Department of Economics
University of Toronto

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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 1 hour and 45 minutes.
2. Aids allowed: a simple, non-programmable calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I	_____/30	Part III	1. _____/10
Part II	_____/15		2. _____/10
			3. _____/10
TOTAL	_____/75		

PART I (30 marks)

Instructions:

- Enter your answer to each question in the table below.
- Each correct answer is worth 3 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	D	B	D	C	B	C	A	C	D

1. Suppose the money supply is an increasing function of the interest rate. Then,

A) the LM curve will be flatter than when the money supply is fixed.
B) the LM curve will be steeper than when the money supply is fixed.
C) the IS curve will be steeper than when the money supply is fixed.
D) the IS curve will be flatter than when the money supply is fixed.
E) both the IS and the LM curves will be flatter than when the money supply is fixed.

2. Looking at the macroeconomic statistics for a hypothetical closed economy, you discover that at the beginning of the year, the nominal supply of money was $400 million and by the end of the year it was equal to $420 million. You also found that the inflation rate in this economy was 4%. In this case, you would expect the LM curve

A) to shift up as the real money supply falls.
B) to shift up as the real money supply rises.
C) to shift down as the real money supply falls.
D) to shift down as the real money supply rises.
E) not to shift.

3. Consider a fixed-price level, closed economy. Expansionary monetary policy is more effective in increasing output when the

A) income sensitivity of money demand is large.
B) interest rate sensitivity of investment is large.
C) *IS* curve is very steep.
D) *LM* curve is very flat.
E) interest rate sensitivity of money demand is large.

Use this space for rough work.

Use the following information to answer questions 4 and 5 below. Consider the fixed-price model of the economy where the expression for the *IS* curve is $i = 10 - 0.001Y$ and the expression for the *LM* curve is $i = -2 + 0.002Y$. The simple Keynesian multiplier (α_{AE}) for this economy is 2.5 and the interest sensitivity of the demand for real balances (h) is 20. The level of full employment income (Y_{fe}) is \$4500. All money figures are in millions of dollars.

4. Suppose the government wants to achieve full-employment income without altering the initial equilibrium rate of interest. To this end, the government increases its expenditure on goods and services at the same time that the Bank of Canada increases the money supply. By how much should government expenditure be increased?

A) \$100.
B) \$50.
C) \$300.
D) \$200.
E) By none of the above.

5. By how much should the real supply of money be increased?

A) \$16.
B) \$12.
C) \$20.
D) \$18.
E) By none of the above.

6. Suppose that income per capita in Mexico is 45,000 pesos and that the nominal exchange rate for Mexican pesos is 0.10. Further suppose that a given consumption basket of goods and services costs \$2,250 in Canada and 15,000 pesos in Mexico. Using the PPP exchange rate, income per capita in Mexico is:

A) \$7,500.
B) \$6,750.
C) \$4,500.
D) \$9,250.
E) none of the above.

7. Consider a small open economy with a fixed-price level, fixed exchange rates, and ***no*** capital mobility. If the government imposes an import quota, 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 will remain unchanged, the money supply will be lower, and income will be higher.

Use this space for rough work.

8. Consider a model of an open economy with a fixed-price level, fixed exchange rates, and ***imperfect*** capital mobility. If the Bank of Canada pursues expansionary monetary policy, which one of the following would describe the most likely outcome?

A) Both equilibrium rate of interest and equilibrium income will remain unchanged and foreign currency reserves will decrease.
B) Equilibrium interest will fall, equilibrium income will rise, and foreign currency reserves will decrease.
C) Equilibrium interest will remain unchanged, equilibrium income will rise, and foreign currency reserves will decrease.
D) Both equilibrium interest and equilibrium income will remain unchanged and foreign currency reserves will increase.
E) Equilibrium interest will fall, equilibrium income will increase, and foreign currency reserves will increase.

9. Consider a model of an open economy with a fixed-price level, fixed exchange rates, and ***perfect*** capital mobility. Suppose that the initial equilibrium income is below full employment and that there is external balance. An increase in autonomous exports will cause

A) foreign reserves to decrease, the balance in the current account to improve, and the balance in the capital account to deteriorate.
B) foreign reserves to increase, the balance in the current account to improve, and the balance in the capital account to deteriorate.
C) foreign reserves to increase, but the balance in both the current and the capital account to remain unchanged.
D) foreign reserves to increase, the balance in the current account to deteriorate, and the balance in the capital account to improve.
E) Both B) and C) are possible.

