Department of Economics
University of Toronto

Prof. Gustavo Indart
February 13, 2015

ECO 209Y
MACROECONOMIC THEORY AND POLICY

SOLUTIONS

Term Test #3

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 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	11	12
D	B	D	C	D	E	E	A	C	B	C	B

1. Suppose that as a result of greater uncertainty in the world economy, foreign investors choose to invest more in a safe country such as Canada. Given the above, which of the following statements best describes the most likely outcome in Canada?

A) The rate of interest will fall but net exports will rise.
B) The rate of interest will rise but net exports will fall.
C) The rate of interest and net exports will both rise.
D) The rate of interest and net exports will both fall.
E) The rate of interest will remain unchanged but net exports will fall.

2. Consider an open economy with a fixed-price level, imperfect capital mobility, and a flexible exchange rate. Which of the following best describes the impact of a decrease in the international rate of interest?

A) Equilibrium income will rise, the rate of interest will fall, the current account will improve, and the capital account will deteriorate.
B) Equilibrium income will fall, the rate of interest will fall, the current account will deteriorate, and the capital account will improve.
C) Equilibrium income will rise, the rate of interest will rise, the current account will improve, and the capital account will deteriorate.
D) Equilibrium income will fall, the rate of interest will fall, the current account will improve, and the capital account will deteriorate.
E) Equilibrium income will rise, the rate of interest will fall, the current account will deteriorate, and the capital account will improve.

Use this space for rough work.

3. Consider an open economy with a fixed-price level, flexible exchange rates, and imperfect capital mobility. Which of the following best describes the impact of an increase in the tax rate?

A) Output and the exchange rate will decline.
B) Output and the exchange rate will rise.
C) The interest rate will rise and the exchange rate will fall.
D) Output will fall and the exchange rate will rise.
E) Output will fall and the interest rate will rise.

4. Consider a model of an open economy with fixed prices, flexible exchange rates, and perfect capital mobility. Given an increase in the level of U.S. income, which one of the following statements is true with respect to its impact on the Canadian economy?

A) Net exports will increase and equilibrium income will rise.
B) Net exports will increase, the Canadian dollar will appreciate, and the balance in the capital account will deteriorate.
C) Exports will increase, the Canadian dollar will appreciate but the balances in both the current and the capital accounts will remain unchanged.
D) Exports will increase, the Canadian dollar will appreciate, the balance in the current account will improve, and the balance in the capital account will deteriorate.
E) Net exports will increase, the Canadian dollar will depreciate, and the balance in the capital account will deteriorate.

5. The price of oil was $106 a barrel in June 2014 and dropped to less than $50 a barrel by the end of January 2015. Which one of the following might be most responsible for this price decrease?

A) A U.S. and Saudi conspiracy to weaken the Russian and Iranian economies.
B) An increase in oil output by OPEC countries.
C) A drop in demand due to lower rates of growth of China's economy.
D) The expansion of oil extraction from nonconventional sources.
E) A Saudi conspiracy to maintain its market share.

Use this space for rough work.

6. Consider a model of an open economy with fixed prices, flexible exchange rates, and perfect capital mobility. Which one of the following statements is correct?

A) Expansionary monetary policy will appreciate the domestic currency.
B) Fiscal expansion is very effective in stimulating aggregate demand.
C) Fiscal expansion causes a depreciation of the domestic currency.
D) An increase in exogenous exports will increase net exports.
E) None of the above is correct.

7. Which of the following actions will lead to an expansion of the money supply?

A) The government of Canada sells bonds to the Bank of Canada.
B) The Bank of Canada buys government bonds from the public.
C) The government of Canada sells bonds to the commercial banks.
D) The government of Canada sells bonds to the public.
E) Both A) and B) above.

8. Consider the *M1* definition of money and suppose that banks are presently paying interest on chequing account deposits. If a change in government regulations now forbids banks to pay interest on chequing accounts, which of the following best describes the most likely outcome?

A) The demand for money will decrease.
B) The demand for money will increase.
C) The demand for money will remain unchanged.
D) The demand for currency will fall while the demand for chequing accounts deposits will rise.
E) The demand for chequing account deposits will fall but the overall demand for money will not change.

