Solutions to Problem Set No. 1
Econ 14.05

Problem1:

1. Equations:

$$\begin{aligned} \frac{M}{P} &= L(i^*, Y) \\ Y &= E(Y, i^* - \pi^e, G, T, \frac{\varepsilon P^*}{P}) \end{aligned}$$

   Figure 1 shows the equilibrium in this model in the (ε, Y) space. Figure 2 shows the effect of monetary policy. It is completely ineffective, the presure for depreciation resulting from the expansive policy requires a monetary intervention that offsets the initial policy. Fiscal policy is highly effective; this is shown in Figure 3. The pressure for apreciation generated by the policy induces a monetary expansion that amplifies the initial effect. The cost of a fixed exchange rate and perfect capital mobility is the lost of monetary policy. The only macroeconomic policy available is fiscal policy.

2. Figures 4 and 5 show the effect of German policies on Portugal. As the inflationary pressures are offset by the increase in interest rate, there is no change in Portugal's exchange rate (vis a vis the marc). Therefore, the only effect operaties through interest rates. The increase in interest rates induces pressure for depreciation that has to be offset by a contractive monetary policy. As a result, part of the cost of German reunification falls on Portugal. In general, any expansive policy by a country that generates inflationary pressure spreads its costs across all the member countries. In a more complete model the initial expansion would also affect the output of other countries through its effect on other countries exports, but this effect should be second order when compared with the rise in interest rates.

3. The restrictions on fiscal policy leave a country with no available macro intruments to increase employment.

4. Figures 6 and 7 depict the situation. Trade restrictions increase net exports for any level of income and real exchange rate. However, the effect will just be compensated by an appreciation of the currency, with no effect on output.

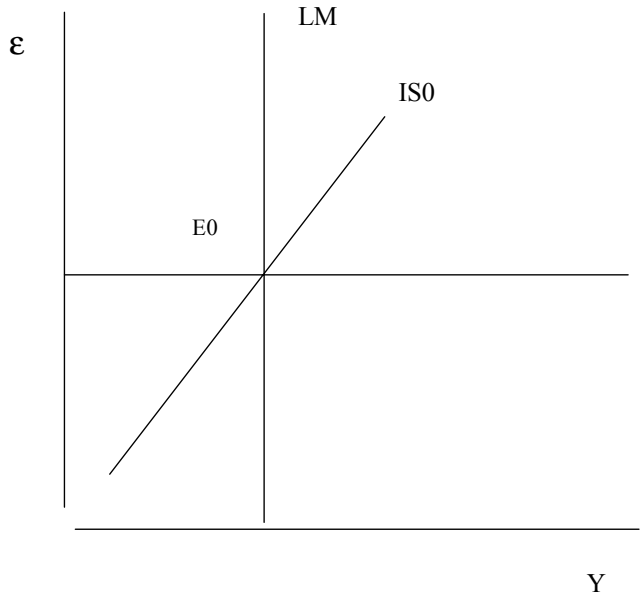


Figure 1:

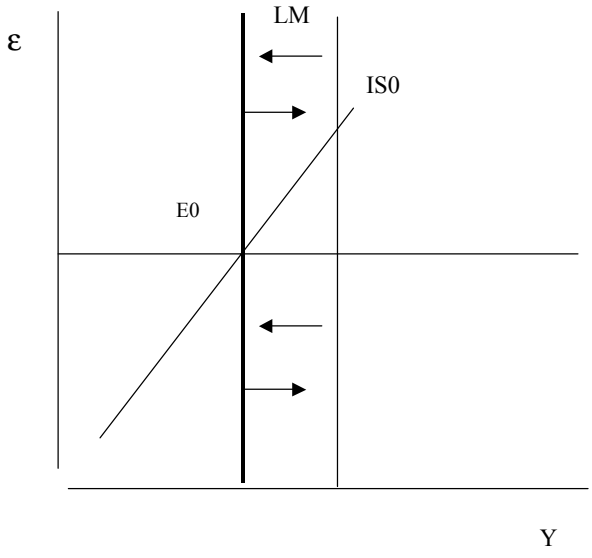


Figure 2:

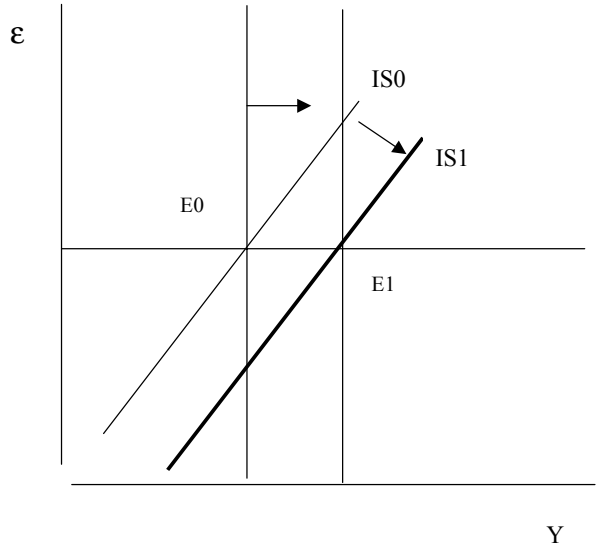
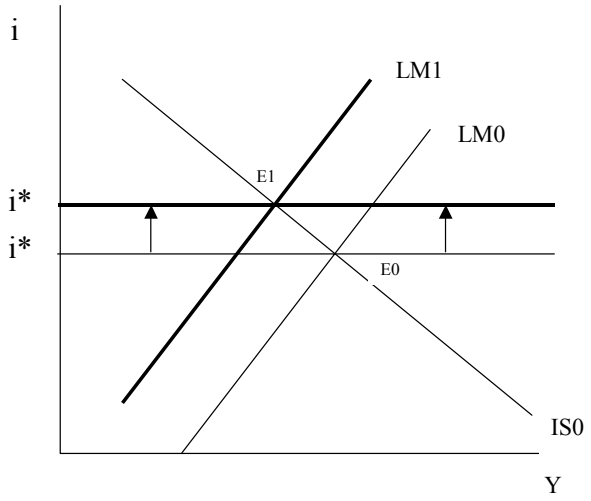


Figure 3:



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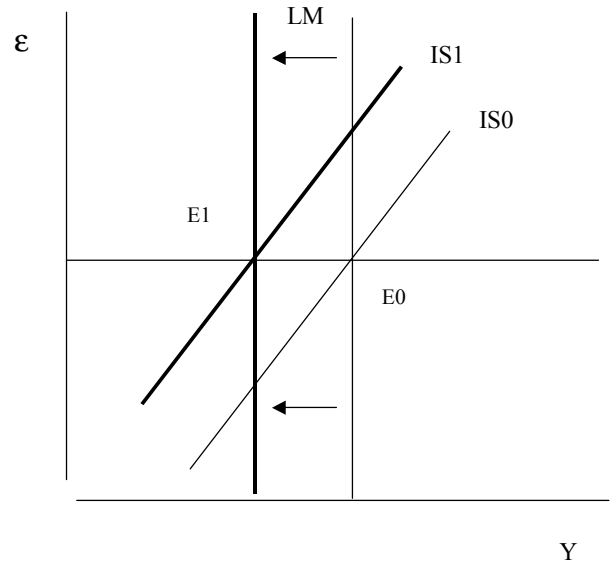

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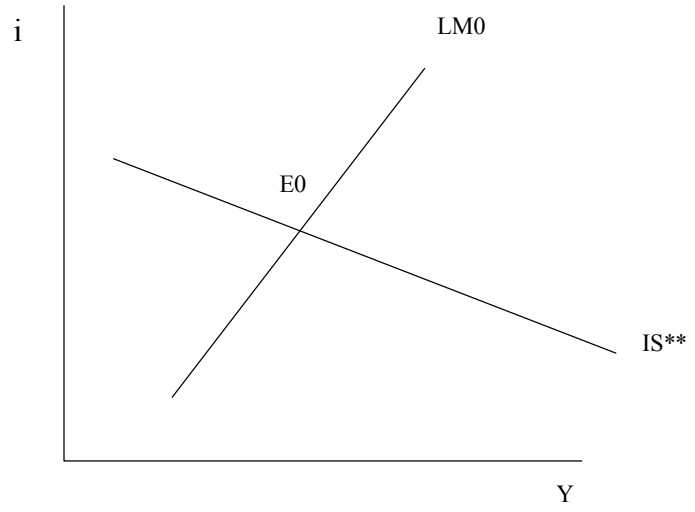