10. Suppose you are an adviser to the government and the economy is experiencing a balance-sheet recession. If you must chose only one policy and the objective is to increase GDP, which one of the following policies will you advice the national government to implement?

A) A reduction in corporate taxes to induce investment.
B) A reduction in income taxes to increase consumption.
C) Open market purchases by the central bank.
D) An increase in transfer payments to the provinces to finance new highway construction.
E) An increase in transfer payments to municipalities to help pay off their debts.

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:

$C = 70 + 0.8\,YD$
$I = 120 - 20\,i + 0.1\,Y$
$G = 200$
$TA = 0.25\,Y$
$TR = 0$
$NX = -40 + 300\,e - 0.1\,Y$

$L = 0.2\,Y - 10\,i$
$M/P = 150$

$CF = -50 + 10\,i$

a) What is the equation for the IS curve in this model? **(2 marks)**

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

$AE = C + I + G$

$= (70 + 0.8\,YD) + (120 - 20\,i + 0.1\,Y) + 200 + (-40 + 300\,e - 0.1\,Y)$

$= 350 + 0.8\,YD - 20\,i + 300\,e$

where $YD = Y - 0.25\,Y = 0.75\,Y$

$= 350 + 0.6\,Y - 20\,i + 300\,e$

When the goods market is in equilibrium, $Y = AE$:

$Y = 350 + 0.6\,Y - 20\,i + 300\,e \rightarrow 20\,i = 350 - 0.4\,Y + 300\,e$.

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

$i = 17.5 - 0.02\,Y + 15\,e$.

b) What is the equation for the LM curve in this model? **(2 marks)**

The LM curve is found from the money market equilibrium:

$L = M/P \rightarrow 0.2\,Y - 10\,i = 150 \rightarrow 10\,i = 0.2\,Y - 150$

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

$i = 0.02\,Y - 15$.

c) What is the equation for the BP curve in this model? **(2 marks)**

$BP = NX + CF$

$= (-40 + 300\,e - 0.1\,Y) + (-50 + 10\,i)$

$= -90 + 300\,e - 0.1\,Y + 10\,i$

The equation for the *BP* curve is obtained by making $BP = 0$:

$-90 + 300\,e - 0.1\,Y + 10\,i = 0 \rightarrow 10\,i = 90 - 300\,e + 0.1\,Y$

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

$i = 9 - 30\,e + 0.01\,Y$.

d) Suppose the central bank sets the value of the exchange rate at $e = 0.5$. What are the values of *Y* and *i* when $e = 0.5$? **(2 marks)**

To find the values of *Y* and *i* we must equate the *IS* and *LM* curves. If e = 0.5, the equation for the *IS* curve is:

$i = 17.5 - 0.02\,Y + 15\,e = 17.5 - 0.02\,Y + 15\,(0.5) = 17.5 + 7.5 - 0.02\,Y = 25 - 0.02\,Y$.

And equating the *IS* and *LM* curves:

$25 - 0.02\,Y = 0.02\,Y - 15 \rightarrow 0.04\,Y = 40 \rightarrow Y^* = 1000$ **(1 mark)**

and $i^* = 0.02\,(1000) - 15 = 5$. **(1 mark)**

e) Is the external sector in equilibrium at the level of Y obtained in part d) above? If not, what is the size of the deficit or surplus? What are the balances in the current account and the capital account? **(3 marks)**

We determined in part c) above the equation for the balance of payments:

$BP = -100 + 300\,e - 0.1\,Y + 10\,i$, and thus for $e = 0.5$, $Y = 1000$, and i = 5,

$BP = -90 + 300\,(0.5) - 0.1\,(1000) - 50 + 10\,(5) = -90 + 150 - 100 + 50 = 10$. **(1 mark)**

So there is a surplus in the overall balance of payments of \$10, and the balances in the current and capital accounts are:

$NX = -40 + 300\,e - 0.1\,Y = -40 + 300\,(0.5) - 0.1\,(1000) = -40 + 150 - 100 = 10$. **(1 mark)**

$CF = -50 + 10\,(5) = 0$. **(1 mark)**

f) Given the situation described in part e), what will the central bank do to maintain the exchange rate at $e = 0.5$? As a result of this action by the central bank, what will be the new equilibrium Y and i? What will be the new level of M/P? **(4 marks)**

Given the surplus in the balance of payments (and thus the excess supply in the exchange market), the central bank will buy foreign currency and the real money supply will increase. **(1 mark)**

Therefore, the LM curve will shift down to the right until it intersects the IS curve at the point at which the latter intersects the BP curve.

