

# Lecture 15 - Recommended Problems Solutions

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## ☆☆ Chapter 19, Problem 2

**Consider an open economy with flexible exchange rates. Suppose output is at the natural level, but there is a trade deficit. The goal of policy is to reduce the trade deficit and leave the level of output at its natural level. What is the appropriate fiscal and monetary policy mix?**

The appropriate mix is a cut in interest rates (shift the LM curve down) to depreciate the currency (and thereby to improve the trade balance) and a fiscal contraction (shift the IS curve to the left), in order to undo the increase in aggregate demand created by the increase in net exports. If this is done correctly, the level of output will be unchanged and the trade balance will be less negative as net exports increase due to the depreciation of the currency. Note that for this to work, the Marshall-Lerner condition must hold that is, when there is a depreciation of the currency  $d\epsilon$ , net exports increase (see Lecture 14 here for more detail):

$$d\epsilon < 0 \quad \Rightarrow \quad \frac{dNX}{X} = \frac{dX}{X} - \frac{dIM}{IM} + \frac{d\epsilon}{\epsilon} > 0.$$

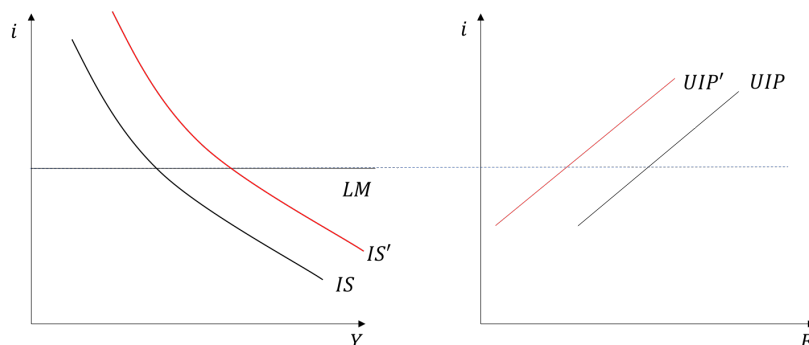
## ☆☆ Chapter 19, Problem 5

**Flexible exchange rates and the responses to changes in foreign macroeconomic policy. Suppose there is an expansionary fiscal policy in the foreign country that increases  $Y^*$  and  $i^*$  at the same time.**

- a. **In an IS-LM-UIP diagram, show the effect of the increase in foreign output,  $Y^*$ , and the increase in the foreign interest rate,  $i^*$ , on domestic output ( $Y$ ) and the exchange rate ( $E$ ), when the domestic central bank leaves the policy interest rate unchanged. Explain in words.**

According to the Uncovered Interest Parity (UIP) given by  $E = \frac{1+i}{1+i^*} \bar{E}^e$ , at the same domestic interest rate and a higher foreign interest rate, the currency will depreciate ( $E$  will decrease). Therefore, the UIP curve will shift left (recall that exogenous variables,  $i^*$  and  $\bar{E}^e$  for UIP, will shift a curve). This is intuitive: the foreign country is undertaking a restrictive monetary policy, which appreciates its currency, and therefore relatively depreciates the home currency.

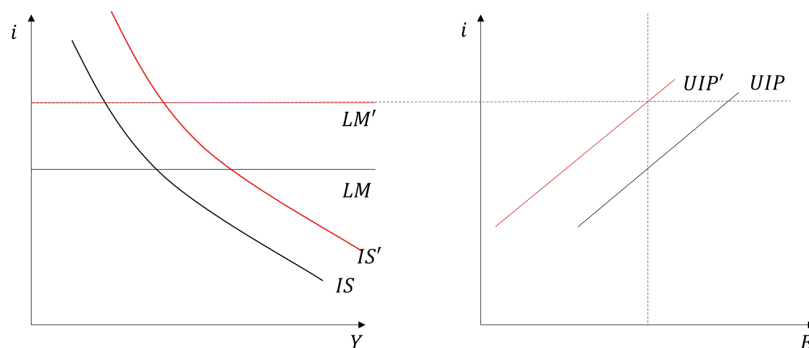
Net exports will then rise due to **both the increase in  $Y^*$  and the decrease in  $E$**  (of course, always if the Marshall-Lerner condition holds, which we always assume). Therefore, the increase in both  $Y^*$  and  $i^*$  shifts the IS curve to the right. If the interest rate does not change, there is therefore a boom in output in the home economy for these two reasons.