Figure 6:

Problem 2:

1. The reduction in tax rates has the same type of effect than an increase in government expenditure. It is an expansive fiscal policy. The basic Mundell Fleming model tells us that under flexible exchange rate, fiscal policy is totally ineffective. Indeed, the expansion induced by the tax cut should be compensated by an appreciation of the currency, until leaving the interest rate at the international level. This can be seen in Figure 8. In the imperfect capital mobility case the policy achieves an small increase in output. The reason is that the appreciation required to restore external equilibrium (BP=0) is smaller than under perfect capital mobility. This can be observed, in Figure 9.

2. Imperfect capital Mobility: The fall in domestic interest rate is equivalent to a monetary expansion (central bank affects interest rates through open market operations). In a closed economy, the result of this policy is a fall in interest rates, and an increase in output. However, at the internal equilibrium, the balance of payments would be in disequilibrium. In other words, the lower interest rate generate an excess demand for foreign currency and therefore a depreciation of the dollar. The depreciation increases net exports, which increases output further. The different effects of this policy can be seen with the usual graph. See figure 10. If you use this graph you have to be very careful about what happens in the (ε, Y) graph. The reason is that under imperfect capital mobility, the local interest rate can be different from the international interest rate. Therefore any policy that affects the interest rate in the (i,Y) graph will shift the different locus in the (ε,Y). Perfect Capital mobility: In this part you were supposed to discuss the difference between a large and a small economy. If the country is small, there is not much to discuss as it can't affect the interest rate. The interesting case is the large economy one, which is basically the same than in the closed economy case, if we assume that is the U.S. who determines the international interest rate. Thus the interest rate goes down and output goes up as can be seen in Figure 11.The decrease in the interest rate creates inflationary pressures that will increase the exchange rate (depreciation).

3. Perfect capital mobility: This is fiscal policy in fixed exchange rate. Mundell-Fleming tells us that this policy is highly effective, however in this case the policy is contractive instead of expansionary. Therefore we will observe a large drop in output. Obviously, interest rate and exchange rate remain the same (to think: Why do you think the IMF recommends this type of measures to Argentina in the middle of a crises? Does it sound familiar to you (think about the Great Depression, and the Krugman's article)?). This situation is depicted in Figure 12. Imperfect capital mobility: The final outcome is very similar, the difference lies in that as a result of the frictions in capital movement, the monetary contraction required to keep the exchange rate level is smaller.

