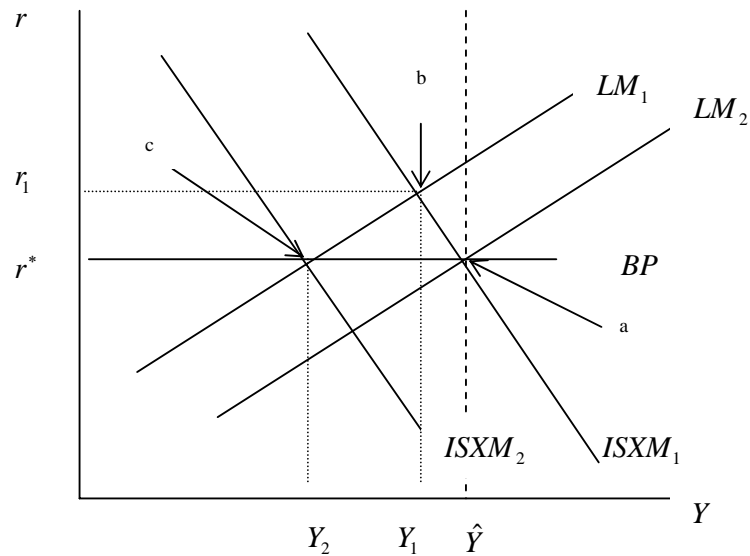
As point c is below the full employment level of output the economy will eventually return to point a if there is downward adjustment in wages and prices.

c. A reduction in money supply with fixed rates

This is simple. A monetary expansion places downward pressure on domestic interest rates. This leads to a world-wide substitution away from domestic into foreign bonds, moving the balance of payments into deficit and putting depreciative pressure on the exchange rate. To maintain a fixed exchange rate it is necessary for the government to offset the original monetary policy expansion.

d. A reduction in government spending with floating exchange rates

A fall in government spending shifts the IS curve inwards, reduces domestic interest rates, and moves the balance of payments into deficit due to a net outflow of capital. However, the exchange rate will depreciate, increasing competitiveness and through an expansion in net exports shift the IS curve back to its original position. Overall, the level of output remains unchanged, but it now consists of a higher level of net exports and a lower level of government spending.
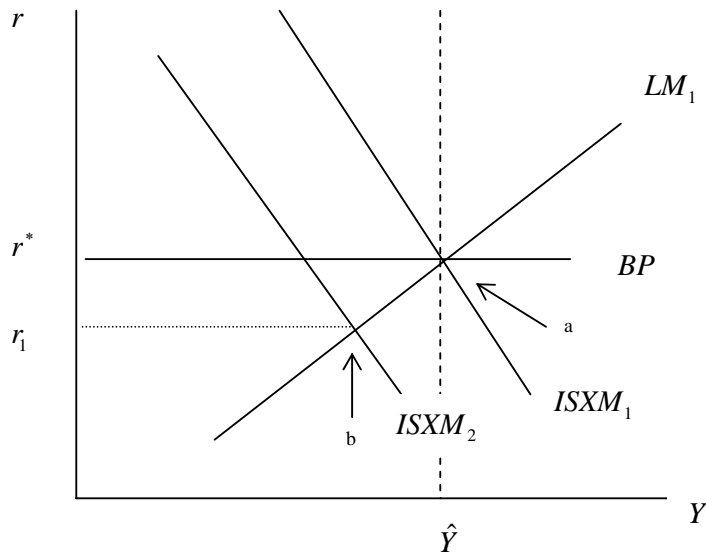
5. An open economy with zero capital mobility consists of the following components:

$C = 2000 + 0.6(Y - T)$
$I = 300 - 3000r$
$G = 300$
$T = 300$
$NX = 400 - 200S$

$M = 500$
$M_d = 0.2Y - 1000r$

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, S in the nominal exchange rate (expressed in terms of foreign currency/domestic currency), M is the money supply and M_d is the demand for money.