- b. In an IS-LM-UIP diagram, show the effect of the increase in foreign output,  $Y^*$ , and the increase in the foreign interest rate,  $i^*$ , on domestic output ( $Y$ ) and the exchange rate ( $E$ ), when the domestic central bank matches the increase in the foreign interest rate with an equal increase in the domestic interest rate. Explain in words.

The UIP curve will still shift left, but as the domestic central bank matches the increase in foreign interest rates, the central bank increases the domestic interest rate (the LM curve moves up) so that the exchange rate remains unchanged.

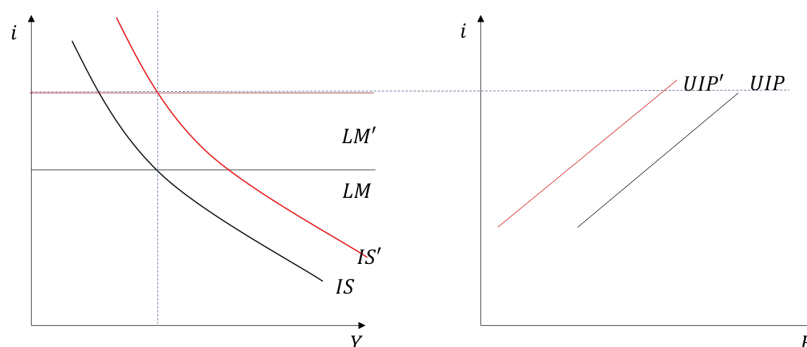
The IS curve will still shift to the right due to changes in  $Y^*$  and  $i^*$  for the same reasons as in part (a). Overall, whether domestic output will rise or fall is ambiguous. We move along the (IS') curve towards a lower level of output, because of the effect of the interest rate on investment; but on the other hand for each interest rate  $i$ , output  $Y$  is higher on curve (IS') than it is on curve (IS) because of the positive effects on exports of the increase in  $Y^*$ .



- c. In an IS-LM-UIP diagram, show the required domestic monetary policy following the increase in foreign output,  $Y^*$ , and the increase in the foreign

interest rate,  $i^*$ , if the goal of domestic monetary policy is to leave domestic output ( $Y$ ) unchanged.

The domestic central bank would have to raise interest rates to leave output unchanged (by repressing investment and offsetting, perhaps partially, the initial depreciation).



## ☆☆ Chapter 19, Problem 6

**Fixed exchange rates and foreign macroeconomic policy.** Consider a fixed exchange rate system, in which a group of countries (called follower countries) peg their currencies to the currency of one country (called the leader country). Because the currency of the leader country is not fixed against the currencies of countries outside the fixed exchange rate system, the leader country can conduct monetary policy as it wishes. For this problem, consider the domestic country to be a follower country and the foreign country to be the leader country.

- a. **How does an increase in interest rates in the leader country affect the interest rate and output in the follower country?**

The follower country must immediately raise interest rates to match the increase in interest rates in the leader country, in order to maintain the fixed exchange rate system. The LM curve shifts up and the interest rate  $i$  increases. Assuming the expected exchange rate does not change (that is, investors believe that the peg will be viable in the future), then there is no change in the current exchange rate as long as increases in  $i^*$  are matched exactly by increases in  $i$ .

The increase in  $i^*$  will also shift the IS curve of the follower country. Recall that  $Y = C(Y - T) + I(i, Y) + G + NX(\frac{1+i}{1+i^*}\bar{E}^e, Y, Y^*)$ . If  $i^*$  increases, then for any given value of  $i$ ,  $E = \frac{1+i}{1+i^*}\bar{E}^e$  will decrease (i.e. UIP curve shifts left), therefore for any given value of  $i$ ,  $NX$  and thus  $Y$  increases. IS curve will shift up. (The movement of curves is similar to part b of problem 5). In total, after the follower country has increased its interest rate, the nominal exchange rate must have stayed the same. The only difference is that investment is now lower in the follower country. Therefore, on balance, output is lower.