So let's find the point of intersection between the IS and BP curves:

$25 - 0.02\,Y = 9 - 30\,(0.5) + 0.01\,Y \rightarrow 0.03\,Y = 25 - 9 + 15 = 31 \rightarrow Y^* = 1{,}033.33$. **(1 mark)**

$i^* = 25 - 0.02\,(1{,}033.33) = 25 - 20.67 = 4.33$. **(1 mark)**

At this new equilibrium $M/P = L$, where $L = 0.2\,Y^* - 10\,i^*$ and thus:

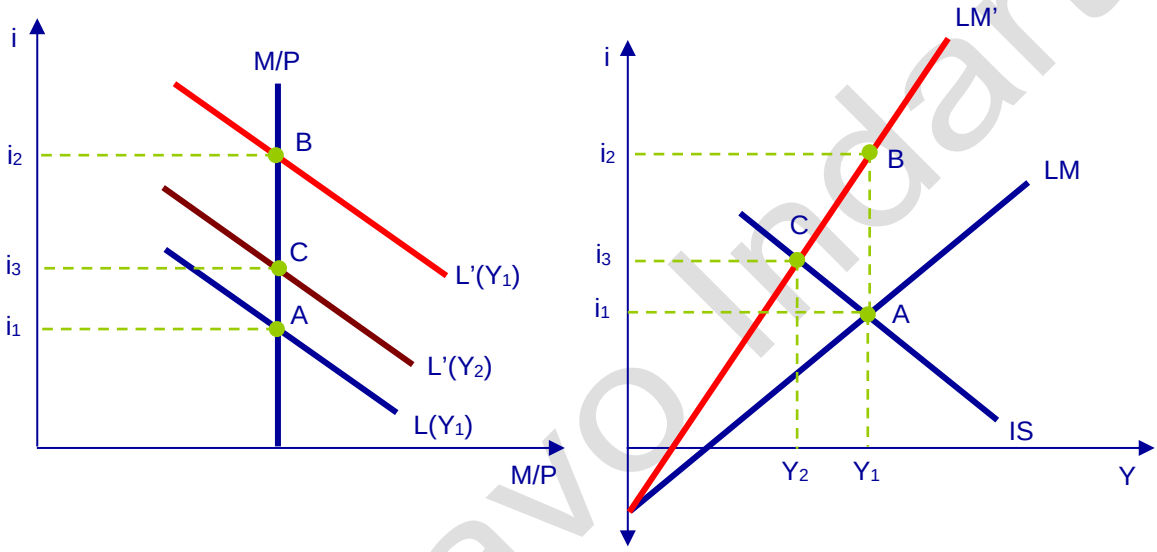
$M/P = 0.2\,(1{,}033.33) - 10\,(4.33) = 206.66 - 43.33 = 163.33$. **(1 mark)**

PART III (30 marks)

Instructions: Answer the following three questions in the space provided. You may continue your answer on pages 11-12 if additional space is required (***but clearly indicate that your answer continues on page 11 or 12***). Each question is worth 10 marks.

1. **Explain with the help of appropriate diagrams whether the following statement is true or false:** *"An increase in the income sensitivity of the demand for real balances will have an expansionary effect on the economy, i.e, it will cause the equilibrium level of income to rise."* **[Note: Consider a closed economy with a fixed-price level.]**

FALSE



An increase in the income sensitivity of the demand for real balances (k) increases the liquidity preference for all levels of income (Y). Recall the expression for the liquidity preference curve, $i = (k/h)\ Y - (1/h)\ L$, and that there is one liquidity preference curve for each level of Y. As shown above in the diagram on the left, when $Y = Y_1$, equilibrium in the money market is determined by the intersection of the real supply of money curve with the liquidity preference curve $L(Y_1)$. The corresponding equilibrium rate of interest is i_1. The diagram on the right shows the initial equilibrium in the *IS-LM* framework: the *IS* and *LM* curves intersect at the rate of interest i_1 and level of income Y_1 (point *A*). As shown, an increase in k causes the liquidity preference corresponding to Y_1 to shift up to $L'(Y_1)$, and thus the rate of interest increases to i_2. At the level of income Y_1 the money market is now in equilibrium at the rate of interest i_2.

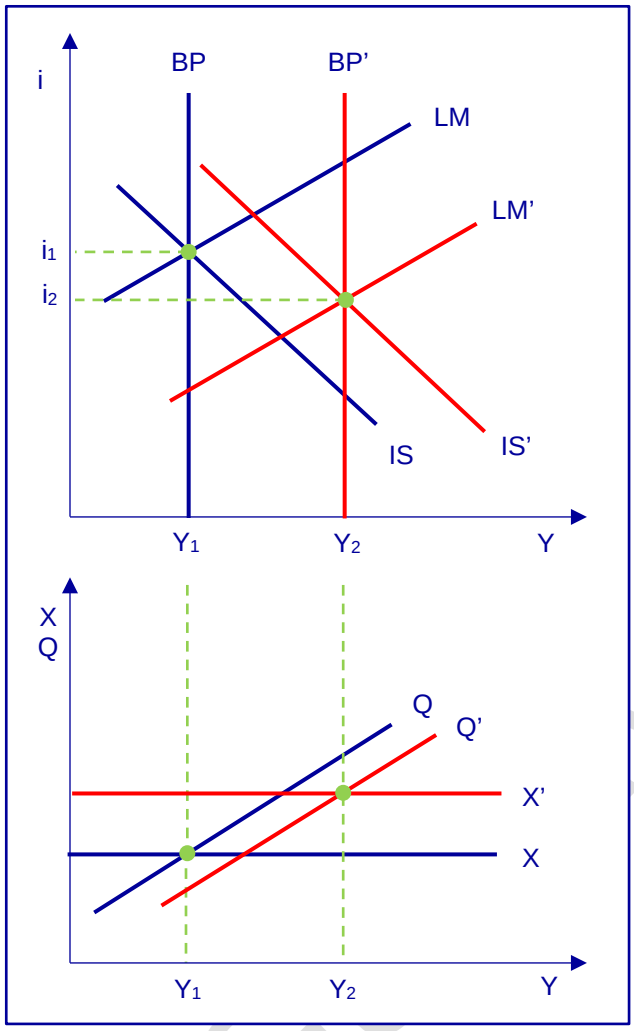
Let's see the changes in the *IS-LM* diagram. Recall that the expression for the *LM* curve is given by $i = -(M/P)\ /\ h - (k/h)\ Y$. Therefore, the change in k affects the slope of the *LM* curve but not its vertical intercept. The *LM* curve becomes steeper when k increases. Note that at the level of income Y_1 the money market is now in equilibrium at the rate of interest i_2 (point *B* on the new *LM* curve). While the money market is in equilibrium, the goods market is not: the point (Y_1, i_2) is above the *IS* curve, representing a situation of excess supply in the goods market.

The excess supply in the goods market will be eliminated by a decrease in the level of output since firms will start accumulating inventories. As Y decreases, the demand for real balances falls and the liquidity preference curve shifts down for all levels of Y. Therefore, the rate of interest decreases. The adjustment is represented by a movement down along the new *LM* curve (since the money market is always in equilibrium). The new equilibrium is reached at the level of income Y_2 and the rate of interest i_3 (point *C*).

The statement is thus false: An increase in the income sensitivity of the demand for real balances has a contractionary effect on the economy.

(Continue on pages 11-12 if necessary)

2. <u>Explain</u> with the help of appropriate diagrams whether the following statement is true or false: *"An increase in the U.S. price level will cause Canadian GDP to rise."* **[Note: Consider an open economy with a fixed-price level, fixed exchange rates, and <u>*no*</u> capital mobility. Assume external balance and a recessionary gap at the initial equilibrium.]**



TRUE

Ceteris paribus, an increase in the U.S. price level causes the real exchange rate ($RER = eP^f/P$) for the U.S. dollar to rise. A higher *RER* means that Canadian goods become relatively less expensive than U.S. goods. Therefore, exports to the U.S. increase and imports from the U.S. decrease, resulting in an increase in net exports (*NX*). Graphically (see lower diagram), the *X* curve shifts up to *X'* and the *Q* curve shifts down to *Q'* (and the *BP* curve shifts to *BP'*). A surplus thus arises in the balance of payments at the initial equilibrium income Y_1.

An increase in *NX* means that *AE* rises, creating a situation of excess demand in the goods market (*AE* > *Y*). Graphically, this means a shift of the *IS* curve to the right to *IS'*. The surplus in the balance of payments implies an excess supply of U.S. dollars in the exchange market, prompting the Bank of Canada to buy U.S. dollars to prevent its depreciation. Therefore, the real money supply increases and the rate of interest falls (i.e., the *LM* curve shifts down to the right). This process continues as long as there remains a surplus in the external sector. At the end of the process, i.e., when a new equilibrium is achieved and the surplus in the *BP* is eliminated, the *LM* curve shifts all the way to *LM'* as shown in the upper diagram.

