

Problem Set 3 Answers

Due **5pm on** Monday, March 29. "Box-in" your answers to the algebraic questions.

1. Policy under Fixed Exchange Rates

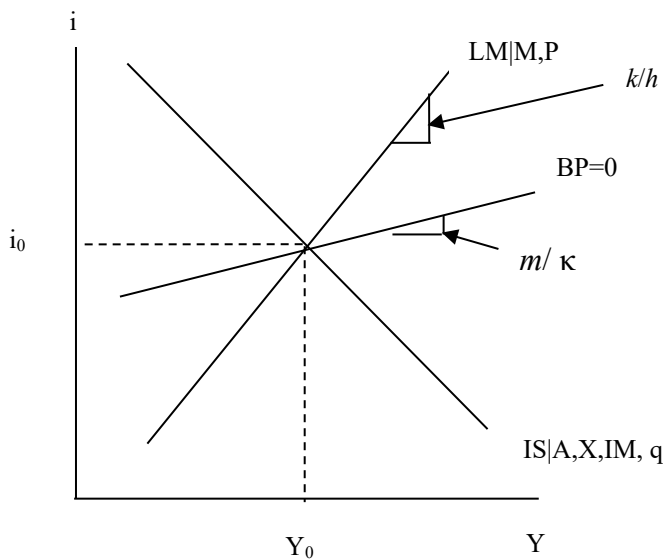
Suppose the economy is given by the following set of equations.

(1) $Y = \bar{\alpha}[\bar{A} + \bar{X} - \bar{I}\bar{M} + (n + v)\bar{q} - bi]$ <IS curve>

(2) $i = -\left(\frac{1}{h}\right)\left(\frac{\bar{M}}{\bar{P}}\right) + \left(\frac{k}{h}\right)Y$ <LM curve>

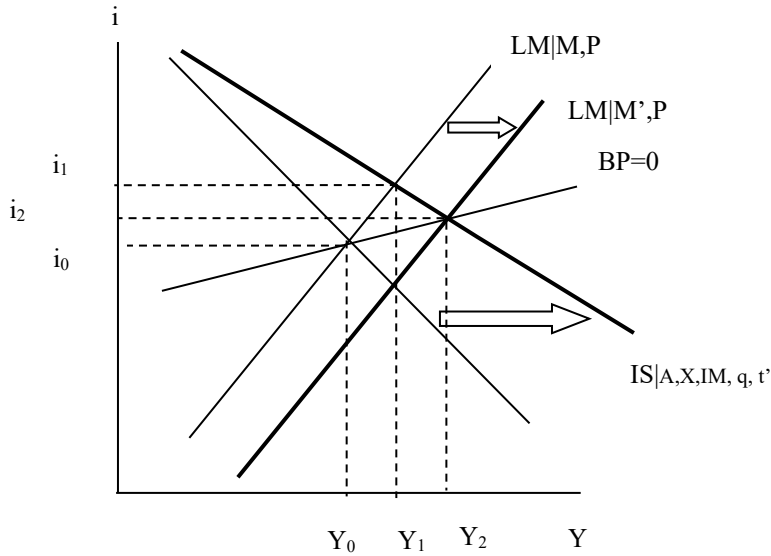
(3) $i = -\left(\frac{1}{\kappa}\right)[(\bar{X} - \bar{I}\bar{M} + \bar{F}\bar{A}) + (n + v)\bar{q}] + \bar{i}^* + \left(\frac{m}{\kappa}\right)Y$ <BP=0 curve>

1.1 Draw a graph of initial equilibrium, where the goods and money markets are in equilibrium, as is the balance of payments. Assume that $m/\kappa < k/h$.



