

ECO 209Y
MACROECONOMIC THEORY AND POLICY

SOLUTIONS

Term Test #2

LAST NAME _____

FIRST NAME _____

STUDENT NUMBER _____

Indicate your section of the course:

☐ Tuesday, 10-12 – L0101

☐ Tuesday, 2-4 – L0201

☐ Wednesday, 2-4 – L0301

☐ Thursday, 2-4 – L0401

INSTRUCTIONS:

1. The total time for this test is 2 hours.
2. Aids allowed: a simple, non-programmable calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I _____/25

Part III 1. _____/10

Part II _____/15

2. _____/10

3. _____/10

TOTAL _____/80

4. _____/10

PART I (25 marks)

Instructions:

- Enter your answer to each question in the table below.
- Each correct answer is worth 2.5 marks. **Note that a deduction of 0.5 mark will be made for each incorrect answer.** Table cells left blank will receive a zero mark (i.e., no deduction).
- **Do NOT guess your answers!**

1	2	3	4	5	6	7	8	9	10
A	B	C	B	C	E	D	E	D	A

Correct: _____ Incorrect: _____ Blank: _____

1. In a fixed-price *IS-LM* model, if we assume that money demand is totally interest insensitive, then
 - A) fiscal policy is ineffective.
 - B) the liquidity preference curves are horizontal.
 - C) the *IS* curve is vertical.
 - D) interest rates cannot be lowered by fiscal or monetary policy.
 - E) the *LM* curve is horizontal.
2. Consider the model of a closed economy with a fixed price-level. If the interest-sensitivity of investment increased, which one of the following statements would be correct with respect to income?
 - A) Fiscal policy would become more effective and monetary policy would become less effective.
 - B) Fiscal policy would become less effective and monetary policy would become more effective.
 - C) Both fiscal and monetary policy would become more effective.
 - D) Both fiscal and monetary policy would become less effective.
 - E) Fiscal policy would become less effective and monetary policy would become neither more nor less effective.

Use this space for rough work.

3. If consumption, investment, and imports are all completely insensitive to changes in the rate of interest, which one of the following statements will be true?
- A) The LM curve is vertical.
 - B) The IS curve is horizontal.
 - C) The IS curve is vertical.
 - D) The BP curve is horizontal.
 - E) None of the above is true.
4. If imports are completely insensitive to changes in the level of income, which one of the following statements will be true?
- A) The BP curve is vertical.
 - B) The BP curve is horizontal.
 - C) The IS curve is vertical.
 - D) The IS curve is flatter than the BP curve.
 - E) None of the above is true.
5. Consider a closed economy with a fixed price-level. If consumption demand declines as the interest rate increases, which one of the following statements will be true?
- A) If the interest sensitivity of consumption is equal to the interest sensitivity of investment, then the IS curve will be horizontal.
 - B) If the interest sensitivity of consumption is equal to the interest sensitivity of investment, then the IS curve will be vertical.
 - C) The larger the interest sensitivity of consumption, the flatter the IS curve.
 - D) The larger the interest sensitivity of consumption, the steeper the IS curve.
 - E) None of the above is true.
6. Consider a small open economy with a fixed price-level, fixed exchange rates, and no capital mobility. Assume that $BP = 0$ at the initial equilibrium. If the central bank devalues the exchange rate, in the new equilibrium
- A) net exports, the money supply, and income will all be lower.
 - B) net exports and the money supply will decrease, but income will remain unchanged.
 - C) net exports, the money supply, and income will all be higher.
 - D) net exports will remain unchanged, the money supply will be lower, and income will be higher.
 - E) net exports will remain unchanged, but the money supply and income will both be lower.

Use this space for rough work.

7. Consider an open economy with a fixed price-level, fixed exchange rates, and perfect capital mobility. An increase in government expenditure will cause
- A) output to increase and the money supply to fall.
 - B) the money supply to rise and the interest to fall.
 - C) output and interest rate to fall.
 - D) output to increase and the current account to deteriorate.
 - E) output and interest rate to rise.
8. Consider a small open economy with a fixed-price level, fixed exchange rates, and **no** capital mobility. If the government decreases autonomous taxes, in the new equilibrium:
- A) net exports, the money supply, and income will all be lower.
 - B) net exports, the money supply, and income will all be higher.
 - C) net exports will remain unchanged, but the money supply and income will both be higher.
 - D) net exports, the money supply, and income will all remain unchanged.
 - E) net exports and income will remain unchanged, but the money supply will be lower.
9. The Japanese economy has been stagnant for a number of years now. After implementing aggressive fiscal and monetary policy, Japan's government is now considering:
- A) a reduction in corporate taxes in order to increase profits and investment expenditure.
 - B) a reduction in sales taxes in order to increase consumption expenditure.
 - C) a reduction in wages in order to increase profits and investment expenditure.
 - D) an increase in minimum wages in order to increase consumption expenditure.
 - E) a reduction of protectionist measures in order to increase competition in the economy.
10. Which one of the following characterizes a balance-sheet recession?
- A) Due to greater uncertainty, commercial banks reduce their lending.
 - B) Households try to increase the value of their assets.
 - C) Consumers do not spend because interest rates are too high.
 - D) Over optimistic expectations create excess capacity in the economy.
 - E) Concerned with inflation, central banks raised interest rates.
-

Use this space for rough work.

PART II (15 marks)

Consider an open economy with a fixed-price level, fixed exchange rates, and imperfect capital mobility. This economy is characterized by the following behavioural equations:

$$C = 100 + 0.6 Y$$

$$L = 0.2 Y - 10 i$$

$$I = 200 - 20 i + 0.1 Y$$

$$M/P = 200$$

$$G = 300$$

$$NX = -150 + 300 e - 0.1 Y$$

$$CF = 10 i - 60$$

a) What are the equations for the IS, LM, and BP curves in this model? (3 marks)

First, we must obtain the expression for the aggregate expenditure function:

$$AE = C + I + G + NX$$

$$= (100 + 0.6 Y) + (200 - 20 i + 0.1 Y) + (300) + (-150 + 300 e - 0.1 Y)$$

$$= 450 + 300 e + 0.6 Y - 20 i$$

In equilibrium, $Y = AE$:

$$Y = 450 + 300 e + 0.6 Y - 20 i \rightarrow 20 i = 450 + 300 e - 0.4 Y$$

And solving for i we obtain the equation for the IS curve:

$$i = 22.5 + 15 e - 0.02 Y$$

The LM curve is found from the money market equilibrium:

$$L = M/P \rightarrow 0.2 Y - 10 i = 200 \rightarrow 10 i = 0.2 Y - 200$$

And solving for i we obtain the equation for the LM curve:

$$i = 0.02 Y - 20$$

The BP curve is found from the equilibrium in the external sector:

$$BP = NX + CF$$

$$= (-150 + 300 e - 0.1 Y) + (10 i - 60)$$

$$= -210 + 300 e - 0.1 Y + 10 i$$

And in equilibrium $BP = 0$:

$$-210 + 300 e - 0.1 Y + 10 i = 0 \rightarrow 10 i = 210 - 300 e + 0.1 Y$$

And solving for i we obtain the equation for the BP curve:

$$i = 21 - 30 e + 0.01 Y$$

b) If the economy has achieved external balance, what are the values of Y , i and e ? **(6 marks)**

We have a set of three equations (IS , LM , and BP functions) and three unknown (Y , i , and e):

$$IS: i = 22.5 + 15 e - 0.02 Y$$

$$LM: i = -20 + 0.02 Y$$

$$BP: i = 21 - 30 e + 0.01 Y$$

$$IS = LM \rightarrow 22.5 + 15 e - 0.02 Y = -20 + 0.02 Y \rightarrow 0 = 42.5 + 15 e - 0.04 Y \quad (1)$$

$$BP = LM \rightarrow 21 - 30 e + 0.01 Y = -20 + 0.02 Y \rightarrow 0 = 41 - 30 e - 0.01 Y \quad (2)$$

And solving for (1) and (2):

$$2 \times (1) + (2) = 0 \rightarrow 85 + 30 e - 0.08 Y + 41 - 30 e - 0.01 Y = 0 \rightarrow 126 - 0.09 Y = 0 \rightarrow Y = 1400$$

Plugging this value for Y in the LM curve we obtain the equilibrium value of i :

$$i = -20 + 0.02 (1400) = 8$$

And plugging these values for Y and i in the BP curve we obtain the equilibrium value of e :

$$8 = 21 - 30 e + 0.01 (1400) \rightarrow 30 e = 27 \rightarrow e = 0.9$$

c) What are the balances in the current and capital accounts in the above equilibrium? **(1 mark)**

$$NX = X - Q = -150 + 300 (0.9) - 0.1 (1400) = -150 + 270 - 140 = -20$$

$$CF = 10 (8) - 60 = 20$$

- d) Suppose now that the central bank changes the exchange rate to $e = 1$. What are the new equilibrium values of Y and i in this economy? **(3 marks)**

We have a set of two equations (IS and BP functions) and two unknowns (Y and i):

$$\text{IS: } i = 22.5 + 15(1) - 0.02 Y = 37.5 - 0.02 Y$$

$$\text{BP: } i = 21 - 30(1) + 0.01 Y = -9 + 0.01 Y$$

$$\text{IS} = \text{BP} \rightarrow 37.5 - 0.02 Y = -9 + 0.01 Y \rightarrow 0.03 Y = 46.5 \rightarrow Y = 1550$$

And plugging this value for Y in the IS curve we obtain the equilibrium value of i :

$$i = 37.5 - 0.02(1550) = 6.5$$

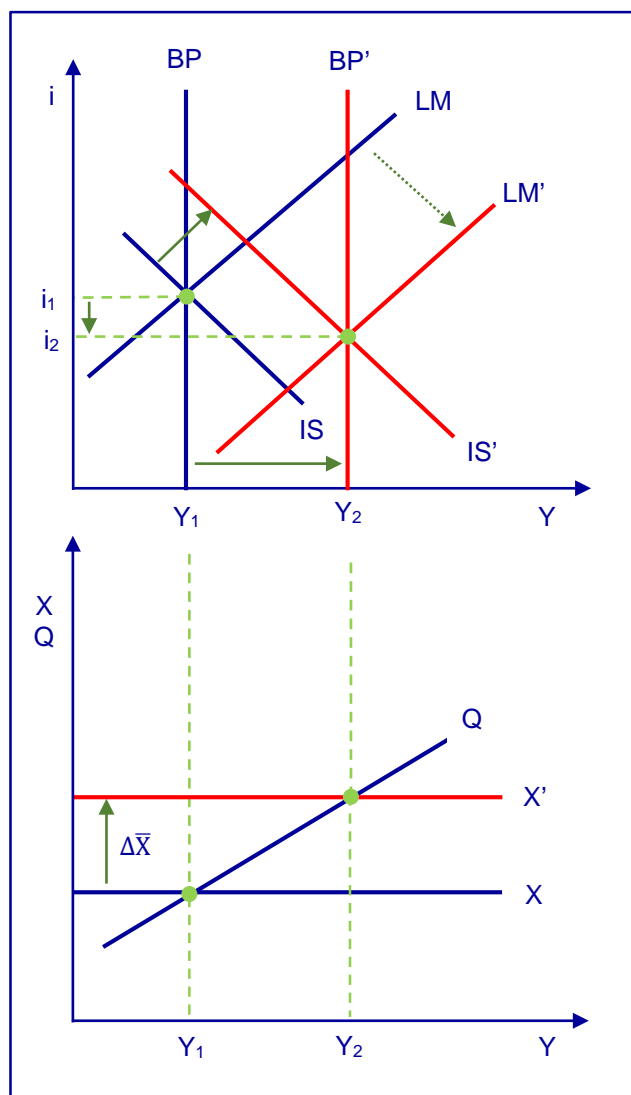
- e) What is the level of the real supply of money in this new equilibrium? **(2 marks)**

$$M/P = L \rightarrow M/P = 0.2 Y - 10 i = 0.2(1550) - 10(6.5) = 310 - 65 = 245$$

PART III (40 marks)

Instructions: Answer the following four questions in the space provided. You may continue your answer on page 12 if additional space is required (**but clearly indicate that your answer continues on page 12**). Each question is worth 10 marks.

1. Critically evaluate the following statement: "An increase in autonomous exports will cause the level of income to increase, the rate of interest to rise, and the balance in the current account to improve." Show your answer with the help of a diagram and explain the economics. Consider an economy characterized by a fixed-price level, a fixed exchange rate, and no capital mobility. Assume a recessionary gap and external balance at the initial equilibrium.



An increase in autonomous exports causes the X curve to shift up to X' as shown in the lower diagram. A surplus thus arises in the balance of payments at the initial equilibrium income Y_1 . Indeed, the external sector would be now in equilibrium at Y_2 and thus the BP curve shifts to BP' .

Since the increase in X causes NX to rise, the IS curve also shifts up to IS' as shown in the upper diagram. A situation of excess demand thus arises in the goods market ($AE > Y$) at the initial equilibrium income Y_1 . Therefore, Y increases to eliminate the excess demand in the goods market. Indeed, since $AE > Y$ at Y_1 , firms start selling more than they are actually producing and inventories decrease. The involuntary decrease in inventories gives the signal to firms to increase production and Y increases.

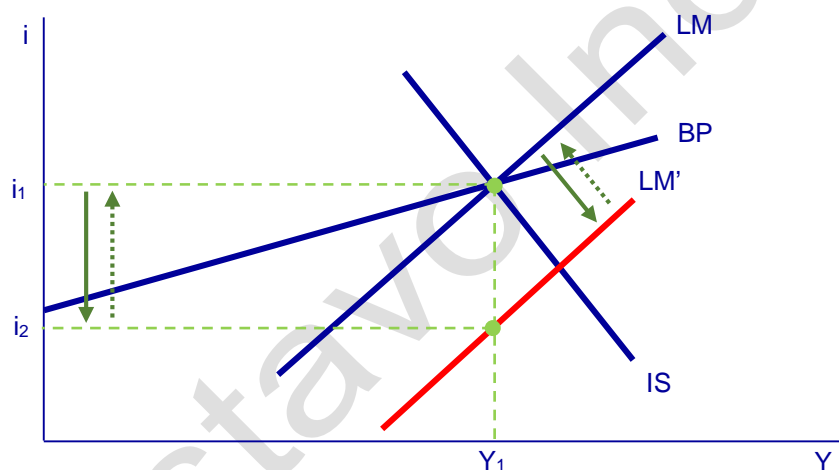
The surplus in the balance of payments implies an excess supply of foreign currency in the exchange market, thus prompting the central bank to buy foreign currency to prevent the depreciation of the exchange rate. Therefore, the real money supply increases (i.e., the rate of interest falls) and the LM curve shifts down to the right. This process continues as long as there remains a surplus in the external sector (and thus the central bank continues buying foreign currency and accumulating reserves). Note that as Y increases, imports increase along the Q curve and the surplus in the balance of payments decreases. At the end of the process — i.e., when the excess demand in the goods market and the surplus in the BP are both eliminated — the LM curve shifts all the way to LM' as shown in the upper diagram.

Therefore, the statement is incorrect: an increase in autonomous exports causes income to rise, the interest rate to fall, while the balance in the current account does not change. Indeed, at the end of the process, in the new equilibrium $BP = NX = 0$ (which means that both X and Q end up increasing by the same amount).

2. **Critically evaluate the following statement:** “An open market purchase (of government bonds) by the Bank of Canada will cause income to increase, the rate of interest to fall, the balance in the current account to deteriorate, and the balance in the capital account to improve.” **Show your answer with the help of a diagram and explain the economics. Consider an economy characterized by a fixed-price level, a fixed exchange rate, and imperfect capital mobility. Assume a recessionary gap and external balance at the initial equilibrium.**

An open market purchase increases the money supply and thus the domestic rate of interest decreases. Graphically, the increase in the money supply is represented by a shift of the LM curve to the right, i.e., at each level of Y the money market will now be in equilibrium at a lower rate of interest (see diagram below).

At the initial level of income (Y_1), the money market is now in equilibrium at a lower interest rate (i_2). Therefore, while the money market continues in equilibrium, the goods market and the external sector are now in disequilibrium. As a result of the decrease in the rate of interest, there is now an excess demand in the goods market due to the increase in desired investment, and a deficit in the balance of payments due to the deterioration in the capital account (with no change in the current account). A deficit in the balance of payments implies an excess demand for foreign currency in the exchange market.



To maintain the level of the exchange rate unchanged, the Bank of Canada sells foreign currency to eliminate the excess demand in the foreign exchange market. Therefore, the domestic money supply decreases. As the money supply decreases, the LM curve shifts back to the left and the domestic rate of interest rises. This process continues as long as $BP < 0$, i.e., until the LM' curve shifts all the way back to LM and the external sector is in equilibrium once again. At this point, the initial deterioration in the balance of the capital account is completely eliminated.

The adjustment in the goods market is as follows. As the rate of interest starts to rise back towards its initial level, desired investment also decreases. Once the rate of interest is back to its initial level, the level of desired investment is also as before and the excess demand in the goods market is eliminated. Note that the adjustment in the goods market takes place only on the demand side of the economy—desired investment first increases and then decreases back to its initial level without any change in the level of output taking place.

Therefore, the statement is incorrect. The results of the open market purchase by the Bank of Canada are as follows. First, the levels of equilibrium Y and the rate of interest remain as before, which indicates that monetary policy is completely ineffective with respect to income in this model. Second, since the exchange rate and the level of income do not change, the balance in the current account also remains as before. And finally, since the overall balance of payments is again equal to zero and the balance in the current account has not changed, then the balance in the capital account is also the same as before. Note that at the end of the process of adjustment, the purchase of government bonds by the Bank of Canada is equal to its loss of foreign exchange reserves.

3. Critically evaluate the following statement: "The imposition of a tariff on all imports will cause the level of income to increase, the rate of interest to fall, the balance in the current account to improve, and the balance in the capital account to deteriorate." Show your answer with the help of a diagram and explain the economics. Consider an economy characterized by a fixed-price level, a fixed exchange rate, and imperfect capital mobility. Assume a recessionary gap and external balance at the initial equilibrium.

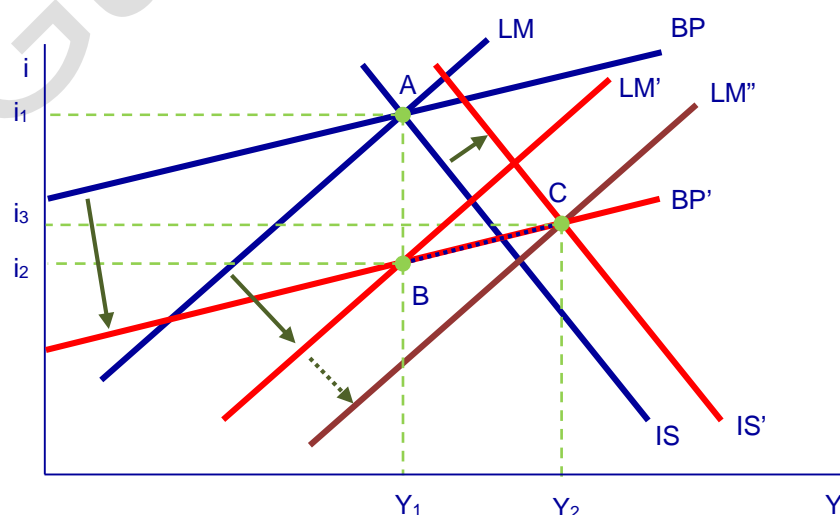
The economy is initially in equilibrium at point A (see diagram below). The imposition of the tariff reduces imports and thus NX increases. The increase in NX causes the IS curve to shift to the right to IS' . A situation of excess demand (i.e., $AE > Y$) arises in the goods market.

At the initial equilibrium, the reduction in imports causes the balance in the current account to improve while leaving the balance in the capital account unchanged. Therefore, at point A there is now a surplus in the external sector (i.e., $BP > 0$ and thus the supply of foreign currency is greater than its demand). For the external sector to be in equilibrium at Y_1 , the rate of interest must be lower (i.e., the balance in the capital account must deteriorate by the same amount as the balance in the current account improved). Therefore, BP would be zero at Y_1 when the rate of interest is i_2 — this means that the BP curve has shifted down and goes through point B.

The economy is still at point A. However, since there is now a surplus in the external sector and an excess supply in the foreign exchange market, the central bank will buy foreign currency to keep the exchange rate unchanged. As a result, the domestic supply of money will increase and the LM curve will shift to the right to LM' . Now the economy is at point B — both the money market and the external sector are in equilibrium but there is an excess demand in the goods market. Note that the fall in the interest rate to i_2 causes the balance in the capital account to deteriorate by the same absolute amount as the previous improvement in the current account due to the imposition of the tariff.

Now Y starts to increase to eliminate the excess demand in the goods market and the domestic rate of interest starts to rise (because of the increase in demand for real balances). The increase in the rate of interest improves the balance in the capital account and creates a surplus in the external sector, which the central bank eliminates by buying foreign currency. Therefore, the money supply increases and the LM' curve shifts further to the right. This process continues as long as there is an excess demand in the goods market and Y continues to increase, i.e., until the LM' curves shifts all the way to LM'' . Note that the money market is always in equilibrium (by assumption) and that the intervention of the central bank in the exchange market helps maintaining equilibrium in the external sector at all times as well. Therefore, during the process of adjustment, the economy is always at a point of intersection of the (shifting) LM curve and the (static) BP' curve, i.e., the adjustment path is graphically represented by a movement up along the BP' curve.

The statement is therefore correct: as equilibrium moves from point A to point C, the level of income rises to Y_2 , the rate of interest falls to i_3 , the balance in the current account improves (due to the decrease in Q), and the balance in the capital account deteriorates (due to the fall in i).



(Continue on page 12 if necessary)

4. Critically evaluate the following statement: "An increase in the international rate of interest will cause the equilibrium income of a small economy to fall, its money supply to decrease, the balance in its current account to improve, and the balance in its capital account to deteriorate." Show your answer with the help of a diagram and explain the economics. Consider an economy characterized by a fixed-price level, a fixed exchange rate, and perfect capital mobility. Assume a recessionary gap and external balance at the initial equilibrium.

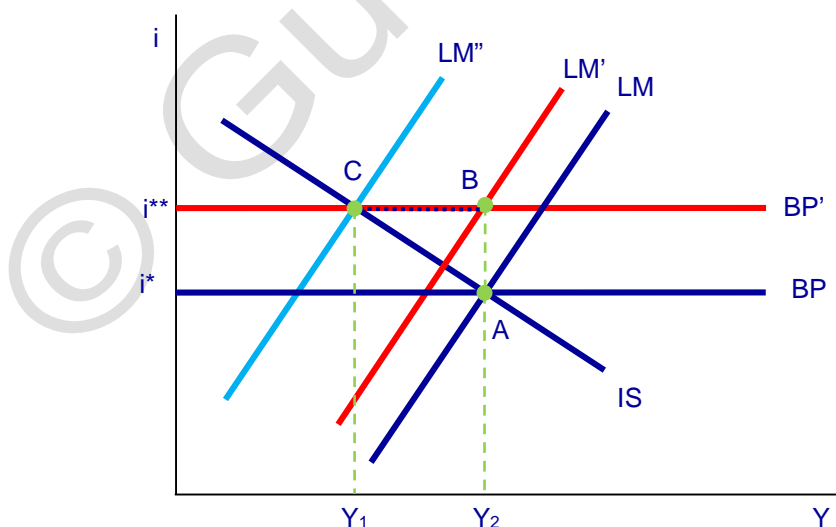
As shown in the diagram below, the economy is initially in equilibrium at point A. Given the assumption of perfect capital mobility, the BP curve is horizontal at the level of the international rate of interest, i.e., the external sector is in equilibrium only when $i = i^*$. Therefore, an increase in i^* causes the BP curve to shift up to BP' . Let's analyze the initial impact of this increase in the international rate of interest.

The rise in i^* leaves the balance in the current account unchanged but causes the balance in the capital account to deteriorate. Therefore, at point A there is now a deficit in the external sector (and thus an excess demand in the foreign exchange market). To prevent the exchange rate from appreciating, the central bank sells foreign currency and the money supply decreases. Graphically, this causes the LM curve to shift to the left to LM' . The decrease in the money supply causes the domestic rate of interest to increase to i^{**} and thus equilibrium in the external sector is restored. There is now equilibrium in the money market and the external sector (point B in the diagram). At point B, however, there is now an excess supply in the goods market (this point is above the IS curve, indicating that $AE < Y$ due to the increase in i). Y will thus have to decrease to eliminate this excess supply.

As Y decreases, the demand for money decreases and i falls to restore equilibrium in the money market. The decrease in i causes now the balance in the capital account to deteriorate (while leaving the balance in the current account unchanged), and thus the external sector moves to a situation of a deficit again. The central bank, therefore, once again sells foreign currency and the domestic money supply decreases. Graphically, this causes the LM' curve to shift to the left.

The process just described continues until the excess demand in the goods market is eliminated. Therefore, graphically the adjustment path can be depicted as a movement along the BP' curve—the economy being always at a point of intersection between the (static) BP' curve and the moving LM' curve. Once the LM' curve shifts all the way to LM'' , not only the money market and the external sector continue in equilibrium but now the excess supply in the goods market is also eliminated. A new equilibrium for the economy as a whole is thus reached (point C).

Therefore, the statement is correct: an increase in i^* causes Y to fall, the real supply of money to decrease, the balance in the current account to improve (due to the decrease in Q as a result of the fall in Y , and the balance in the capital account to deteriorate since $BP = 0$ and $\Delta NX > 0$.



(Continue on this page if necessary)

© Gustavo Indart