9. The monetary base is $20 billion, vault cash held by commercial banks is equal to $3 billion, commercial banks' deposits at the Central Bank are $7 billion, and the public's deposits at the commercial banks are $70 billion. The money multiplier is equal to

A) 2.5.
B) 3.0.
C) 4.0.
D) 5.0.
E) 5.5.

Use this space for rough work.

10. In an open economy, a flatter aggregate demand (*AD*) curve implies a

A) larger difference between the fiscal policy and the monetary policy multipliers.
B) larger sum of the fiscal policy and the monetary policy multipliers.
C) larger monetary policy multiplier and a smaller fiscal policy multiplier.
D) larger fiscal policy multiplier and a smaller the monetary policy multiplier.
E) smaller difference between the fiscal policy and the monetary policy multipliers.

11. Which of the following will cause the *AD*-curve to shift up to the right?

A) An increase in the real money supply due to an increase in the price level.
B) A decrease in the real money supply due to an increase in the nominal money supply.
C) A decrease in the interest sensitivity of investment.
D) An increase in the income sensitivity of the demand for real balances.
E) An increase in autonomous imports.

12. According to neoclassical theory, a profit-maximizing firm will hire more labour if the

A) real wage rate exceeds the marginal product of labour.
B) nominal wage rate is lower than the value of the marginal product of labour.
C) marginal product of labour exceeds the nominal wage rate.
D) real wage rate equals the marginal product of labour.
E) nominal wage rate exceeds the marginal product of labour.

Use this space for rough work.

PART II (15 marks)

Consider a closed economy where the price level is fixed and equal to 1. In this economy, the expressions for the *IS* and *LM* curves are respectively given by:

$$i = 30 - 0.02Y \quad \text{and} \quad i = -0.1M + 0.02Y,$$

where Y is income and M is the nominal money stock in the economy. This economy is initially in equilibrium at $Y = 1250$.

a) What is the size of the nominal money stock at the initial equilibrium? Show how you obtained this figure. **(2 marks)**

To find the equilibrium rate of interest (i) we must plug $Y = 1250$ into the expression for the *IS* curve: $i = 30 - 0.02\,(1250) = 30 - 25 = 5$.

We now plug $i = 5$ and $Y = 1250$ onto the expression for the *LM* curve to find the equilibrium M: $5 = -0.1M + 0.02\,(1250) \rightarrow 0.1M = 25 - 5 = 20 \rightarrow M = 20/0.1 = 200$.

Alternatively, we could equate *IS* and *LM*: $30 - 0.02Y = -0.1M + 0.02Y \rightarrow 0.1M = -30 + 0.04Y \rightarrow 0.1M = -30 + 0.04\,(1250) = -30 + 50 = 20 \rightarrow M = 20/01 = 200$.

b) If the desired currency-deposit ratio (cu) of the public is 0.2 and the desired cash-reserve ratio (re) of the banks is 0.1, what is the value of the money multiplier (mm)? Show how you obtained this figure. **(2 marks)**

$$mm = \frac{M}{B} = \frac{CU_P + D}{CU_P + R} = \frac{CU_P/D + D/D}{CU_P/D + R/D} = \frac{cu + 1}{cu + re} = \frac{0.2 + 1}{0.2 + 0.1} = \frac{1.2}{0.3} = 4.$$

c) Of the total nominal money stock of part a) above, how much is it held in currency (CU_P) and how much in deposits (D)? What are the total reserves (R) of the commercial banks? Show how you obtained these figures. **(3 marks)**

The fraction of any amount of money held in the form of currency (CU_P) is:

$$\frac{CU_P}{CU_P + D} = \frac{cu}{cu + 1} = \frac{0.2}{1.2} = 1/6.$$

Similarly, the fraction of any amount of money held in the form of deposits (D) is:

$$\frac{D}{CU_P + D} = \frac{1}{cu + 1} = \frac{1}{1.2} = 5/6.$$

Therefore, 1/6 of $M = 200$ is held in the form of currency:

$CU_P = 200/6 = 33.33.$

And 5/6 of $M = 200$ is held in the form of deposits:

$D = 200\ (5/6) = 1000/6 = 166.67.$

Since $M = mm\ B$, the monetary base is: $B = M/mm = 200/4 = 50$. Further, since $B = CU_P + R$,