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

The IS curve:

$$Y = C + I + G + NX$$

$$Y = 2000 + 0.6*(Y - 300) + 300 - 3000r + 400 - 200S$$

$$Y(1 - 0.6) = 2520 - 3000r - 200S$$

$$Y = 6300 - 7500r - 500S$$

The LM curve:

$$500 = 0.2Y - 1000r$$

$$Y = 2500 + 5000r$$

The BT curve:

$$400 = 200S$$

b. What are the equilibrium levels of income and interest rates?

Equilibrium is where IS, LM and BT curves intersect.

From the BT curve:

$$NX = 0 \Rightarrow S = 2$$

Substituting into the IS curve gives:

$$Y = 5900 - 7500r$$

Intersection with the LM curve:

$$5900 - 7500r = 2500 + 5000r$$

$$3400 = 12500r$$

$$r = 3400/12500 = 0.272 \text{ or } 27.2\%$$

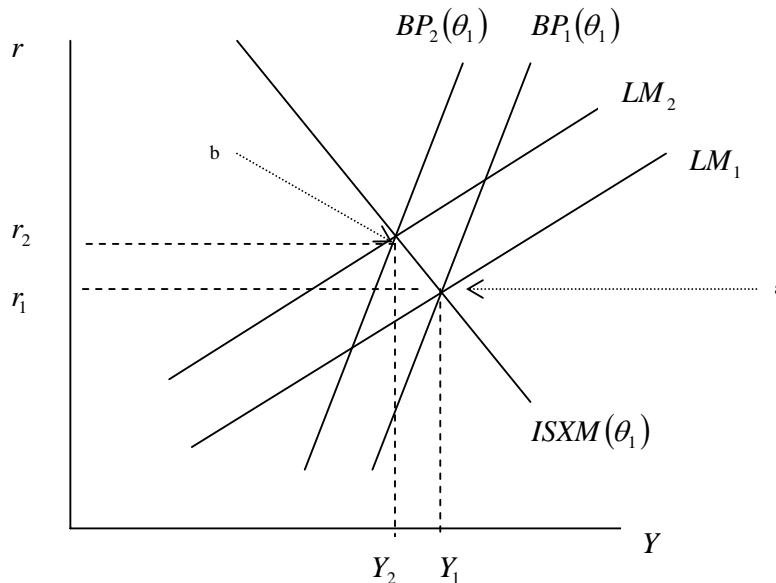$$Y = 5900 - 7500*(0.272) = 3860 \text{ from the IS curve}$$

$$Y = 2500 + 5000*(0.272) = 3860 \text{ from the LM curve}$$

More advanced problems

6. How will a change in the world interest rate affect the equilibrium level of output when

a. capital mobility is low and exchange rates are fixed

Even though capital mobility is low, a rise in foreign interest rates will lead to an upward shift in the BP schedule. This is because at every income level the balance of payments will be in a slightly worse position, simply because of a net flow of capital from domestic to higher interest bearing foreign bonds. However, because capital mobility is low this affect might be small, and the upward shift in the BP curve small.


Maintaining the fixed exchange rate will require a contraction in domestic interest rates. This will remove the balance of payments deficit by reducing domestic income and therefore imports, and also by reducing the interest differential between domestic and foreign bonds. The economy will move from point a to point b as a consequence. Note that a reduction in world interest rates would have the opposite effect, i.e. a movement from b to a.

b. capital mobility is perfect and exchange rates are flexible

When capital mobility is perfect the balance of payments are in equilibrium whenever domestic and foreign interest rates coincide. Therefore, a rise in the overseas interest rate will lead to balance of payments deficits as capital flows out of domestic into higher interest bearing foreign bonds.