- b. **How does the increase in leader country interest rates change the composition of output in the follower country? Assume the follower country does not change fiscal policy.**

Again, the LM curve shifts up and  $i$  increases. Output  $Y$  falls in equilibrium, therefore  $NX$  increases (because  $\frac{1+i}{1+i^*}\bar{E}^e$  is the same when  $i$  matches the change in  $i^*$ , and lower  $Y$  reduces imports),  $C$  and  $I$  decrease.

- c. **Can the follower country use fiscal policy to offset the effects of the leader country's reduction in interest rates and leave domestic output unchanged? When might such a fiscal policy be desirable?**

The follower country could use fiscal policy to shift the IS curve rightwards and increase output back to its original level at the now higher rate of interest. It would be desirable if the decline in output due to the leader country's increase in interest rates moved output below potential output.

- d. **Fiscal policy involves changing government spending or changing taxes. Design a fiscal policy mix that leaves consumption and domestic output unchanged when the leader country increases interest rates. What component of output is changed?**

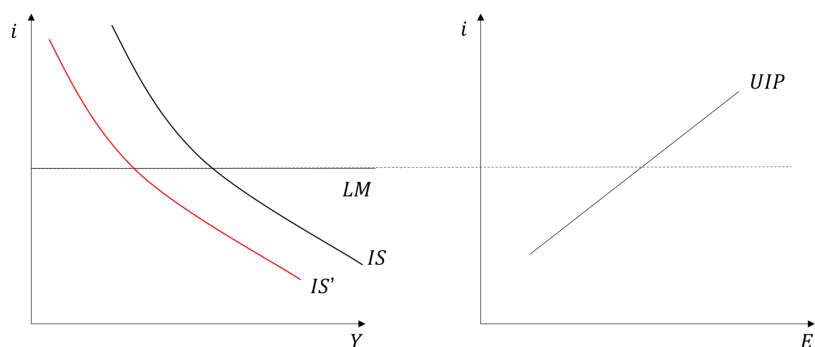
The fiscal policy that leaves consumption unchanged would have to leave output at the original level and taxes at their original level. Thus a fiscal policy that only increases government spending would work to leave consumption unchanged. To sum up, there would then be less investment because of the increase in the interest rate, but also more government spending, offsetting exactly the decline in investment. Consumption would be the same, as well as net exports, which would be unchanged because the exchange rate is fixed.

## ☆☆ Chapter 19, Problem 7

**The exchange rate as a policy tool. A flexible exchange rate combined with a willingness to change the domestic interest rate can increase the effectiveness of monetary policy in an open economy. Consider an economy that suffers a fall in business confidence (which tends to reduce investment).**

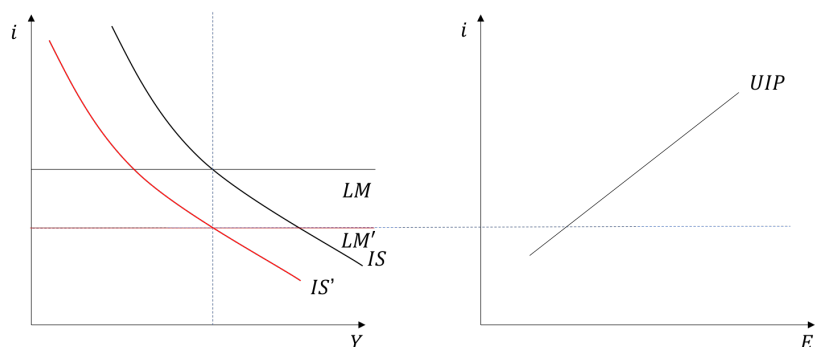
- a. **In an IS-LM-UIP diagram, show the short-run effect of the fall in business confidence on output and the exchange rate when the central bank leaves the interest rate unchanged. How does the composition of output change?**

The IS curve shifts to the left. Output falls. Investment falls – both due to the fall in business confidence and due to the decline in output. Consumption falls due to the decline in disposable income. Net exports would actually rise slightly as imports fall and the exchange rate is unchanged as long as interest rate and foreign interest rates remain unchanged, offsetting some of the fall in aggregate demand.