$R = B - CU_P = 50 - 33.33 = 16.67.$

Alternatively, since $D = 166.67$ and $re = R/D = 0.1$, $R = re\ D = 0.1\ (166.67) = 16.67.$

d) Suppose that full-employment income is $Y^* = 1400$. If the central bank decides to implement expansionary monetary policy to achieve full-employment, by how much should the money supply (M) be increased? **(2 marks)** What must the central bank do to cause M to increase by this amount? Show how you obtained all figures. **(1 mark)**

The increase in the money supply will cause the LM curve to shift down and to the write and intersect the IS curve at $Y^* = 1400$. Plugging $Y^* = 1400$ onto the expression for the IS curve allows us to find the value of the rate of interest (i^*) at the point of intersection between the new LM curve and the IS curve:

$i^* = 30 - 0.02Y^* = 30 - 0.02\ (1400) = 30 - 28 = 2.$

Plugging $i^* = 2$ and $Y^* = 1400$ onto the expression for the LM curve allows us to find the new equilibrium M:

$2 = -0.1M + 0.02\ (1400) \rightarrow 0.1M = 28 - 2 = 26 \rightarrow M = 26/0.1 = 260.$

Therefore, the nominal money stock should increase by $\Delta M = 60$.

To achieve this result, the central bank should engage in an open market purchase to increase the monetary base (i.e., to increase D_{CB}) as follows:

$\Delta M = mm\ \Delta B \rightarrow 60 = 4\ \Delta B \rightarrow \Delta B = 60/4 = 15.$

e) As a result of the expansionary monetary policy implemented by the central bank of part d) above, what are the changes in the currency (ΔCU_P) and deposits (ΔD) held by the public? What is the change in the reserves (ΔR) of the banks? Show how you obtained all figures. **(3 marks)**

Since the public wants to hold 1/6 of their money holdings in the form of currency:

$\Delta CU_P = \Delta M/6 = 60/6 = 10.$

Similarly, since the public wants to hold 5/6 of their money holdings in the form of deposits:

$\Delta D = \Delta M/6 = 60\ (5/6) = 50.$

Given that $\Delta CU_P = -\Delta CU_B$, then $\Delta CU_B = -10$. Further, since $\Delta B = 15$ and $\Delta B = \Delta CU_P + \Delta CU_B + \Delta D_{CB}$, then $\Delta D_{CB} = 15$. Therefore, $\Delta R = \Delta CU_B + \Delta D_{CB} = -10 + 15 = 5$.

Alternatively, since $re = 0.1$ and $\Delta D = 50$, then $\Delta R = 5$.

f) Suppose the government decides to achieve full-employment by increasing government purchases while keeping the rate of interest unchanged at the level of the initial equilibrium of part a) above. What is the required increase in the nominal money stock (ΔM) and the monetary base (ΔB)? **(2 marks)**

Both G and M must increase in a way that the new IS and LM curves intersect at $i = 5$ and $Y = 1400$. Therefore, plugging $i = 5$ and $Y = 1400$ onto the expression for the LM curve allows us to find the equilibrium M: $5 = -0.1M + 0.02\ (1400) \rightarrow 0.1M = 28 - 5 = 23 \rightarrow M = 23/0.1 = 230.$

Therefore, $\Delta M = 30$. And $\Delta B = \Delta M/mm = 30/4 = 7.5.$

PART III (30 marks)

Instructions: Answer the following three 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:** *"The undervaluation of the yuan (the Chinese currency) is the underlying cause of the large deficit in the U.S. trade account."*

The undervaluation of the yuan could be seen as partly responsible for the U.S. trade deficit with China but not necessarily for the overall U.S. trade account deficit since the U.S. also has trade deficits with flexible-exchange-rate countries such as Germany and Japan. The ultimate cause of the U.S. trade account deficit appears to be a combination of excess liquidity in international financial markets and, most particularly, the large fiscal deficit of the U.S. government.

What would happen if China were to revalue the yuan? Well, the U.S. trade deficit with China would most likely decrease but Americans would continue buying products from abroad even if not as much from China — they would now be buying these same products from other countries such as India, Bangladesh, or Cambodia. Therefore, the overall trade deficit would not decrease in any significant manner since other countries would take the place of China as exporters of these goods to the U.S.