This will then prompt an exchange rate depreciation, which will improve competitiveness and shift the IS curve outwards. As net trade, and output expands the domestic interest rate will rise, this will continue until domestic interest rates once again equal those overseas.
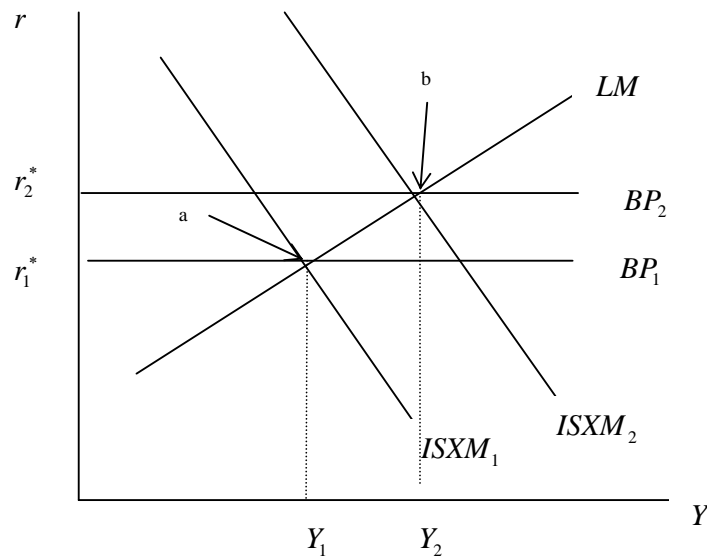
A fall in world interest rates would have the opposite effect. The balance of payments will move into surplus and the exchange rate will appreciate until sufficient net trade has been crowded out so that domestic and foreign interest rates coincide.

More advanced questions

7. Domestic demand (E) is determined in the following way:

$E = 2000 + 0.75(Y\text{-}T) + G$ -2000r – 400S

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

The money demand equation is $M_d = 0.5Y$ -3000r

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

Finally, there is perfect capital mobility and world interest rates are $r^* = 0.1$.

a. If the government decides to run a fixed exchange rate regime so that S = 1, what level of money supply is required?

First, define the IS curve using S = 1 and r = 0.1:

$$Y = 2000 + 0.75(Y - 200) + 200 - 2000 * (0.1) - 400 * (1)$$

$$Y(1 - 0.75) = 1650$$

$$Y = 6600$$

From the money market:

$$M = 0.5Y - 3000r$$

$$M = 0.5 * (6600) - 3000 * (0.1) = 3000$$

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 (S=1) or if the government allows the exchange rate to float? Explain your answer.

An increase in government spending of 100

Maintaining the fixed exchange rate at S = 1.

$$Y = 2000 + 0.75(Y - 200) + 300 - 2000 * (0.1) - 400 * (1)$$

$$Y(1 - 0.75) = 1750$$

$$Y = 7000$$

Note that the multiplier is equal to 4.

Money supply must accommodate fiscal policy so as to maintain $r = r^*$:

$$M = 0.5 * (7000) - 3000 * (0.1) = 3200$$

$$\Delta M = 3200 - 3000 = 200$$

What if the exchange rate is flexible?
Then S will change to crowd out the fiscal expansion.

$$\Delta G = -\Delta NX$$
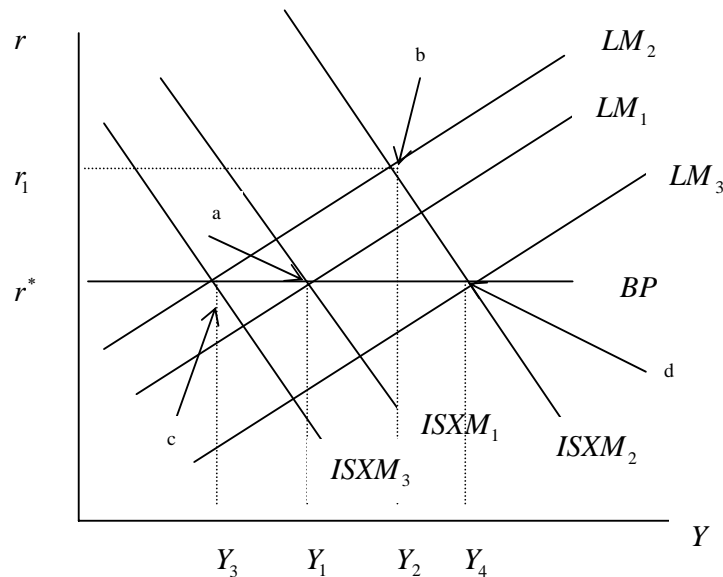
$$\Delta NX = -400 * \Delta S$$

