University of Chile **Macroeconomics** **Elton Dusha**
CEA **Solution set #7**

Disclaimer: These solutions are just guidelines for you, and may NOT include a complete solution for the questions and problems in your homework, as you must present in your assignments and/or exams. In your solutions you must show your work, and demonstrate your line of thinking clearly. Please, always check my calculations for unintentional typos or miscalculations.

1-

a)- Based on Marshal-Lerner Condition, trade balance would improve in response to a depreciation of real exchange rate, i.e. increase in ε, if the export sector is elastic enough to be able to increase, and the import sector should be elastic enough to be able to decrease in response to the depreciation. Therefore, there should be available infrastructure to expand exports; also there enough room to cut back the imports. But how elastic should they be? That is exactly what Marshal-Lerner Condition says: If sum of export and import elasticities is greater than one, then trade balance would improve in response to a depreciation of real exchange rate.

b)- The J-curve case is a direct application of above concept. In a very short run, Imports and exports are completely inelastic, and cannot adjust. Therefore, a real depreciation not only does not increase the exports, and decrease the imports, but overall will increase the value of imports and deteriorate the trade balance.

2-

Uncovered Interest Parity Relation (UIP): $i = i^* + \frac{(E^e - E)}{E}$

a)- i=6% + (1.5-1.5)/1.5 ➔ i= 6%

b)- 6%=13% + (1.5-E)/E ➔ E= 1.6129
Given fixed expected exchange rate, and Canadian interest rate, higher interest rate in the US makes American bonds more attractive, and causes a capital outflow, which leads to an exchange depreciation. Because the new point (i^*, E^e) is located above the old point, the interest parity curve shifts up, (UIP' in figure 1).

c)- 6%=6% + (1.6-E)/E ➔ E=1.6
Given the fixed Canadian and American interest rates, an increase in expected exchange rate, i.e. and expectation that the Canadian currency loses its value, increases the rate of return to American bonds, which initiates a capital outflow, and therefore exchange rate depreciation. As it is seen, because the new point (i^*, E^e) is located to the right of the old point, the interest parity curve shifts up, (UIP'' in figure 2).

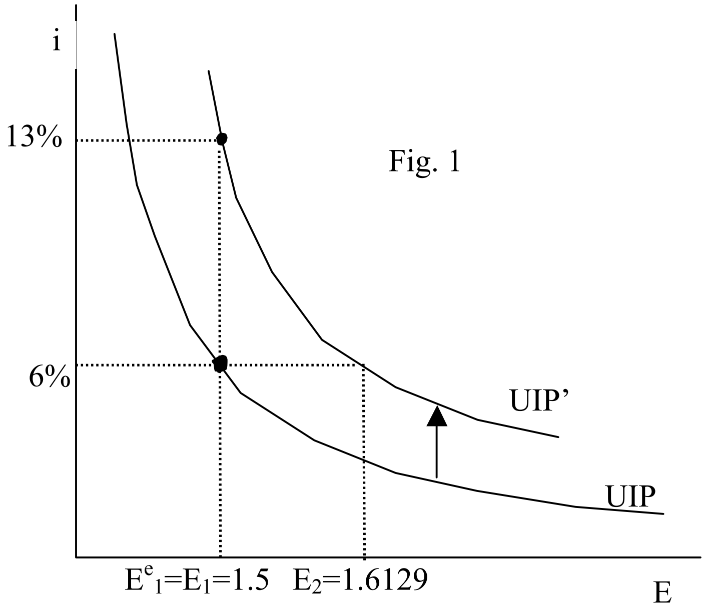
Fig. 1

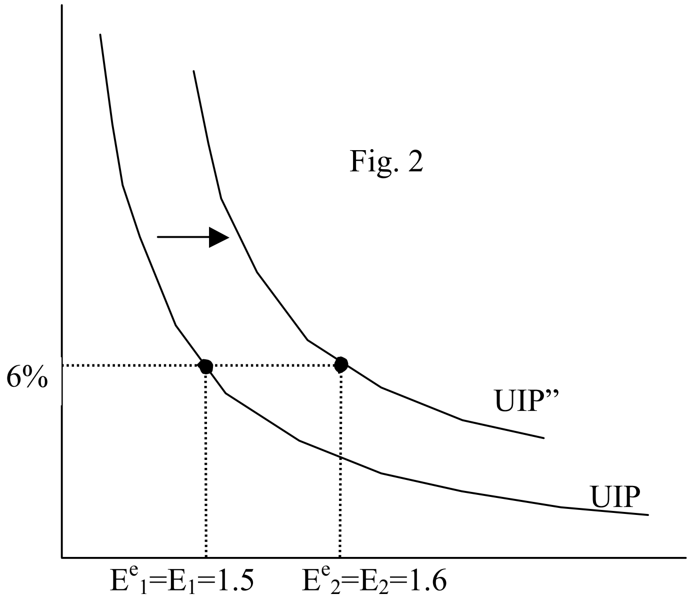
Fig. 2

3- a)-

$$\begin{cases} \text{IS}: \quad Y = c_o + c_1(Y - T) + G + I(\underset{+}{Y}, \underset{-}{i}) + NX(\underset{-}{Y}, \underset{+}{Y^*}, \dfrac{\overline{E}^e}{1 + \underset{+}{i} - i^*}) \\ \text{LM}: \dfrac{\overline{M}}{P} = Y.\, L(\underset{-}{i}) \end{cases}$$