Since *AE* > *Y* at Y_1, firms start selling more than they are producing and inventories decrease. The involuntary decrease in inventories gives the signal to firms to increase production and *Y* increases. As *Y* increases, imports increase along the *Q'* curve and the surplus in the balance of payments decreases. This process continues until *Y* increases to Y_2 (and the *LM* curve thus shifts to *LM'*). Indeed, at Y_2 the excess demand in the goods market is eliminated and the surplus in the balance of payments is also erased, and thus the money supply does not change any further (and the *LM* curve stops shifting).

Therefore, the statement is true: An increase in the U.S. price level translates into an increase in Canadian GDP. Note that *NX* initially increases, causing the excess demand in the goods market that prompts *Y* to increase. But as *Y* increases, *Q* also increases and *NX* decreases. At the end of the process, in the new equilibrium *NX* = 0 once again, which means that both *X* and *Q* end up increasing by the same amount.

(Continue on pages 11-12 if necessary)

3. <u>Explain</u> with the help of appropriate diagrams whether the following statement is true or false: *"An increase in autonomous investment will cause equilibrium output to increase, the equilibrium rate of interest to rise, the balance of the current account to deteriorate, and the balance of the capital account to improve."* **[Note: Consider an open economy with a fixed-price level, fixed exchange rates, and *<u>imperfect</u>* capital mobility. Assume external balance and a recessionary gap at the initial equilibrium.]**

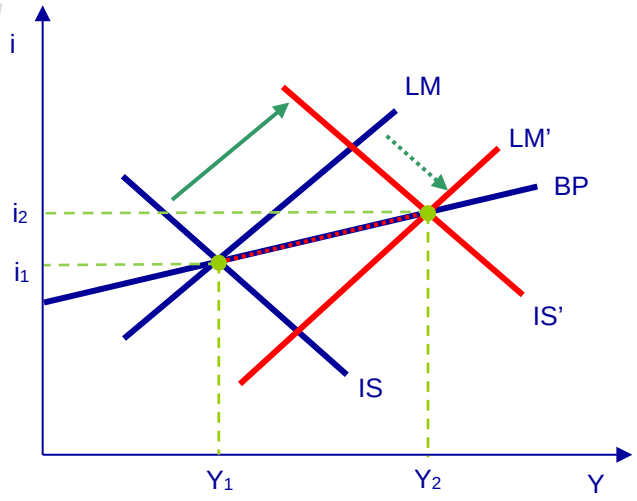
TRUE

An increase in autonomous investment causes *AE* to increase and an excess demand arises in the goods market. This is shown in the diagram below by the shift of the *IS* curve to *IS'*. Output starts increasing to eliminate the excess demand and thus the demand for money also starts increasing. Therefore, the rate of interest rises, the balance in the capital account improves, and a surplus arises in the balance of payments. The surplus in the external sector implies an excess supply of foreign currency in the exchange market. Therefore, the central bank buys foreign currency to prevent the depreciation of the exchange rate. As a result of the central bank's purchases of foreign currency, the money supply increases and thus the *LM* curve shifts down to *LM'*. This process continues as long as the excess demand in the goods market remains and Y continues to increase.

Note that short-run equilibria in both the money market and the external sector are restored very rapidly: equilibrium in the money market is restored by a change in the rate of interest, and equilibrium in the external sector is restored by the intervention of the central bank in the foreign exchange market. Therefore, as *Y* increases to eliminate the excess demand in the goods market, the corresponding increase in the rate of interest ensures equilibrium in the money market and the purchase of foreign currency by the central bank ensures equilibrium in the external sector. This implies that the economy is always at a point of intersection between the static *BP* curve and the moving *LM* curve. Therefore, the adjustment path is a movement up along the *BP* curve.

A new equilibrium is reached when the excess demand in the goods market is eliminated (at Y_2 in the diagram below). At this level of *Y*, the money market and the external sector continue in equilibrium and the goods market is now also in equilibrium. Therefore, *Y* does not change any further and the equilibrium in the money market and the external sector ceases to be disturbed.

The statement is thus true: The increase in autonomous investment causes output to increase, the rate of interest to rise, the balance in the current account to deteriorate (because of the increase in *Y*), and the balance in the capital account to improve (because of the increase in *i*).



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