Now, if the U.S. is running a large trade and current account deficits, then at the same time it's running a large capital account surplus. Then the question to be answered is whether the U.S. is borrowing from abroad in order to finance its deficit in the current account or the other way around — i.e., is the appreciation of the U.S. dollar resulting from the inflow of capital the cause of the deficit in the current account? The evidence suggests that the latter might be the most likely causal direction.

Why is the U.S. running such a large capital account surplus? This could be seen as the result of two main factors. On the one hand, there is excess liquidity in international financial markets as a result of commodity-exporting countries (particularly oil-exporting countries) accumulating large surpluses and these countries are seeking safe opportunities for the investment of these surpluses — i.e., they are searching for safe financial assets to invest in. On the other hand, the large U.S. government deficit creates an attractive large supply of safe financial assets (i.e., U.S. government bonds). Note that in the absence of a U.S. government deficit the supply of U.S. bonds would be smaller and their price higher (i.e., their yield lower), thus reducing its attractiveness to foreign investors. As a result of foreigners (including China) purchasing large quantities of U.S. government bonds, the U.S. dollar appreciates. In addition, *ceteris paribus*, greater foreign demand for U.S. government bonds increases bond prices and reduces the rate of interest in the U.S. In turn, low rates of interests have an expansionary impact on the American economy, further fuelling American imports and the current account deficit. In other words, while foreign borrowing might prevent the fiscal deficit from crowding out domestic investment, it also contributes to establishing a higher value of the U.S. dollar and to explain to a large extent the U.S. current account deficit.

(Continue on page 12 if necessary)

2. **Critically evaluate the following statement:** *"A sale of gold by the commercial banks to the Bank of Canada, a transfer of the Government of Canada's deposits from the Bank of Canada to the commercial banks, a sale of bonds by the general public to the commercial banks, and an increase in the Bank Rate will all result in a decrease in the money supply."* **In your analysis, assume a fixed currency-deposit ratio of the public and a fixed desired cash-reserve ratio of the commercial banks.**

Assuming a fixed currency-deposit ratio and a fixed desired cash-reserve ratio (i.e., a fixed money multiplier), the money supply decreases if and only if the monetary base (i.e., the stock of high powered money) decreases, where the final decrease in the money supply is equal to the decrease in the monetary base times the money multiplier. Let's recall that the monetary base consists of the total currency in the economy plus the deposits of the commercial banks at the Bank of Canada. Therefore, assuming no change in the total currency in the economy, a change in the monetary base will imply a change in the deposits of the commercial banks at the Bank of Canada. Finally, let's also keep in mind that the monetary base decreases whenever: 1) the Bank of Canada sells an asset; and 2) Government of Canada's deposits at the Bank of Canada are increased. In both cases, deposits of the commercial banks at the Bank of Canada decrease.

What will be the impact of each of the situations described above on the monetary base and, as a result, on the money supply?

a) Sale of gold by the commercial banks to the Bank of Canada.

The Bank of Canada pays the commercial banks for this transaction by increasing the deposits of the commercial banks at the Bank of Canada by the amount of the purchase. *Therefore, the monetary base increases and so does the money supply.*

b) Transfer of the Government of Canada's deposits from the Bank of Canada to the commercial banks.

The deposit of the Government of Canada at a commercial bank represents a transfer from the Bank of Canada to the commercial bank, i.e., it represents a change in the liabilities of the Bank of Canada from the form of Government of Canada's deposits to commercial banks' deposits. *Therefore, the monetary base increases and so does the money supply.*

c) A sale of bonds by the general public to the commercial banks.