$$100 = 400 * \Delta S$$

$$\Delta S = 100/400 = 0.25$$

$$S' = 100 + 25 = 125$$

The exchange rate appreciates by 25%.

8. Some new empirical research has found that the demand for money is a better function of disposable income (Y-T) than actual income Y. What would be the consequences of a tax cut T, under fixed and floating exchange rate regimes?


If the transactions motive is an important determinant of the demand for money, then money demand may rise if disposable income rises, even though actual income has not.

A tax cut now has an affect on both the IS and LM curves. The IS curve shifts to the right reflecting higher consumption. The LM curve shifts upwards because the demand for money is now higher at every level of output, and hence, so are equilibrium interest rates in the money market. As a result the economy moves from *a* to *b*. If capital mobility is high the economy is now in a position of balance of payments surplus. Under a floating regime the exchange rate will appreciate and the economy will move to point c as net trade is crowded out. Note that that output has fallen below its initial level because the demand for money is higher at all output levels, so actual output must fall further to reduce interest rates to world levels.

Under a fixed regime monetary policy must expand to accommodate the rise in domestic rates, so the economy moves from point b to point d.

If capital mobility is low then the story is slightly different.
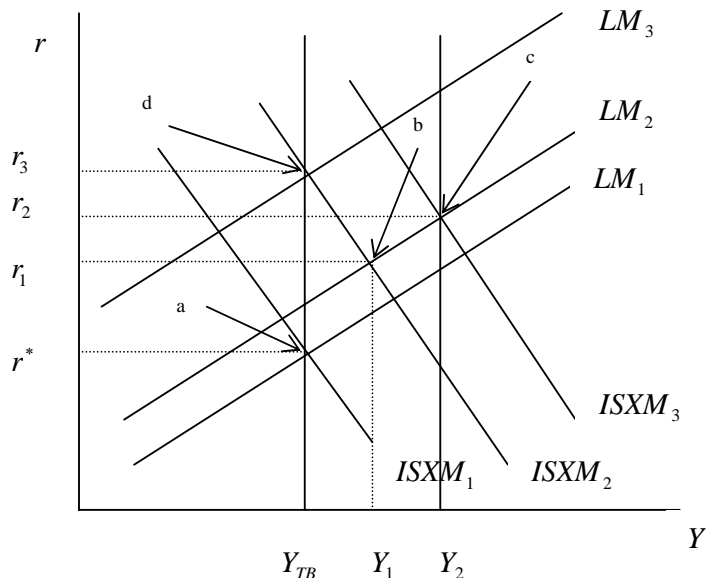
Under a fixed exchange rate regime the economy moves from point a to point b, where the trade deficit requires a monetary contraction to prevent the exchange rate from depreciating, so the economy ends up at point d. If exchange rates were floating then from point b the depreciating exchange rate would improve competitiveness and expand net trade- hence output will expand to point c. The only effect of the new money demand function is that in equilibrium c interest rates will be slightly higher than it would be otherwise, reflecting that demand for money is greater at all output levels.

9. Using the Mundell-Fleming model, examine the impact of an increase in the risk premium on domestic bonds on the level of output under fixed and floating exchange rate regimes. What factors are likely to influence the risk premium?