As it is seen in IS function, in above, interest rate, i, can change the output/income through the investment. This effect is the one we have in closed economies. An increase is interest rate causes a decrease in investment and output/income. Moreover, in open economies, the interest rate can affect the output/income through the net export, NX. The increase in interest rate causes decrease in net export, and therefore an additional fall in output/income. This effect does not exist in closed economies.

b-

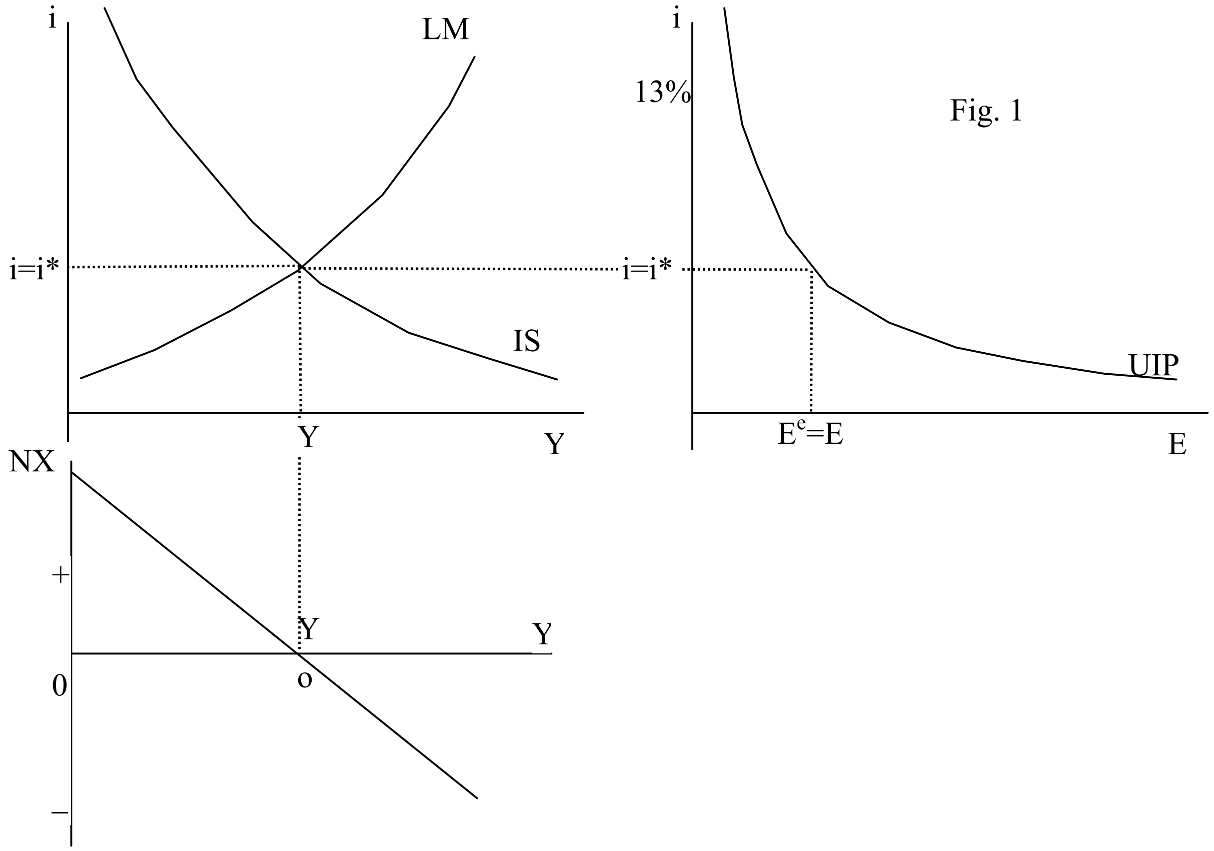

Fig. 1

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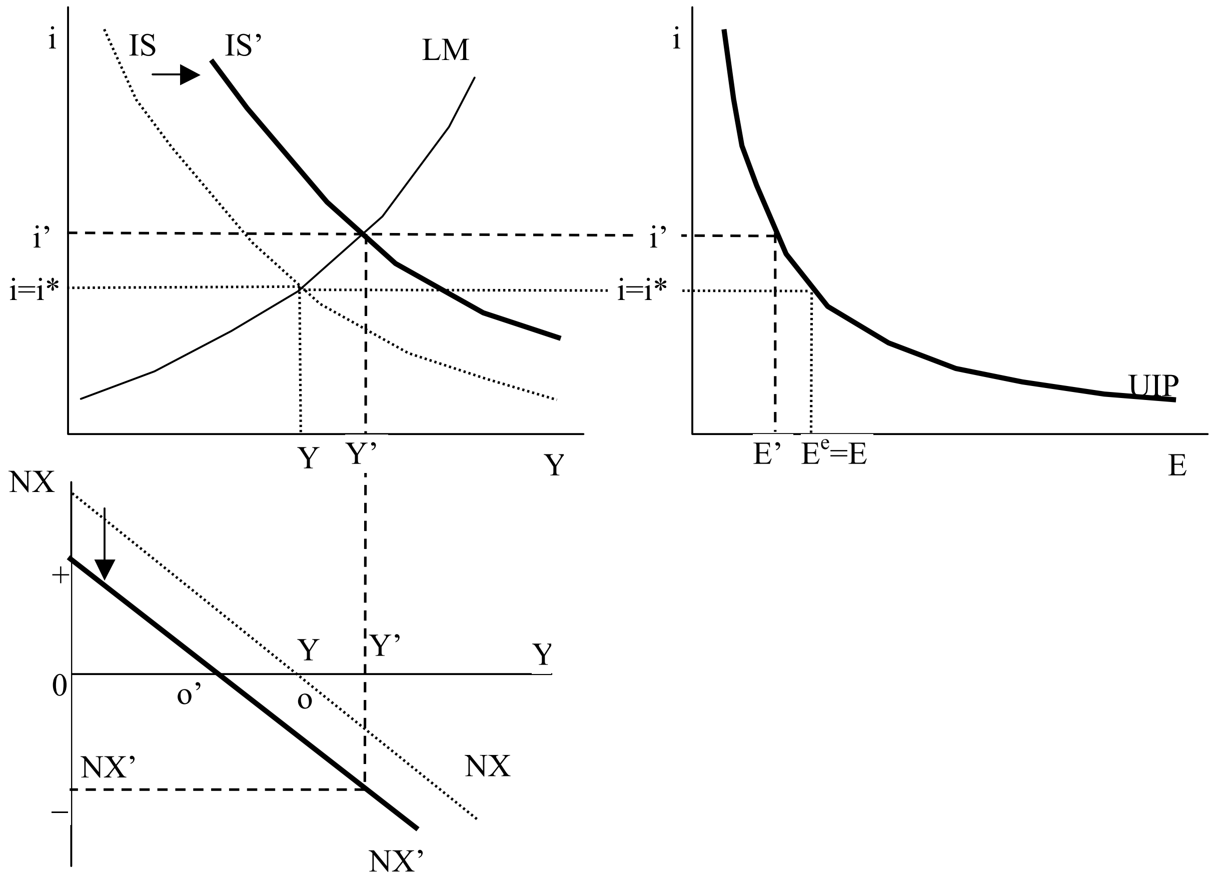
c- If for example government increases its spending, G, the demand for goods, Z, and then output/income, Y, go up (in goods market). As a result, the demand for money goes up, which initiates a selling of bonds among people. Thus, price of bonds falls, which is equivalent to increase in interest rate, i. These changes can be characterized by a right hand shift in IS curve, which lead to Y', and i', as the new levels of output/income, and interest rate, (see the graph, blow). Given fixed foreign interest