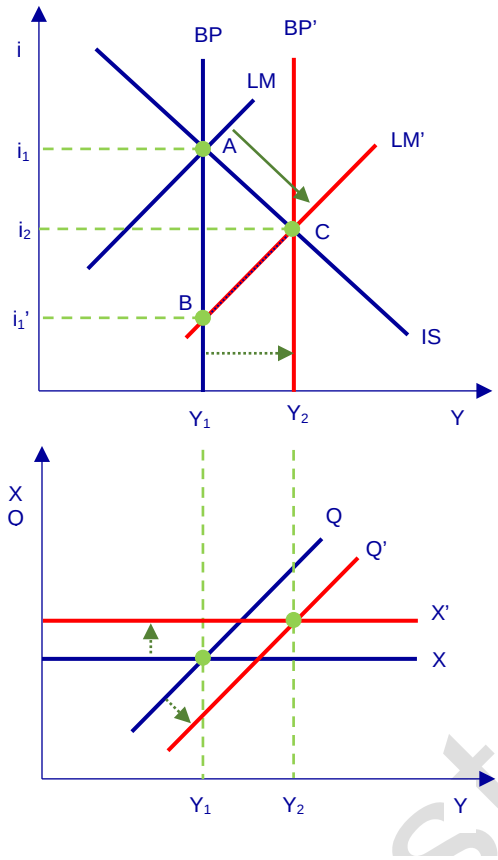
This transaction implies an initial increase in the public's deposit's at the commercial banks. Therefore, the cash reserve ratio of the commercial banks falls below the desired level and the banks recall loans to restore the reserve ratio to the desired level. *Therefore, the money supply does not change (as it was expected, since the monetary base does not change).*

d) An increase in the Bank Rate.

As the Bank Rate rises, the prime rate and all short-term commercial rates of interest increase as well. As a result, the demand for loans decreases and so do the deposits of the public at the commercial banks. The cash-reserve ratio of the commercial banks increases now above the desired level as a result of the decrease in deposits of the public. Therefore, the banks buy Government Bonds from the Bank of Canada and reduce their deposits at the Bank (i.e., its reserves). *Therefore, the monetary base decreases and so does the money supply.*

(Continue on page 12 if necessary)

3. Critically evaluate the following statement: *"If the central bank increases the money supply, equilibrium output will rise, the equilibrium rate of interest will fall, and the balance of the current account will deteriorate."* **(Show your answer with the help of appropriate diagrams and explain the economics. Consider an open economy with a fixed-price level, flexible exchange rates, and no capital mobility. Assume exogenous money supply and a recessionary gap at the initial equilibrium.)**



An increase in the money supply causes the rate of interest to fall and equilibrium income to expand. This is shown in the upper diagram on the left. Note that since there is no capital account, the overall *BP* is equal to the balance in the current account (*NX*) and the *BP* curve is vertical.

The initial equilibrium is at point *A*. At this point, the goods market, the money market, and the external sector are all in equilibrium. The increase in the money supply causes the rate of interest to fall at all levels of *Y*, i.e., graphically the *LM* curve shifts down to *LM'*. At the initial income Y_1 the money market is now in equilibrium at the lower rate of interest i_1' (point *B*). Therefore, now there is an excess demand in the goods market (i.e., point *B* is below the *IS* curve and thus *AE* > *Y*) while the money market and the external sector are both in equilibrium.

Due to the excess demand in the goods market, firms experience an involuntary decrease in inventories. Therefore, they adjust production upwards and *Y* increases. As *Y* increases, the demand for money rises and the rate of interest increases (so the money market remains always in equilibrium). The adjustment path is a movement along the *LM'* curve and the process continues until the excess demand in the goods market is eliminated (at point *C*).

What happens to the equilibrium in the external sector? Since there is no capital account and the exchange rate is flexible, *NX* is always equal to zero (i.e., the exchange rate changes in order to equate *X* and *Q* always). Therefore, as *Y* starts to increase to eliminate the excess demand in the goods market, *Q* increases and a deficit (i.e., an excess demand) arises in the exchange market. Therefore, the exchange rate appreciates causing an increase in *X* and a decrease in *Q* while maintaining *NX* = 0 always. Note that *Q* increases as *Y* rises and decreases as *e* rises, but the net outcome is an increase in *Q* equal to the increase in *X*. Graphically, as *e* rises the *X* curve shifts up and the *Q* curve shifts down — always intersecting (i.e., *NX* = 0) at the current level of *Y*. Therefore, the vertical *BP* curve keeps shifting to the right as *Y* increases. This process continues as long as an excess demand remains in the goods market and *Y* continues to increase.

The new equilibrium is reached at point *C* where the rate of interest is i_2 and the level of income is Y_2. So the statement is correct in that *Y* increase and *i* falls, but wrong in that the balance in the current account does not deteriorate since *NX* = 0 always.

(Continue on page 12 if necessary)

(Continue on this page if necessary)