Under perfect capital mobility the balance of payments are in equilibrium when domestic and foreign interest rates coincide, so $r = r^*$. If however a risk premium μ is placed on domestic bonds then part of the return for holding domestic bonds is compensation for their relative degree of riskiness. In this case, even if $r = r^*$, then risk adjusted interest rates imply that $r - \mu < r^*$ so there would be outflows of capital. Therefore, in the presence of a risk premium the balance of payments are in equilibrium when $r = r^* + \mu$.

Therefore, an increase in a country's risk premium will shift the BP schedule upwards.
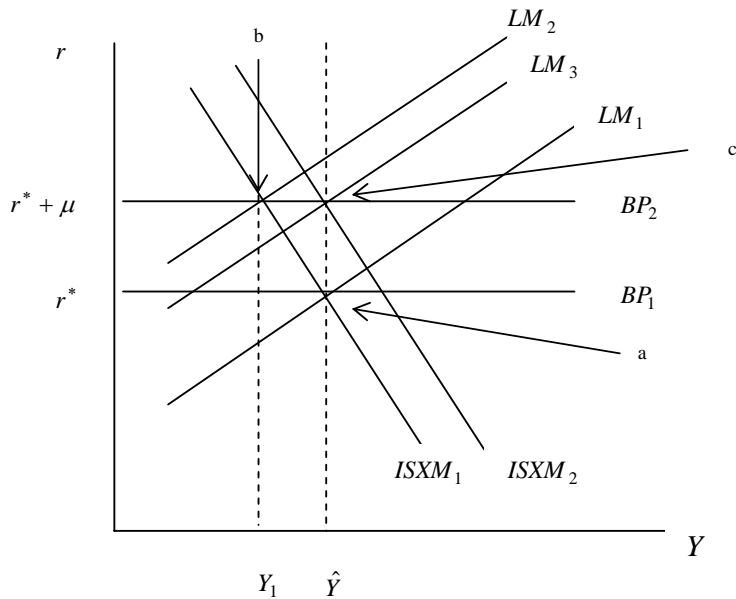

In a fixed exchange rate regime, the risk premium by creating capital outflows would put depreciative pressure on the exchange rate. Therefore, maintaining the fixed exchange rate would require a contraction in monetary policy and an increase in domestic interest rate to $r^* + \mu$. In the short run the economy will move from a to b and output will fall. However, output will eventually return to its full employment level at point c if there is downward movement in prices that increases both competitiveness and the real money supply.
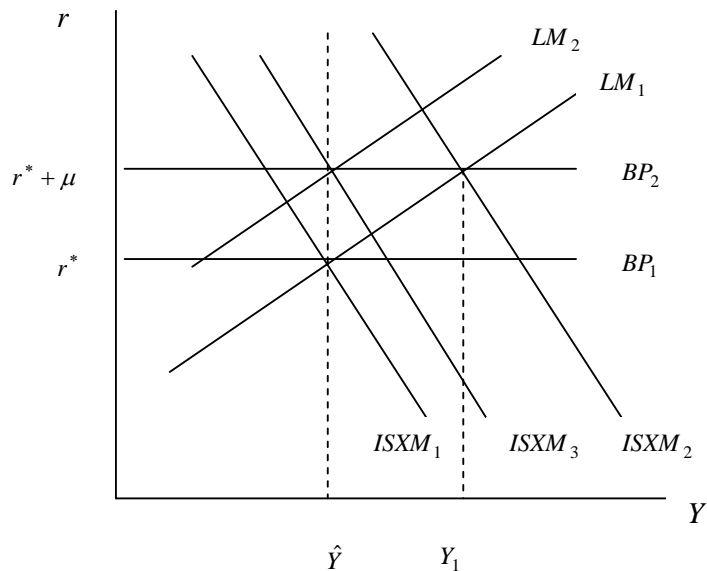
In a floating regime, capital outflows lead to a depreciation in the currency. Net trade and output therefore expand until domestic risk adjusted interest rates have been driven up to world levels. Here, the economy expands with output rising to Y_1. If output though has risen above its full employment level rising prices will eventually reduce competitiveness and contract the real money supply- shifting the economy back to its full employment level.

There are two main risks in holding issued in a certain country. The first is the risk of default- that is the issuer of the bond will fail to pay the bonds yield on maturity. The second is a risk that the currency in which the bond is denominated in will face a large depreciation or devaluation. In this case, when the returns from the bond are transferred into other currencies the deterioration in the exchange rate will generate capital losses.

10. Using the Mundell-Fleming model, with fixed and floating exchange rates, describe the effects of an increase in the full employment level of output. What are the likely determinants of the full employment level of output?
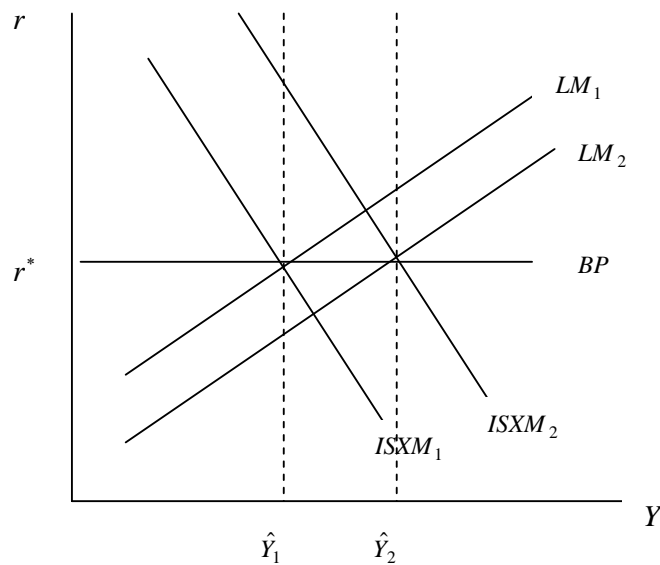
An increase in the full employment level of output will see the economy simply move along the BP schedule to its new higher level of output. This is because there is negative output gap which leads to falling domestic prices so:

Falling domestic prices imply a real depreciation in the exchange rate, this improves competitiveness, enhances net trade and shifts the ISXM curve outwards.

Falling domestic prices increases the real value of the money stock, shifting the LM curve downwards.

The combination of the movement in the LM and ISXM curves act to keep interest rates at the overseas rate- hence the same transition occurs regardless of whether the exchange rate regime is fixed or floating.

The full employment level of output is likely to be determined by a range of factors that influence:

Labour productivity- such as education and training, and capital stock levels.
Labour participation- incentives to work and not to work
Labour market institutions- which might control the degree of competition in the labour market and the amount of job creation.

11. If monetary policy is neutral, are there any costs in forsaking discretionary monetary policy to fix the exchange rate?

The disadvantage of a fixed exchange rate regime is that monetary policy cannot be used to influence the domestic economy. However, the neutrality argument implies that money cannot influence the level of output in any case.
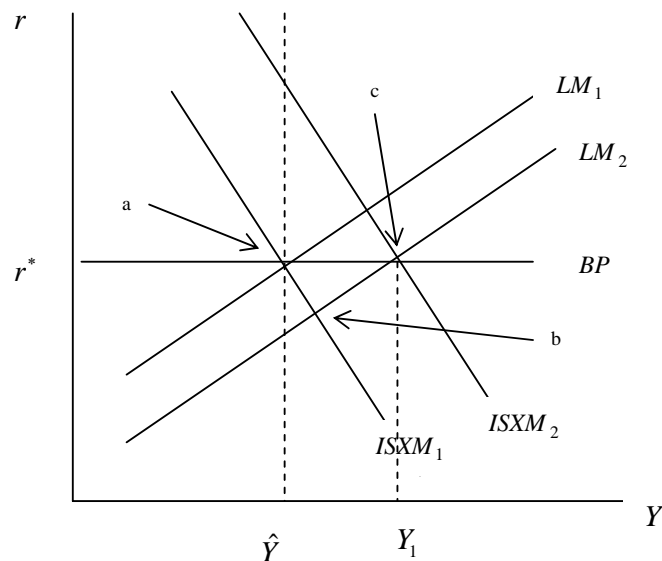
For example, in a floating exchange rate regime a monetary expansion can increase the level of output by reducing domestic interest rates and depreciating the currency.

The quantity theory of money though argues that: $Mv = P\hat{Y}$ where $\hat{Y}$ is the full employment level of output. The prediction f the Quantity Theory is $\%\Delta M = \%\Delta P$,

so any change in the money supply increases prices in the same proportion. Therefore the real money supply (M / P) is left unchanged, the LM curve fails to shift downwards and the economy remains at the full employment output level. In this case the costs of operating an dependent monetary policy appear low.

Monetary policy can only influence the economy if there are rigidities that prevent the immediate adjustment of prices, i.e. $\%\Delta M > \%\Delta P$. In which case, changes to the nominal money supply also leads to a movement in the real money supply and hence the domestic interest rate. Once it is accepted that the neutrality of money does not hold in the short run, it is free to influence the economy, at least in the short run.

Long run monetary neutrality is less controversial. If prices though do adjust slowly the short run may be defined as a considerable period of time. Also, once it is acknowledged that short run neutrality fails it offers scope for monetary policy to create hysteresis type affects on output.

12. With the use of a conventional IS-LM-BP model (i.e. no price adjustment) identify the conditions where fiscal policy is most effective in influencing the level of output in the economy.

Under a floating exchange rate regime fiscal policy is most effective when there is zero capital mobility.
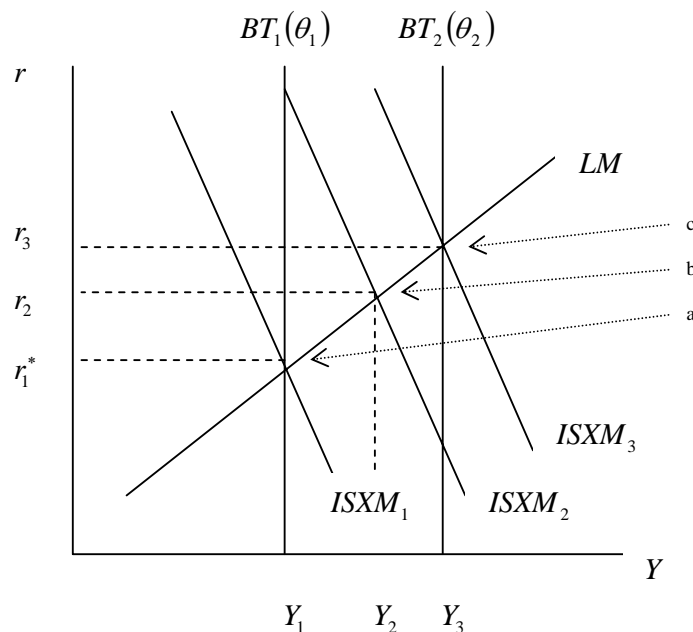
When capital is immobile a fiscal expansion pushed the balance of payments (trade) into deficit, and hence the resulting exchange rate depreciations boost net trade. However, when capital is perfectly mobile- the fiscal expansion raises interest rates

and moves the balance of payments into surplus. The resulting depreciation then crowds out net trade.

Under a fixed exchange rate regime the situation is reversed.
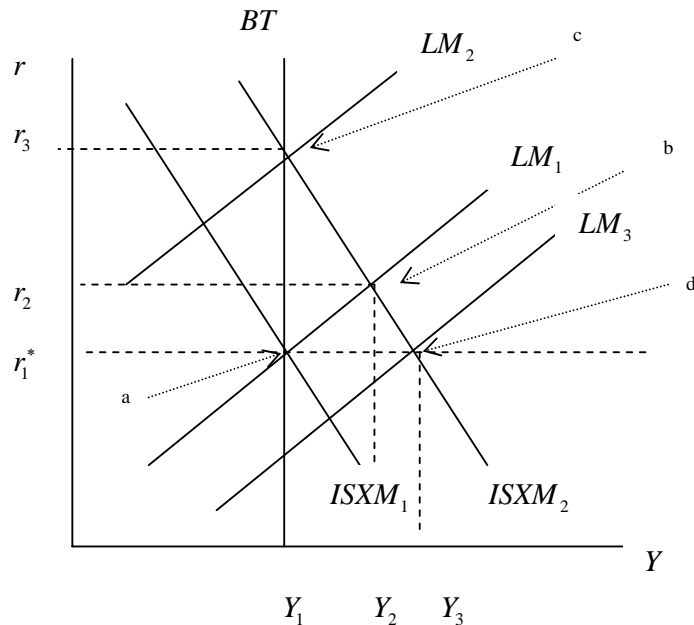
When capital is immobile a fiscal expansion pushes the balance of payments towards deficit. To prevent the exchange rate from depreciating a monetary contraction is required to crowd out the increase in output. However, when capital is perfectly mobile monetary policy must expand to accommodate the fiscal expansion. Otherwise the resulting balance of payments surplus would lead to an exchange rate appreciation.

In an open economy the effectiveness of fiscal policy depends on the degree of capital mobility and the exchange rate regime.

13. If exchange rates are free to float, under what conditions does an expansive monetary policy fail to increase the equilibrium level of output?

Under a floating exchange rate, there are two situations in which an expansionary monetary policy will fail to increase the level of output.

- Investment is interest inelastic and there is zero capital mobility
Equilibrium in this case requires the BT and ISXM schedules to lie on top of each other. Any shift in the LM curve will alter the level of prevailing interest rates, but will have no impact on the level of output.

First, because investment is perfectly interest inelastic. Second, as there is no (positive) impact on output the economy remains in balance of trade- so there will be no exchange rate movements.
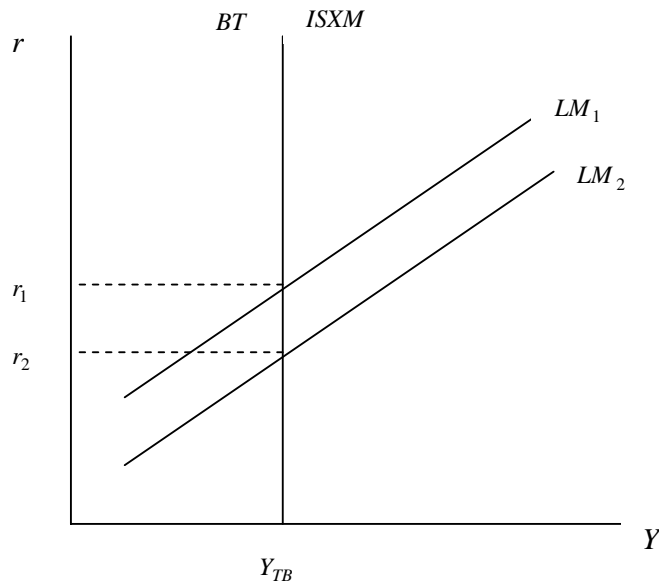
- liquidity trap
Here a monetary expansion fails to put any downward pressure on interest rates. The demand for money is perfectly elastic, so any increase in the money supply simply adds to money holding because current rates are too low to encourage agents to purchase bonds. If a liquidity trap position has been reached, then monetary policy is always ineffective in failing to shift the LM schedule and change output.