1.2 Show what happens if the government cuts the tax rate, both immediately, and over time.

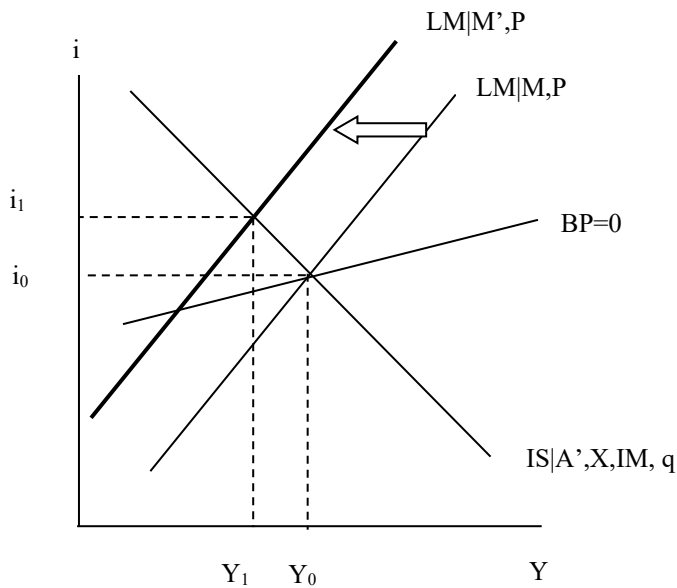
In the figure below, the IS curve rotates out. If there is sterilization, then Y_1, i_1 is equilibrium, and there is capital inflow. If there inflows are not sterilized, then the LM shifts out to LM' , and equilibrium is Y_2, i_2 .



1.3 At the new equilibrium, what is true about (i) the level of output; (ii) the level of investment; (iii) the real exchange rate; and (iv) the trade balance.

Output is higher, investment is lower, real exchange rate is unchanged (the nominal exchange rate is pegged), trade balance is lower.

1.4 Redraw 1.1, and show the impact of a monetary contraction, both immediately and over time. Assume over time, capital flows are sterilized.



1.5 Explain why the process you lay out in 1.4 occurs.

A decrease in M to M' decreases the real money stock, shifting the LM to the left. Interest rates rise above that consistent with external equilibrium; there is a balance of payments surplus so

that foreign exchange reserves increase. Since inflows are sterilized, the money supply stays fixed at M' , so output and interest rates stabilize at Y_1 and i_1 .

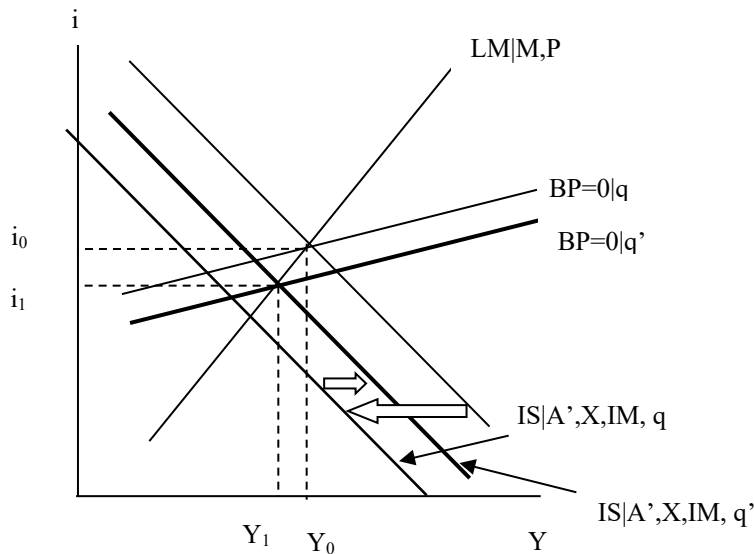
1.6 Answer 1.4 if capital flows are not sterilized.

In this case, the LM shifts back to where it started, so that the original income level and interest rate are restored at Y_0 and i_0 . As capital flows in, foreign exchange reserves increase, increasing the money base, in the absence of sterilization. Consequently, the money supply increases, and the LM shifts out.

2. Policy under Floating Exchange Rates

- (1) $Y = \bar{\alpha}[\bar{A} + \bar{X} - \bar{I}\bar{M} + (n + v)q - bi]$ <IS curve>
- (2) $i = -\left(\frac{1}{h}\right)\left(\frac{\bar{M}}{\bar{P}}\right) + \left(\frac{k}{h}\right)Y$ <LM curve>
- (3) $i = -\left(\frac{1}{\kappa}\right)[(\bar{X} - \bar{I}\bar{M} + \bar{F}\bar{A}) + (n + v)q] + \bar{i}^* + \left(\frac{m}{\kappa}\right)Y$ <BP=0 curve>

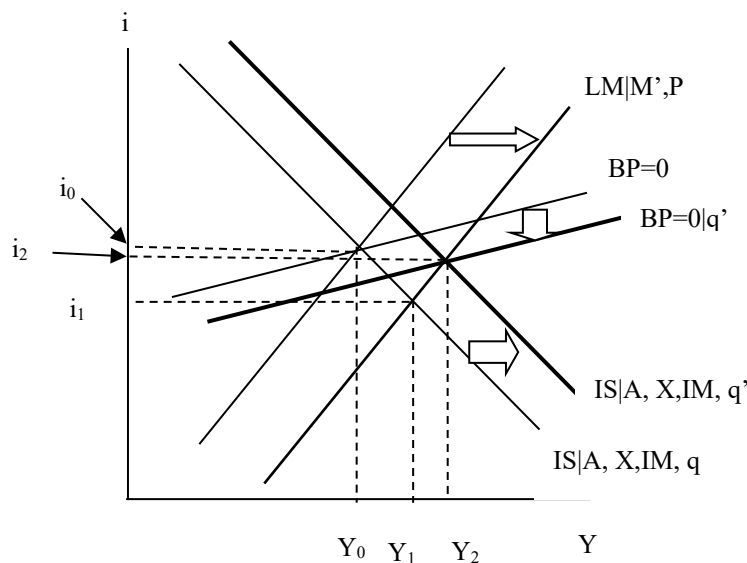
2.1 Now assume the economy described above under a floating exchange rate regime. Show what happens if the government cuts government spending.



2.2 Explain your answer to 2.1

Assuming high but not perfect capital mobility. The decrease in government spending changes A to A' , shifting in the IS curve. The resulting interest rate is less than that consistent with external equilibrium, so the exchange rate depreciates from q to q' . This shifts out the IS curve, thus offsetting partly the initial inward shift. The $BP=0$ curve shifts down because with the weaker home currency, a lower amount of capital inflows is necessary for any given level of income, and that means a lower interest rate is required for any given level of income to balance the external accounts. Income and interest rates settle at Y_1 and i_1 .

2.3 Now examine a monetary expansion from initial equilibrium, carefully distinguishing between initial impact, and the effect over time.



In this case, the resulting equilibrium interest rate i_1 is less than required for external equilibrium. As a consequence, there is an incipient balance of payments deficit and the exchange rate depreciates. The resulting increase in net exports means that the required interest rate for external equilibrium falls (the $BP=0$ curve shifts downward). The increase in net exports means that domestic aggregate demand rises, and the IS curve shifts out. The equilibrium settles at income level Y_2 and interest rate i_2 .

2.4 Explain why monetary policy has a larger effect in this open economy as opposed to that in a closed economy.

Monetary policy has two channels whereby which output is affected, in the open economy. In both economies, lower interest rates increase investment. In the open economy, lower interest rates drive down the value of the currency (depreciations the exchange rate), boosting net exports.

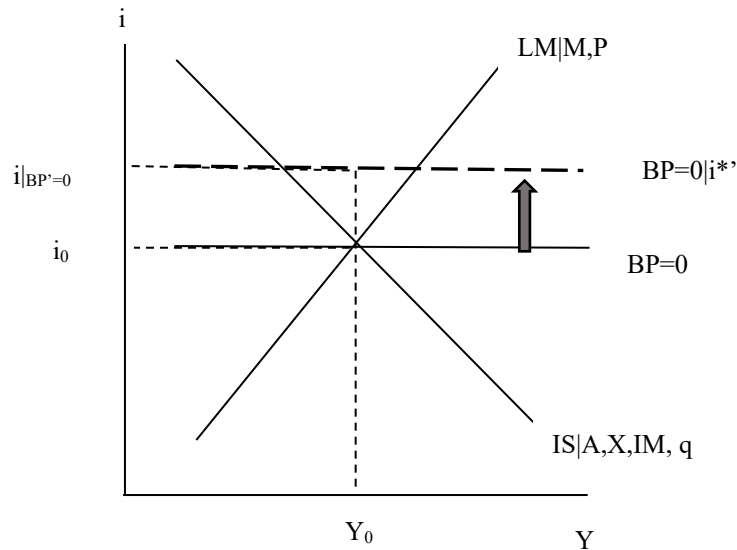
2.5 What is the balance of payments at the beginning (i.e., are reserves increasing, decreasing, or constant)? What is the balance of payments after a monetary expansion?

Under floating rates, the balance of payments is always equal to zero.

3. Consider the Mundell-Fleming model, under fixed exchange rates, and perfect capital mobility.

3.1 Show graphically what happens if the foreign interest (considered exogenous) rises, immediately.

The $BP=0$ curve shifts up (gray arrow); the equilibrium interest rate remains at i_0 , which is below that consistent with balance of payments equilibrium, so there is a capital outflow, $ORT > 0$. Since capital mobility is infinite, LM should shift up immediately.

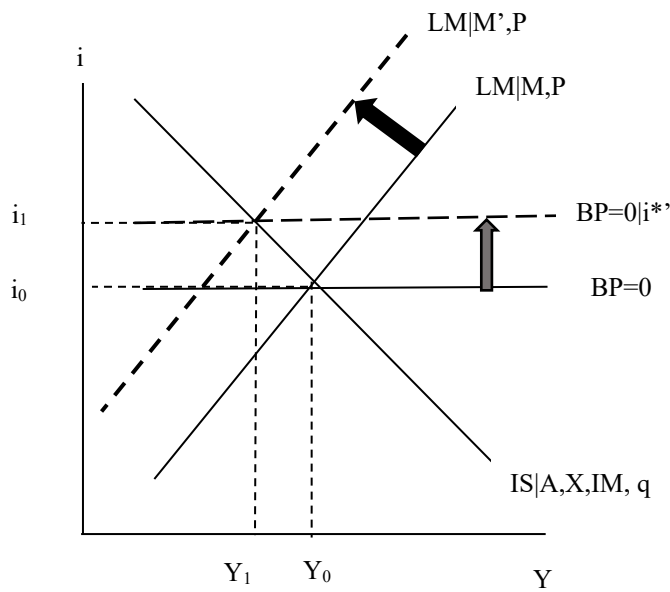


3.2 Assume sterilization **is attempted**; what happens to output, interest rates, real exchange rate, and foreign exchange reserves. Show graphically what happens.

If there is sterilization, the economy remains at interest rate i_0 , for just an instant, before reserves are exhausted. Then the LM shifts back.

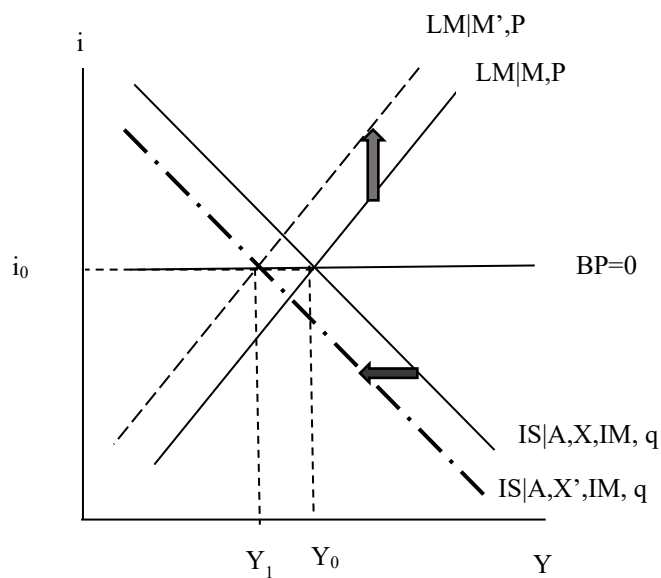
3.3 Show what policies are available to the policy authorities if they wish to avoid foreign exchange decumulation.

The authorities could pre-emptively shrink the money supply, shift the LM curve back (black arrow) and raise the interest rate to i_1 , such that the interest rate matched that sufficient to restore external equilibrium. The end result is to reduce income to Y_1 .