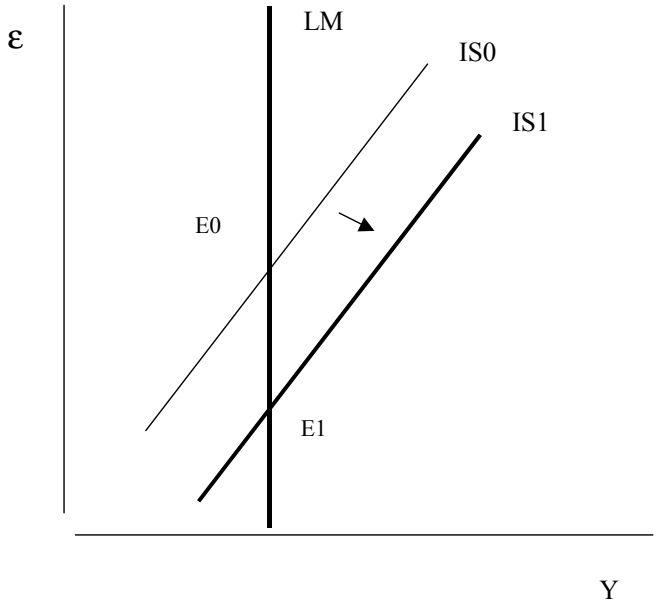
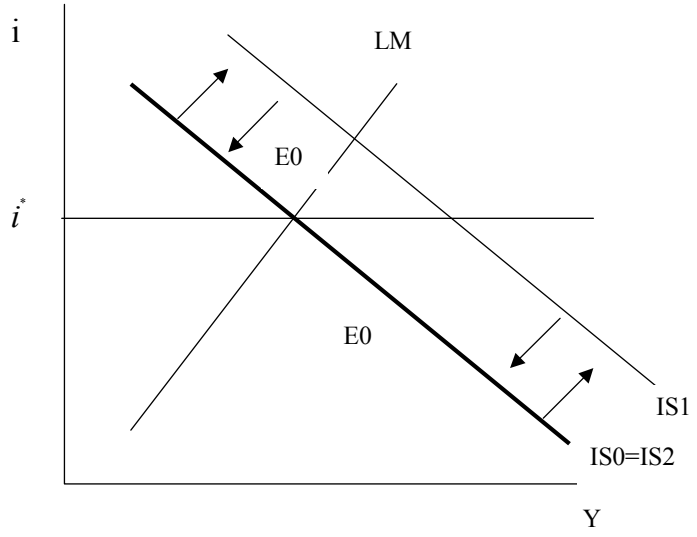


Figure 7:



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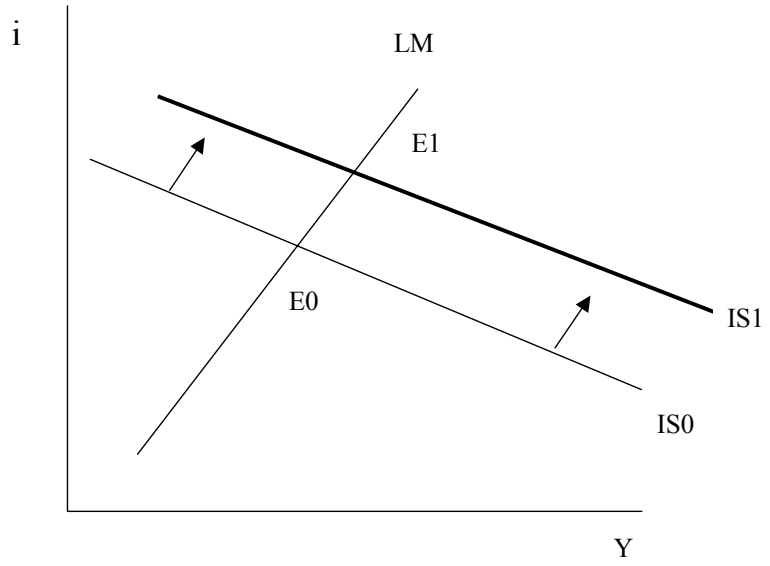

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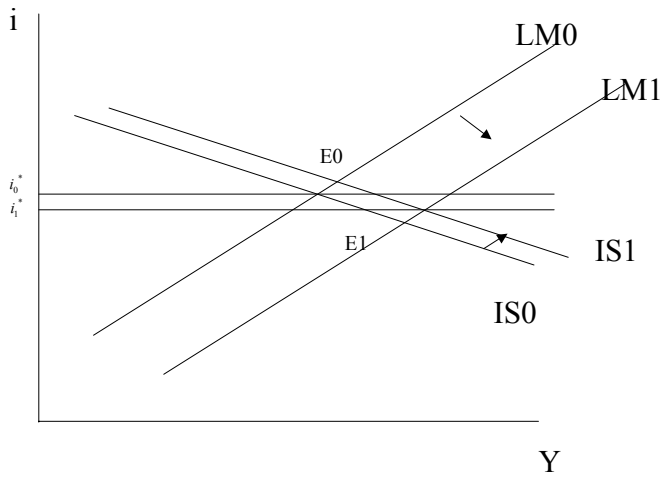


Figure 10:

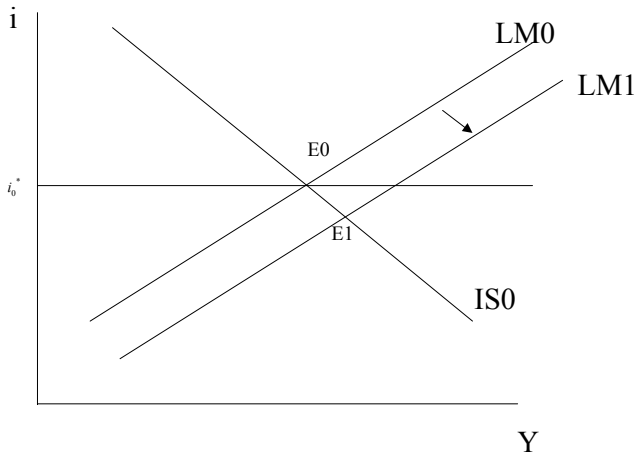


Figure 11:

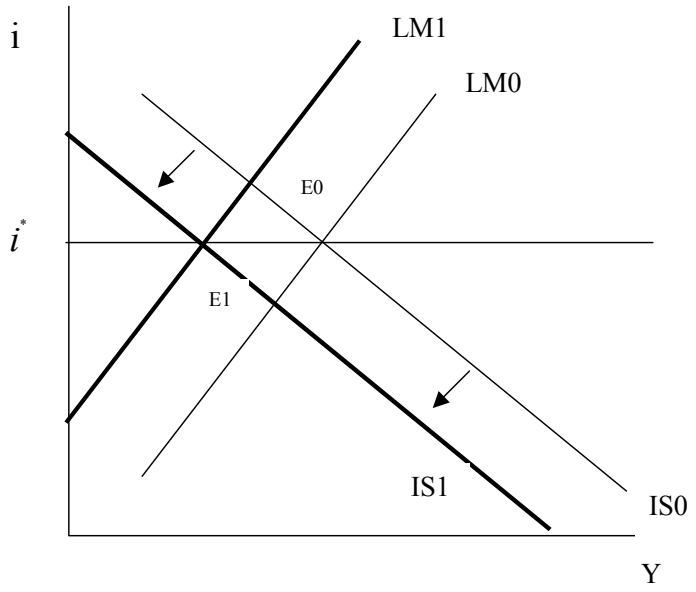


Figure 12:

You can observe that in Figures 13 and 14. Figure 13 shows the movements of IS and LM. Figure 14, which is more interesting, shows the movements of the different curves in the (ε,Y). The movement of the IS curve is attenuated by the fact that, as the interest rate is falling, the expenditure is increasing in the IS. The movement of the IS is between IS0 and IS1, without the attenuating effect of the interest rate, the fall would have been between IS0 and IS2 (dashed line), and the equilibrium output would have been smaller. In fact, the dashed lines represent the equilibrium under perfect capital mobility.

4. Perfect capital mobility: We can understand this situation as a fall in the interest rate of the rest of the world (i^*). This fall would generate pressure for appreciation that has to be released by a monetary expansion. As a result, output should increase, and interest rate fall. See figure 15. Imperfect capital mobility: This case is more interesting. The fall in i^* increases capital flows for any given Y. Therefore, at the original output and interest rate there is an excess demand for pesos, and pressure for appreciation. In order to keep the exchange rate constant the monetary authority has to increase the supply of pesos (monetary expansion).The usual graph (replacing BP=0 on the IS curve) can be used to analyze this situation, as depicted in Figure 16. However, again you have to be careful about complementing your analysis with the graph in the (ε,Y) space. In other words, when there is fixed exchange rate and/or imperfect capital mobility you cannot safely rely in only one graph. In this case, if you were just using the (i,Y) graph you might have thought that the policy was contractive. In fact, the increase in capital flows requires a fall in net exports in order to equilibrate the balance of payments, therefore the first order effect is a fall in the IS*. However, as it was discussed above, the maintenance of the exchange rate requires a monetary expansion which takes the output beyond its original level (if you didn't do this graph try to figure out how to make it. The analysis is analogous to 1.3 with imperfect capital flows).