rate, and fixed expected exchange rate, the increase in domestic interest rate, improves the relative rate of return in favor of domestic assets (bonds) vs. foreign assets (bonds). This in turn triggers a wave of selling of foreign bonds and capital inflow. Capital inflow increases demand for domestic currency vs. foreign currency that entails stronger domestic currency and nominal appreciation. In short run, because of fix prices, the real and domestic exchange rates are equal; therefore, this process is involved with real appreciation too. As it can be seen in following graph, the trade balance curve also shifts down, because of presence of the real appreciation. Obviously, the real appreciation, which means cheaper foreign goods vs. more expensive domestic goods, and the increase in income together deteriorate the trade balance. Notice that while consumption increases, the status of investment is unclear, because of opposite effects of the interest rate and income on it.


i
IS
IS’
LM
i’
i=i*
Y
Y’
Y
i
i’
i=i*
UIP
E’
E^e=E
E
NX
+
Y
Y’
Y
0
o’
o
NX’
NX
–
NX’

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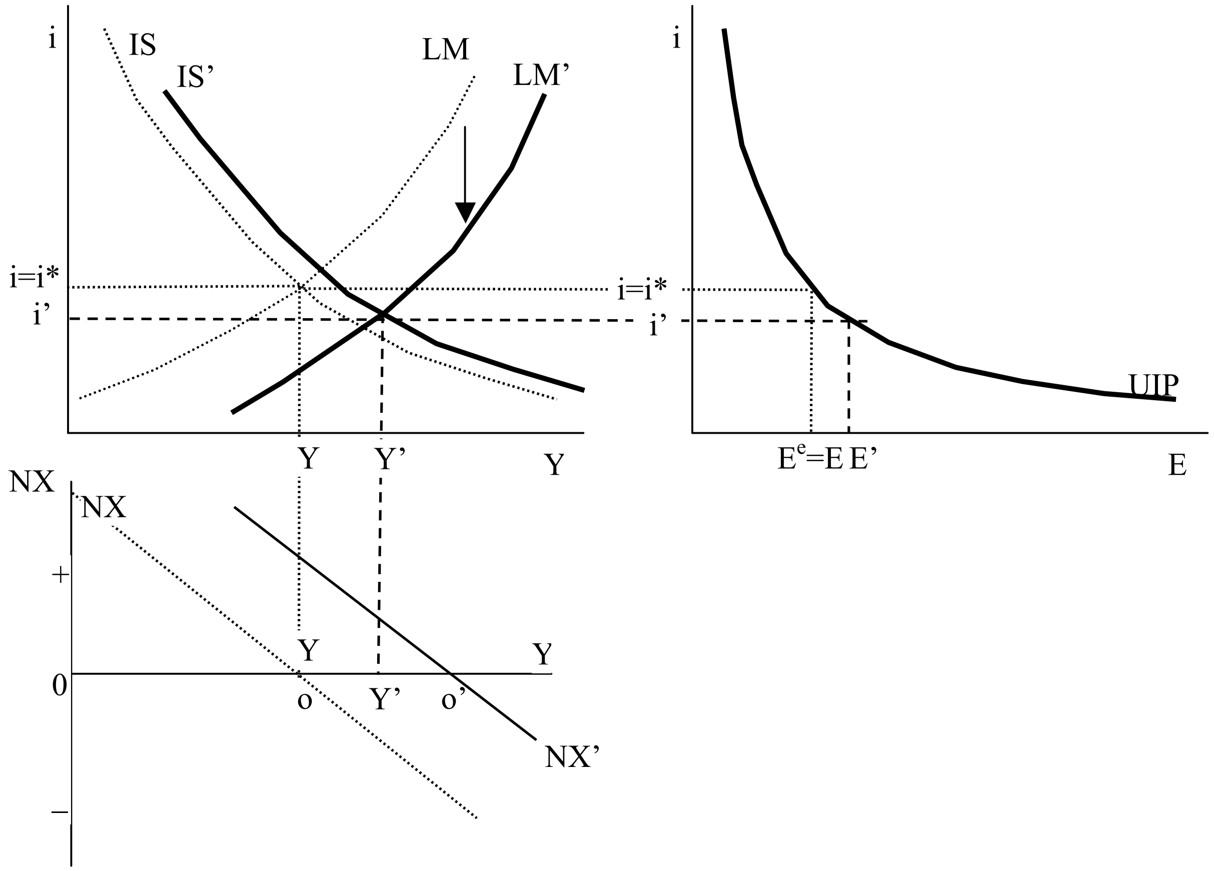
d-


i
IS
IS’
LM
LM’
i=i*
i’
Y
Y’
Y
i
i=i*
i’
UIP
E^e=E
E’
E
NX
NX
+
Y
Y
0
o
Y’
o’
NX’
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- If Central Bank increases money supply, M, through the open market operation by buying bonds, the price of bonds rises, which is equivalent to falling in interest rate, i. Therefore investment, I, demand for goods, Z, and then output/income, Y, go up (in goods market). These changes can be characterized by a downward shift in LM curve, which leads to Y', and i', as the new values of output/income, and interest rate, (see the graph, above). Given fixed foreign interest rate, and fixed expected exchange rate, the decrease in domestic interest rate, improves the relative rate of return in favor of foreign assets (bonds) vs. domestic assets (bonds). This in turn triggers a wave of selling of domestic bonds and capital outflow. Capital outflow increases demand for foreign currency vs. domestic currency that entails weaker domestic currency and nominal depreciation. In short run, because of fix prices, the real and domestic exchange rates are equal; therefore, this process is involved with real depreciation too, which means cheaper domestic goods vs. more expensive foreign goods that tends to improve the trade balance. Notice that in this case investment goes up for sure, and so does consumption.

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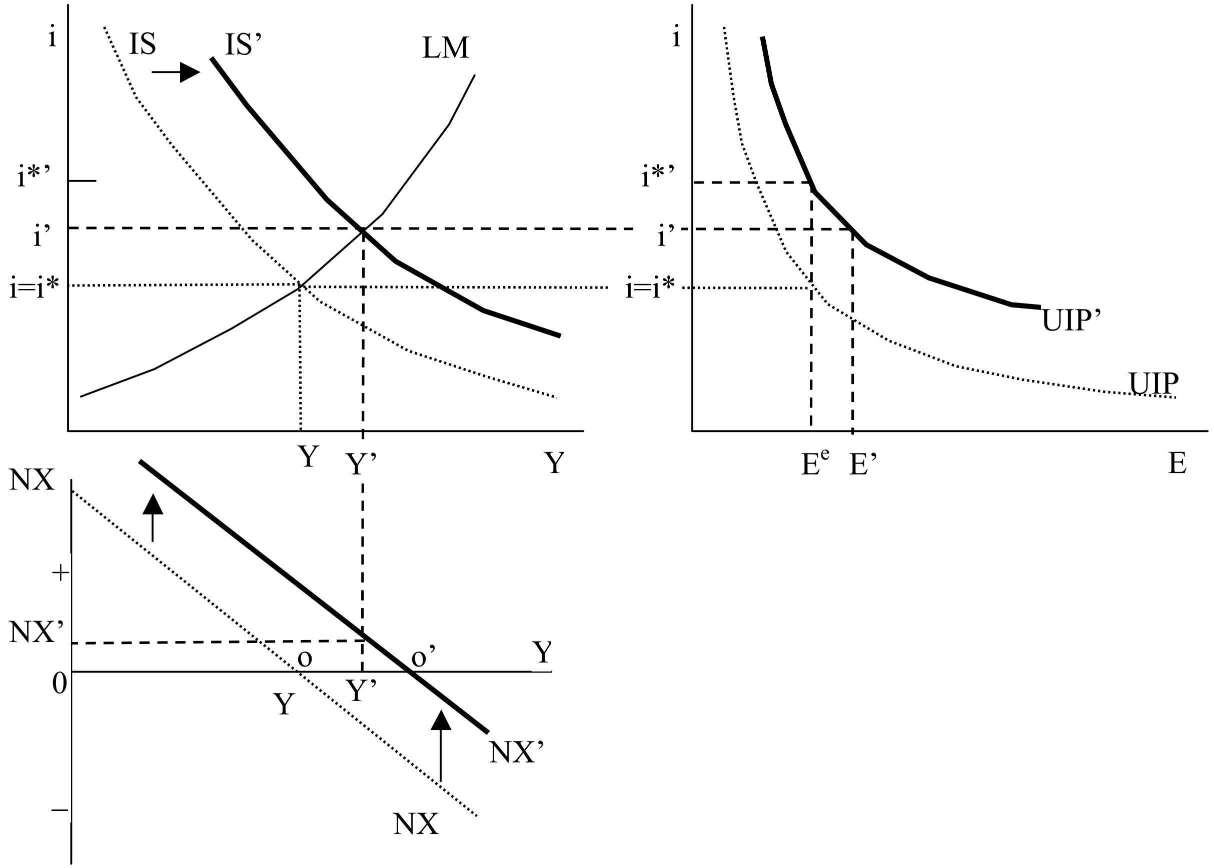
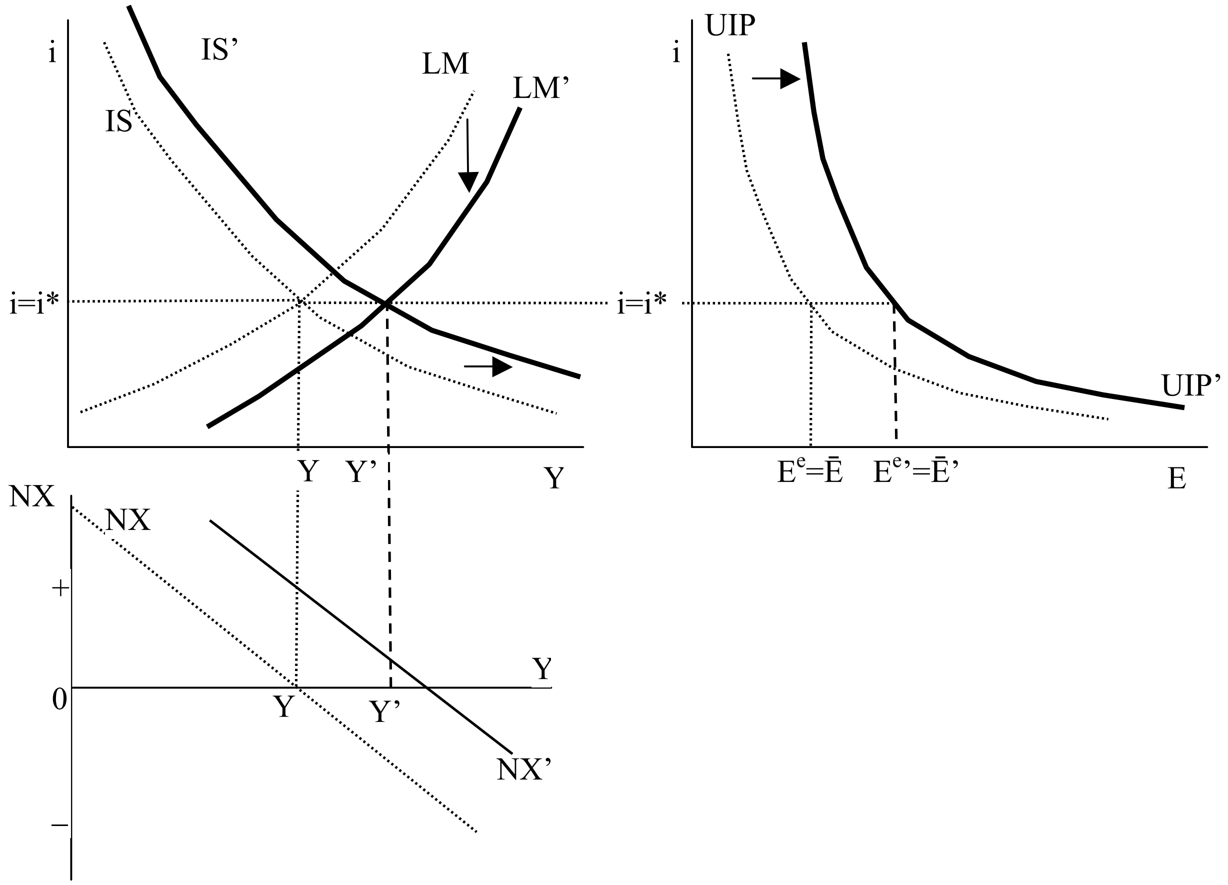
e)-



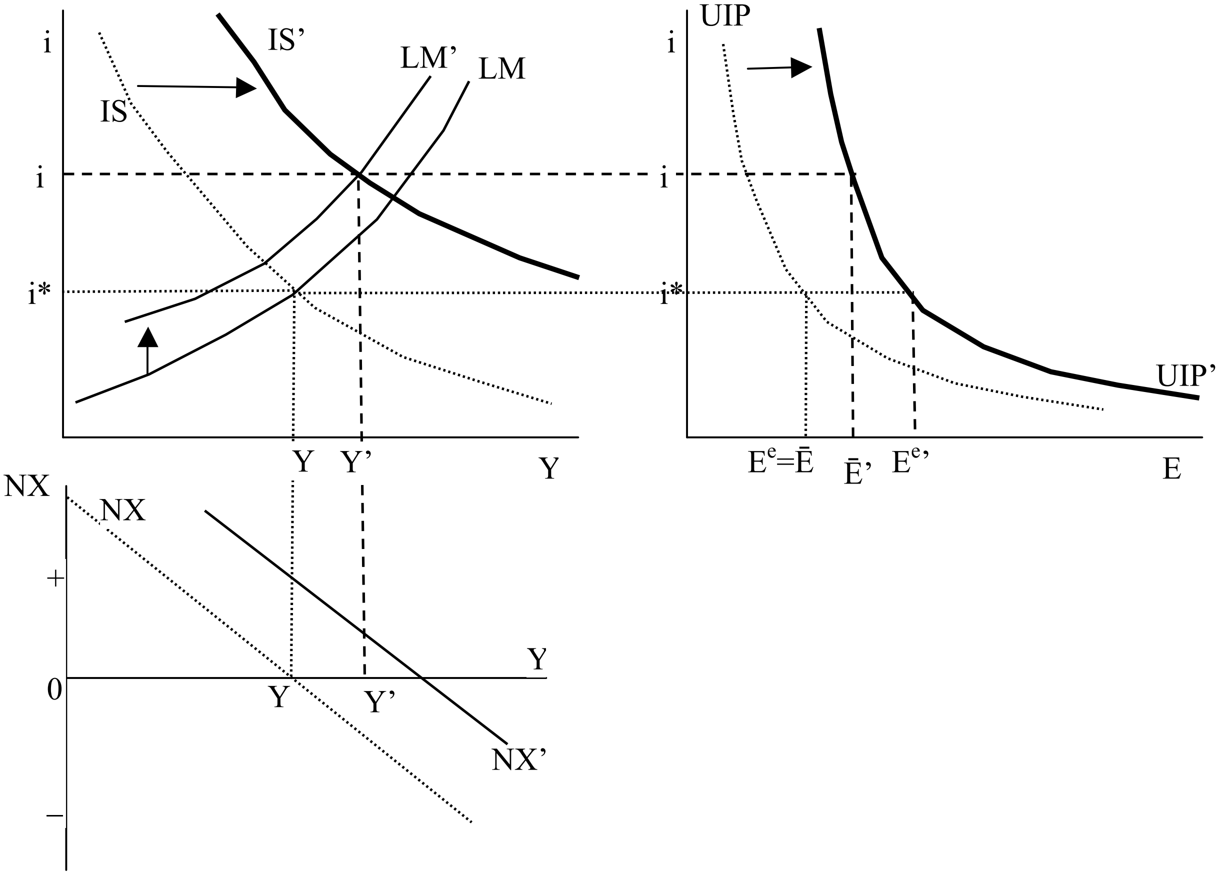
Suppose foreign interest rate goes up from i* to i*', given the fixed expected exchange rate, the interest parity curve shifts up, as we explained in Q3 part (b). The foreign assets (bond) become more attractive, and capital outflow is triggered. The capital outflow in turn increases demand for foreign currency, therefore the foreign currency becomes stronger, which leads to a nominal exchange rate depreciation (point E'), and then real exchange rate depreciation, due to the fix prices. The real depreciation would shift NX curve up, and entails trade balance improvement. In the goods market, the increase in NX, increases the demand for goods, Z, and output/income, Y to Y'. In the financial market increase in income increases the demand for money, and triggers the bond selling by people, which leads to fall of the bond prices and increase in interest rate, from i to i'. This changes can be characterized by the right hand shift in IS curve. Meanwhile consumption goes up, while the status of investment in unclear, because increase in output/income, and increase in the interest rate have opposite effects on the investment.

4-

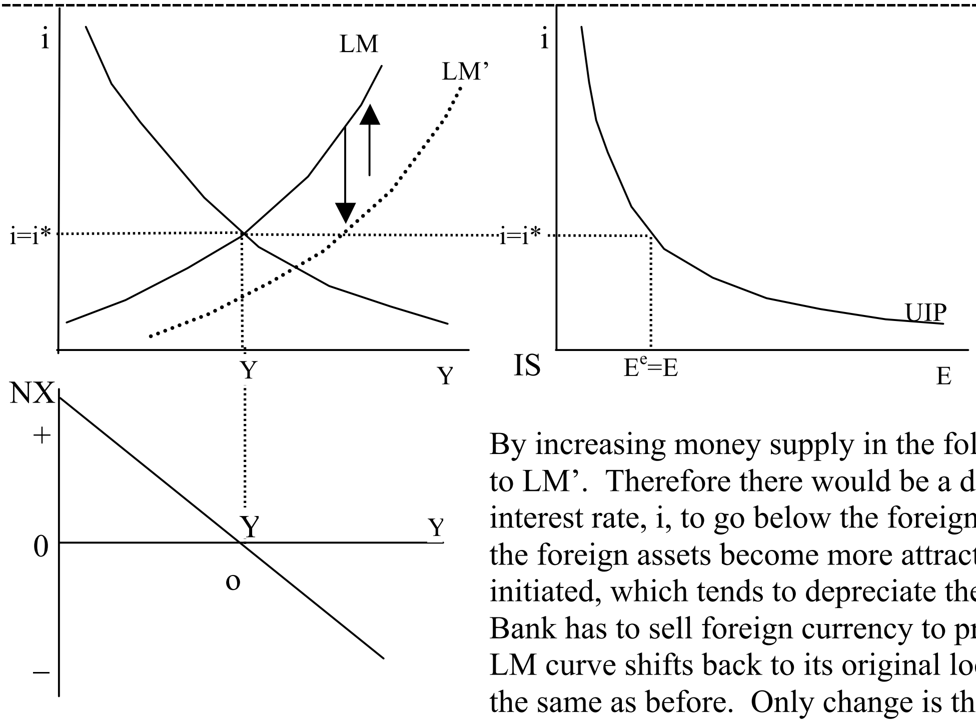
a)- After devaluation of exchange rate from Ē to Ē', interest parity curve shifts to the right, therefore NX curve shifts up, and trade balance improves. The trade balance improvement leads to increase in demand for domestic goods, and shifting IS curve to the right. Output tends to go up, and there would be upward pressure on interest rate to go above foreign interest rate, which would initiate a capital inflow and exchange rate appreciation. Therefore, the Central Bank must impose monetary expansionary policy to support fixed exchange rate, and keep the exchange rate constant, leading to a downward shift in LM curve up to the point where the interest rate remains the same at the foreign interest rate level. (see the graph below). Notice that I started from a balanced trade situation



b)- In this case, the fixed exchange policy will not be credible, therefore while the Central Bank sets the rate at Ē’, the expected exchange rate goes further up, above the fixed exchange rate level to E^{e}’. Changing the expected exchange rate would cause a right shift in the interest parity curve. This leads to a capital outflow, and the Central Bank needs to sell foreign exchange to defend its rate, Ē’. This would be contractionary monetary policy, shifting LM up. Also devaluation cause NX improvement, shifting NX and IS curves. Finally this in turn leads to increase in output and interest rate. As a result when the fixed exchange policy is not credible, the interest rate could go above foreign interest rate.

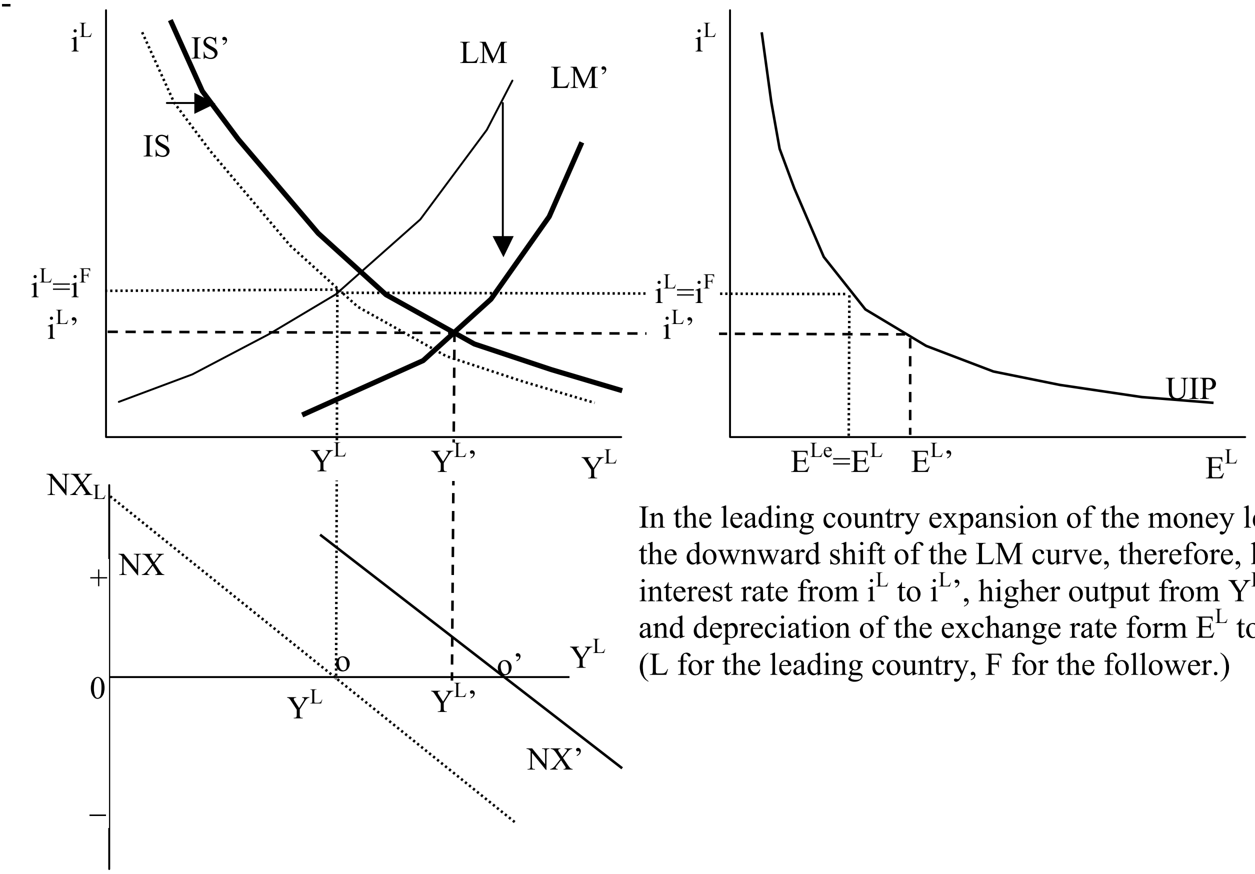


5-
a)-



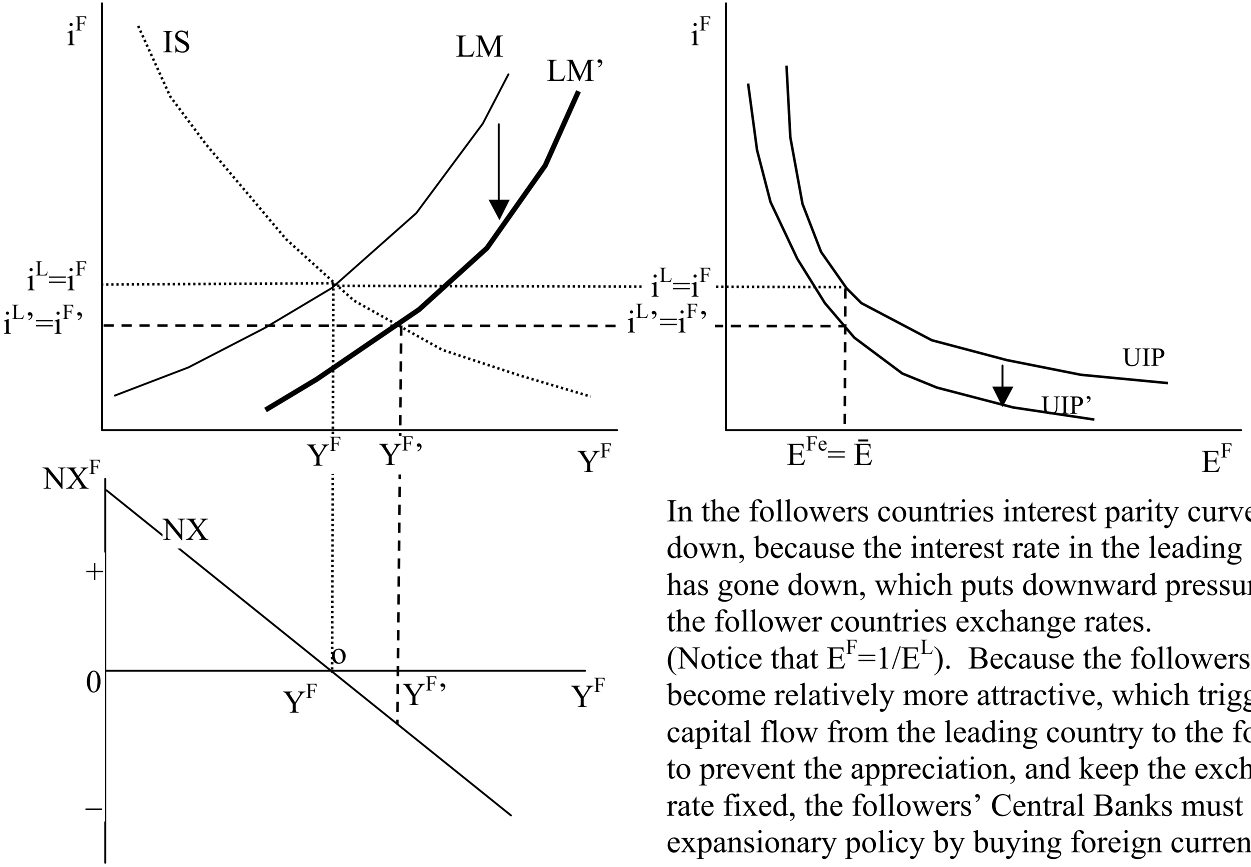
By increasing money supply in the follower country, the LM curve to LM’. Therefore there would be a downward pressure on the interest rate, i, to go below the foreign interest rate, i*. As a result, the foreign assets become more attractive, and a capital outflow is initiated, which tends to depreciate the exchange rate. The Central Bank has to sell foreign currency to prevent the depreciation. The LM curve shifts back to its original location. Everything would be the same as before. Only change is the Central Bank assets, now it has more domestic bonds, and less foreign currency reserves.

b)-



i^L
IS'
LM
LM'
IS
i^L=i^F
i^L'
Y^L
Y^L'
Y^L
i^L=i^F
i^L'
UIP
E^Le=E^L
E^L'
E^L
NX_L
+
NX
o
o'
Y^L
0
Y^L
Y^L'
NX'
–

In the leading country expansion of the money leads to the downward shift of the LM curve, therefore, lower interest rate from i^L to $i^{L'}$, higher output from Y^L to $Y^{L'}$, and depreciation of the exchange rate form E^L to $E^{L'}$. (L for the leading country, F for the follower.)



i^F
IS
LM
LM'
i^L=i^F
i^L'=i^F'
Y^F
Y^F'
Y^F
i^F
i^L=i^F
i^L'=i^F'
UIP
UIP'
E^Fe= Ē
E^F
NX^F
NX
+
o
0
Y^F
Y^F'
Y^F
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In the followers countries interest parity curve shifts down, because the interest rate in the leading country has gone down, which puts downward pressure on the the follower countries exchange rates. (Notice that $E^F=1/E^L$). Because the followers' bonds become relatively more attractive, which triggers capital flow from the leading country to the followers. to prevent the appreciation, and keep the exchange rate fixed, the followers' Central Banks must impose expansionary policy by buying foreign currency or bonds. Interest rates in follower countries would catch up with leader interest rate. [Notice that we assume the followers are small and cannot affect the large leading country.]