3.4 Instead of a foreign interest rate increase, suppose exports autonomously decline. Show what happens immediately.

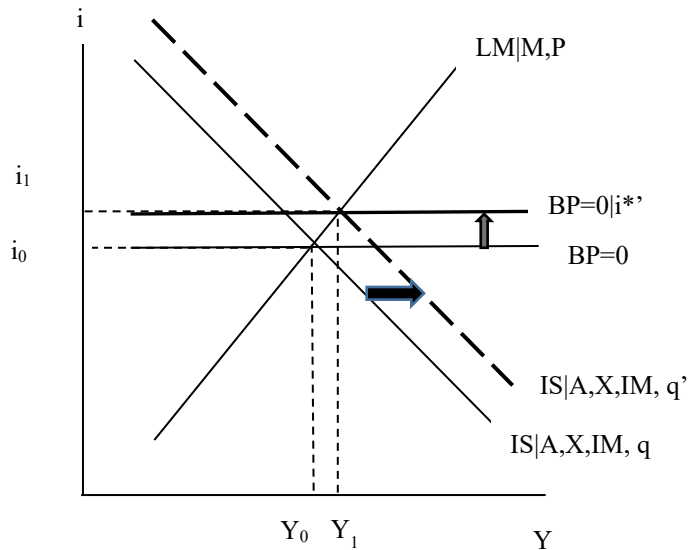
A decrease in autonomous exports shifts in the IS curve (gray arrow). Output falls to Y_1 , interest rate to i_0 . The interest rate remains below that consistent with external equilibrium, causing immediate financial capital outflow, reduction in money base and hence money supply shifting in LM curve (black arrow). Output falls to Y_1 .



4 Consider the Mundell-Fleming model, under floating exchange rates, and perfect capital mobility.

4.1 Show graphically what happens if the foreign interest (considered exogenous) rises, immediately.

The $BP=0$ curve shifts up. The incipient balance of payments deficit induces a real exchange rate depreciation, q rises to q' and the IS shifts out (black arrows). The interest rate rises to i_1 , output rises to Y_1 .

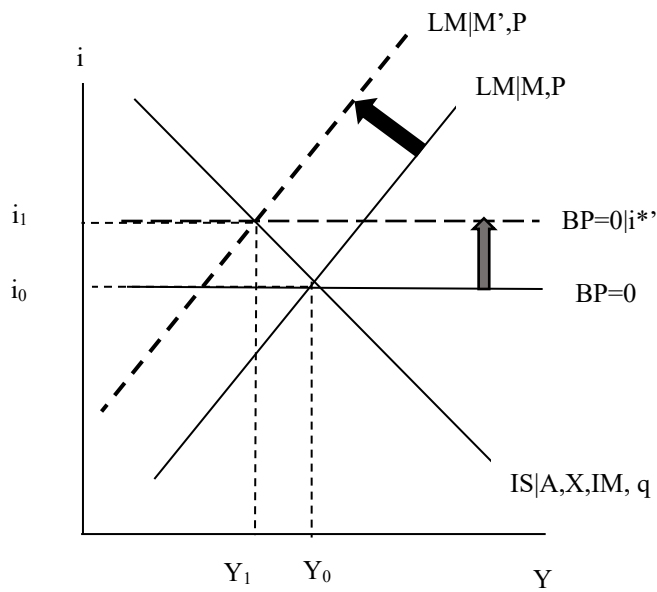


4.2 Assume sterilization is attempted; what happens to output, interest rates, real exchange rate, and foreign exchange reserves. Show graphically what happens.

This is floating exchange rates; sterilization is irrelevant.

4.3 Show what policies are available to the policy authorities if they wish to avoid an exchange rate change.

The authorities could pre-emptively shrink the money supply, shift the LM curve back (black arrow) and raise the interest rate to i_1 , such that the interest rate matched that sufficient to restore external equilibrium. The end result is to reduce income to Y_1 .



4.4 Instead of a foreign interest rate increase, suppose exports autonomously decline.
Show what happens immediately.

A decrease in autonomous exports shifts in the IS curve (gray arrows). The interest rate is below that consistent with external equilibrium, so immediately the currency depreciates shifting out the IS curve (black arrow). Output rises back to Y_0 , interest rate to i_0 .