- b. **The central bank is willing to cut the interest rate to restore the level of output to its original value. How does this change the composition of output?**

The LM curve will shift down. You will move down **along** the new IS curve ( $IS'$ ). The fall in interest rates will stimulate investment. Net exports will rise as the exchange rate depreciates. You will move down **along** the UIP curve. Consumption would return to its original level, because it only depends on output. Investment must actually fall in aggregate. Here is the logic: since the exchange rate depreciated, net exports must rise. Since output returns to its original level and C and G are the same, Investment must fall to allow NX to rise.



- c. **If the exchange rate was fixed and the central bank could not change the interest rate (remember it is fixed at the foreign value  $i^*$ ) what policy options are left for the central bank?**

There would not be any policy option for the central bank. Fixing your exchange rate is choosing to follow the interest rate of your major economic partner.

- d. **Central banks generally favor flexible exchange rates. Explain why.**

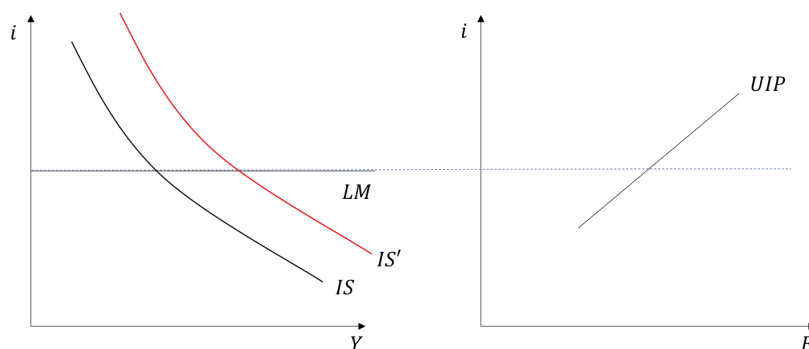
A central bank under a flexible exchange rate has to option to set the domestic interest rate. Under fixed exchange rates, central banks simply set the domestic interest rate to the foreign interest rate. Sometimes, that interest rate does not exactly correspond to the conditions that are needed for this country.

## ☆ Chapter 19, Problem 4

**Flexible exchange rates and foreign macroeconomic events.** Consider an open economy with flexible exchange rates.

- a. In an IS-LM-UIP diagram, show the effect of an increase in foreign output,  $Y^*$ , on domestic output ( $Y$ ) and the exchange rate ( $E$ ), when the domestic central bank leaves the policy interest rate unchanged. Explain in words.

The IS curve shifts right, because net exports tend to increase as foreign output rises. Domestic output increases if the central bank leaves the interest rate unchanged (the LM curve does not shift). The exchange rate will be unchanged.



- b. In an IS-LM-UIP diagram, show the effect of an increase in the foreign interest rate,  $i^*$ , on domestic output ( $Y$ ) and the exchange rate ( $E$ ), when the domestic central bank leaves the policy interest rate unchanged. Explain in words.

According to the UIP given by  $E = \frac{1+i}{1+i^*} \bar{E}^e$ , at the same domestic interest rate and a higher foreign interest rate, the currency will depreciate ( $E$  will decrease). Therefore, the UIP curve will shift left (recall that exogenous variables,  $i^*$  and  $\bar{E}^e$  for UIP, will shift a curve). For any given level of  $i$ ,  $E = \frac{1+i}{1+i^*} \bar{E}^e$  is lower. Therefore net exports will rise (of course, always provided that the Marshall-Lerner condition holds). Therefore, the IS curve would shift to the right. Domestic output rises when the foreign country tightens its monetary policy. The exchange rate depreciates.