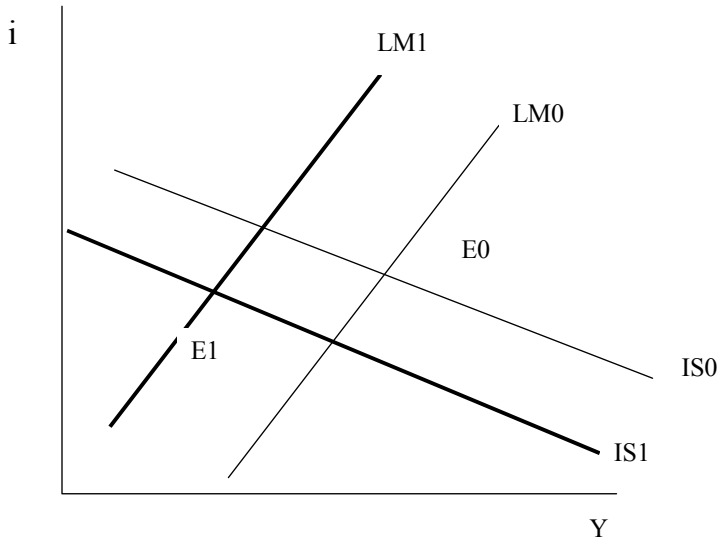
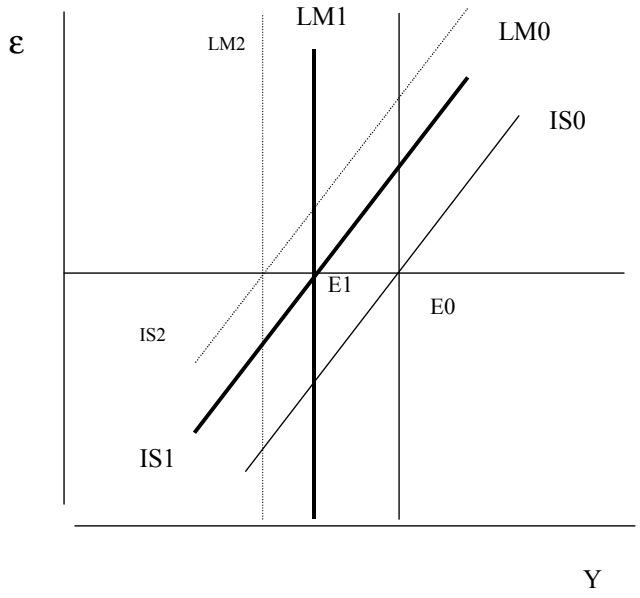


Figure 13:



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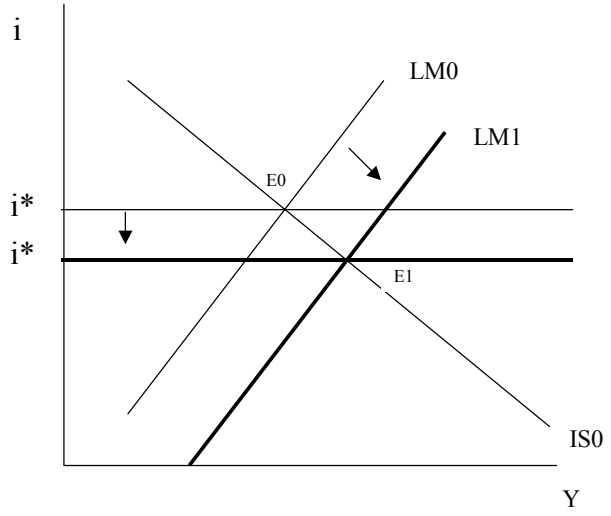

Figure 15:

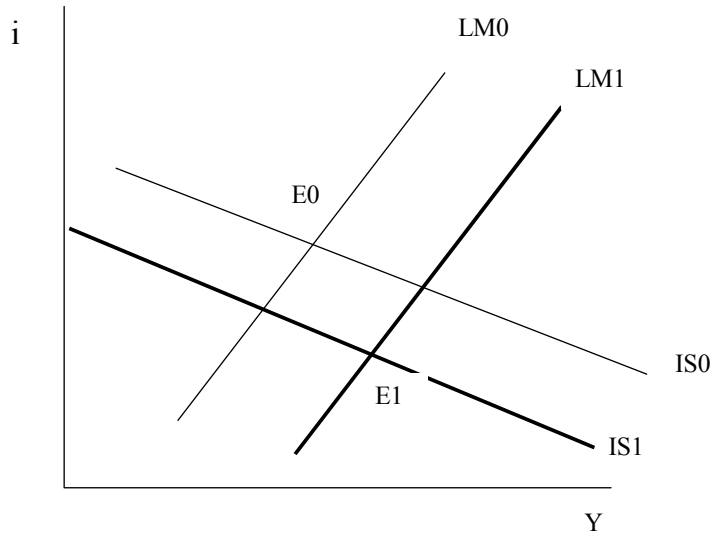

Figure 16:

Problem 3:

1. Setup of Mundell-Fleming model:

$$\begin{aligned} \frac{M}{P} &= L(i, Y) \\ Y &= E(Y, G, T, i, \varepsilon P^*/P) \\ i &= i^* \end{aligned}$$

   Graphically, in the space (ε, Y), the equations look like in figure 17 for the fixed exchange rate regime.The impact of an increase in international interest rates is described in figure 18. The increase in foreign interest reduces investment, contracting IS. Another way of describing this situation is that the increase in the foreign interest rate creates pressure for a devaluation. Domestic savers have an incentive to invest abroad, selling the local currency. In order to keep the value of the currency, the Central Bank must sell reserves of foreign assets, contracting the monetary base. This contraction increases the interest rate reducing the investment until the local interest rate is again equal to the foreign.

2. Uncovered interest parity:

$$i = i^* + E(\dot{\varepsilon}/\varepsilon)$$

   The condition $i = i^*$ disappears if a devaluation is expected because under this condition rational investors would require a higher domestic interest rate in order to invest in domestic assets. Otherwise they would be losing money. We saw that if investors expect a devaluation, UIP implies that $i > i^*$. Therefore, the analysis is completely similar to the case where the foreign interest rate goes up. The situation is depicted in figure 19. There we can see that the Central Bank has to take contractive measures in order to keep the exchange rate. Therefore, the final result is a fall in output.

3. Here the assumption is that the Thai Central Bank fixes a new fixed value for the exchange rate, which is higher than before. After doing so, the speculation disappears (the expected devaluation is 0), therefore the domestic interest rate has again to be equal to the foreign interest rate. The situation is depicted in figure 20. We see that the effect of the devaluation is (obviously) to raise the exchange rate (rising from $\varepsilon 0$ to $\varepsilon 1$), and given that the domestic interest rate is higher than i^* , the Central Bank has to expand the monetary base in order to keep the new level of interest rate (we move from LM1 to LM2). The result is an increase in output.

4. Fiscal policy is highly effective here, with fixed exchange rate. This can be seen in Figure 21. Increase of taxes and reduction of government expenditure both lead to a shift of the IS curve up and to the left, because

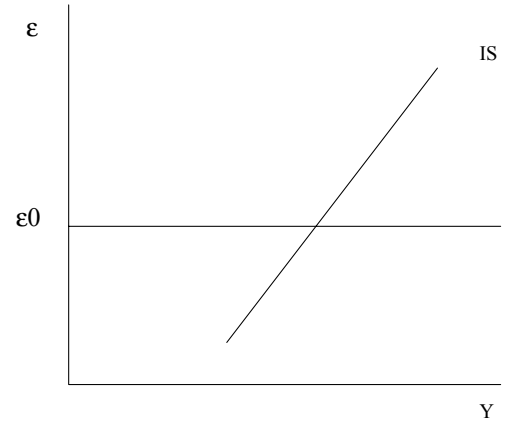

Figure 17:

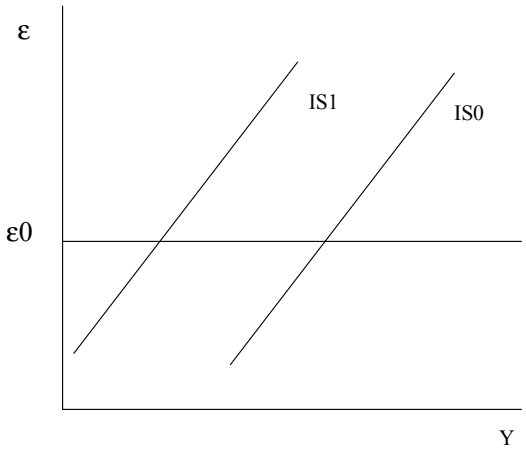

Figure 18:

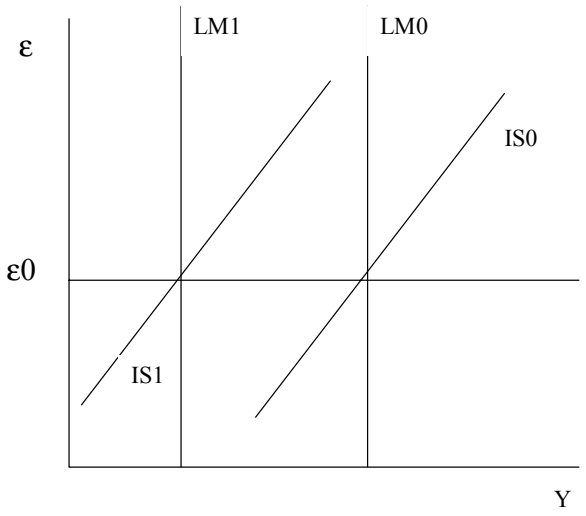

Figure 19:

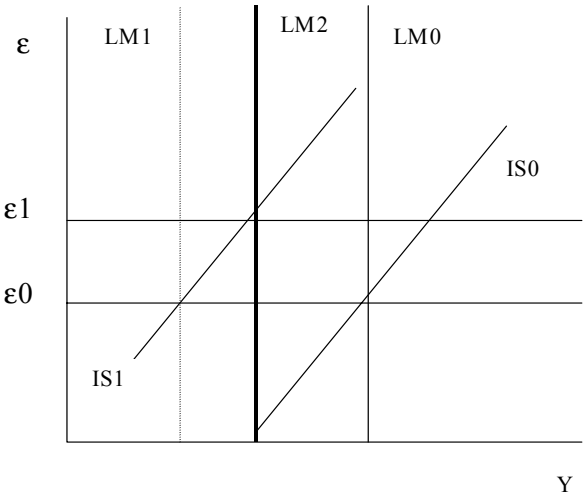

Figure 20:

aggregate expenditure is reduced. this is the typical result of the Mundell-fleming model with fixed exchange rate. Thus output goes down, the exchange rate remains constant, logically, and the interest rate is again equal to the international interest rate (as we assumed that after the one shot devaluation the expectations of changes in the exchange rate went back to 0).

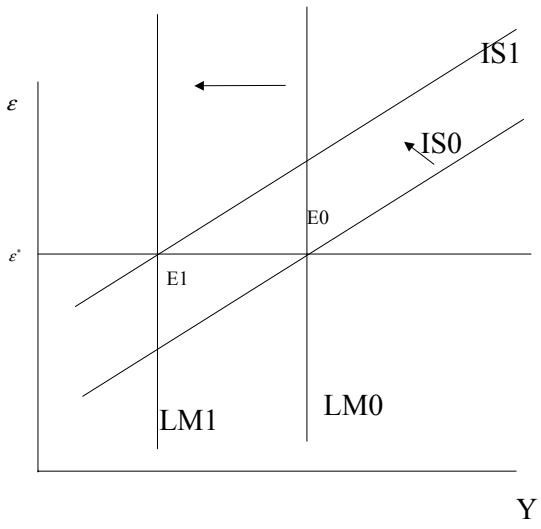

Figure 21: