ECO 209Y – L0101
MACROECONOMIC THEORY

Term Test #2

LAST NAME ____________________________

FIRST NAME ____________________________

STUDENT NUMBER ______________________

INSTRUCTIONS:
1. The total time for this test is 1 hour and 50 minutes.
2. Aids allowed: a simple calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I __________/36

Part II __________/16

Part III 1. __________/12

2. __________/12

3. __________/12

4. __________/12

TOTAL __________/100
PART I  (36 marks)

Instructions: Enter your answer to each question in the table below. Only the answer recorded in the table will be marked. Table cells left blank will receive a zero mark for that question. Each question is worth 3 marks. No deductions will be made for incorrect answers.

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1. In an open economy with 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) Expansionary fiscal policy will cause output to increase.
   C) Expansionary fiscal policy will cause a depreciation of the domestic currency.
   D) Expansionary monetary policy will cause the equilibrium interest rate to fall.
   E) None of the above is correct.

2. In an open economy with flexible exchange rates, an increase in the interest rate that prevails in the rest of the world will cause
   A) the domestic interest rate and the exchange rate to rise, and the level of output to fall.
   B) the domestic interest rate, the level of output, and the exchange rate all to fall.
   C) the domestic interest rate and the level of output to rise, and the exchange rate to fall.
   D) the domestic interest rate and the exchange rate to fall, and the level of output to rise.
   E) the domestic interest rate, the level of output, and the exchange rate all to rise.

3. Suppose that imports are completely insensitive to changes in the level of domestic output. Then, an increase in the degree of capital mobility will
   A) increase the slope of the BP curve.
   B) reduce the slope of the BP curve.
   C) cause the BP curve to shift up if the domestic rate of interest is higher than the international rate.
   D) cause the BP curve to shift down if the domestic rate of interest is higher than the international rate.
   E) have no effect on the BP curve.

4. Suppose that capital flows are completely insensitive to interest rate differentials between the domestic and the international rates. Then, which one of the following statements is correct?
   A) The BP curve will be downward sloping.
   B) The BP curve will be completely flat.
   C) The BP curve will be completely vertical.
   D) The BP curve will be upward sloping.
   E) Not enough information is provided to comment on the slope of the BP curve.
5. Consider an open economy with imperfect capital mobility and a flexible exchange rate system. If the BP curve is flatter than the LM curve, an increase in lump-sum taxes will cause
   A) output to fall, the rate of interest to rise, and the exchange rate to decline.
   B) output, the rate of interest, and the exchange rate all to rise.
   C) output and the rate of interest to rise and the exchange rate to fall.
   D) output and the rate of interest to fall and the exchange rate to rise.
   E) the exchange rate to rise with no change in output and the rate of interest.

6. Suppose that average income per capita in Uruguay is 240,000 pesos per year and that the nominal exchange rate for Uruguayan pesos is 0.04. Further suppose that a given consumption basket of goods and services costs $3,750 in the Canada and 75,000 pesos in Uruguay. Using the PPP exchange rate, income per capita in Uruguay is:
   A) $11,500.
   B) $12,000.
   C) $12,250.
   D) $9,600.
   E) $11,750.

7. Consider an open economy with fixed exchange rates and perfect capital mobility. Suppose the economy is initially in a situation of internal and external balance and the government now implements contractionary fiscal policy. Which one of the following statements better describes the changes once the new equilibrium is achieved?
   A) The exchange rate will appreciate.
   B) The balance in the current account will deteriorate.
   C) The money supply will increase.
   D) The balance of the capital account will deteriorate.
   E) Both output and the interest rate will increase.

8. Consider a small open economy with fixed exchange rates and no capital mobility. Suppose that BP = 0 in the initial equilibrium and the government now imposes an import quota. Which one of the following statements better describes the changes once the new equilibrium is achieved?
   A) Net exports will remain unchanged, but the money supply and income will both be higher.
   B) Net exports, the money supply, and income will all remain unchanged.
   C) Net exports, the money supply, and income will all be lower.
   D) Net exports, the money supply, and income will all be higher.
   E) Net exports will remain unchanged, the money supply will be lower, and income will be higher.

9. In an open economy with fixed exchange rates and perfect capital mobility, which one of the following statements is correct?
   A) Expansionary monetary policy is effective in stimulating aggregate expenditure.
   B) Fiscal expansion is ineffective in stimulating aggregate expenditure.
   C) Fiscal expansion causes a deficit in the exchange market.
   D) An increase in exogenous exports causes the exchange rate to appreciate.
   E) None of the above is correct.
10. China is being accused by Western countries of setting the value for its domestic currency too low. All else equal, which one of the following statements might describe the impact of an undervalued domestic currency on the Chinese economy?
   A) The prices of imported goods would be artificially low for Chinese consumers.
   B) Inflation pressure would tend to decrease in the Chinese economy.
   C) The Chinese money supply would tend to increase.
   D) The balance in the capital account would improve for China.
   E) None of the above is correct.

11. In a flexible exchange rate system with 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 expenditure.
   C) Fiscal expansion causes an appreciation of the domestic currency.
   D) An increase in exogenous exports will increase net exports.
   E) None of the above is correct.

12. Consider an open economy with flexible exchange rates. Which of the following incidents will lead to an improvement in the balance of the current account?
   A) A decrease in foreign output.
   B) An increase in consumer’s confidence.
   C) An expansionary fiscal policy.
   D) An expansionary monetary policy.
   E) A decrease in foreign interest rates.
PART II  (16 marks)

Consider an open economy with fixed prices, fixed exchange rates, and imperfect capital mobility. This economy is in external balance and characterized by the following behavioural equations:

\[
\begin{align*}
C &= 60 + 0.8YD \quad P' = 2 \\
I &= 200 - 20i + 0.1Y \quad P = 1 \\
G &= 300 \\
TA &= 0.25Y \\
TR &= 50 \\
X &= 250 + 100ePf/P \\
Q &= 400 - 50ePf/P + 0.1Y \\
\end{align*}
\]

\[
\begin{align*}
P &= 1 \\
\end{align*}
\]

\[
\begin{align*}
P' &= 2 \\
\end{align*}
\]

\[
\begin{align*}
L &= M/P \\
L &= 0.2Y - 10i \\
10i &= -200 + 0.2Y \\
i &= -20 + 0.02Y \\
\end{align*}
\]

a) What is the equation for the IS curve in this model? [Note: Your equation for the IS curve should be expressed as a function of \( e \).] (2 marks)

\[
\begin{align*}
C &= 60 + 0.8YD \\
&= 60 + 0.8(Y - TA + TR) \\
&= 60 + 0.8(Y - 0.25Y + 50) \\
&= 60 + 0.6Y + 40 \\
&= 100 + 0.6Y \\
NX &= X - Q \\
&= 250 + 200e - 400 + 100e - 0.1Y \\
&= -150 + 300e - 0.1Y \\
AE &= C + I + G + NX \\
&= 100 + 0.6Y + 200 - 20i + 0.1Y + 300 - 150 + 300e - 0.1Y \\
&= 450 + 300e + 0.6Y - 20i \\
Y &= AE \\
Y &= 450 + 300e + 0.6Y - 20i \\
450 + 300e - 0.4Y - 20i &= 0 \\
i &= 22.5 + 15e - 0.02Y \\
\end{align*}
\]

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

\[
\begin{align*}
L &= M/P \\
0.2Y - 10i &= 200 \\
10i &= -200 + 0.2Y \\
i &= -20 + 0.02Y \\
\end{align*}
\]
c) What is the equation for the BP curve in this model? [Note: Your equation for the BP curve should be expressed as a function of e.] (2 marks)

\[ \begin{align*}
\text{NX} + \text{CF} &= 0 \\
- 150 + 300e - 0.1Y + 25(i - 9) &= 0 \\
- 150 + 300e - 0.1Y + 25i - 225 &= 0 \\
- 375 + 300e - 0.1Y + 25i &= 0 \\
25i &= 375 - 300e + 0.1Y \\
i &= 15 - 12e + 0.004Y
\end{align*} \]

\[ i = 15 - 12e + 0.004Y \]

d) What are the values of \( Y, i \) and \( e \) at which the goods market, the money market, and the external sector are simultaneously in equilibrium? (3 marks)

\[ \begin{align*}
\text{IS:} & \quad i = 22.5 + 15e - 0.02Y \quad (1) \\
\text{LM:} & \quad i = -20 + 0.02Y \quad (2) \\
\text{BP:} & \quad i = 15 - 12e + 0.004Y \quad (3)
\end{align*} \]

\[ \begin{align*}
(1) - (2) & \Rightarrow 42.5 + 15e - 0.04Y = 0 \quad (4) \\
(1) - (3) & \Rightarrow 7.5 + 27e - 0.024Y = 0 \quad (5)
\end{align*} \]

\[ \begin{align*}
15 \times (5) - 27 \times (4) & \Rightarrow 112.5 + 405e - 0.36Y - 1147.5 - 405e + 1.08Y = 0.72Y - 1035 = 0 \\
& \Rightarrow Y = 1035/0.72 \Rightarrow Y = 1437.5
\end{align*} \]

\[ \begin{align*}
(2) & \Rightarrow i = -20 + 0.02Y = -20 + 0.02 (1437.5) = -20 + 28.75 = 8.75 \Rightarrow i = 8.75 \\
(3) & \Rightarrow i = 15 - 12e + 0.004Y \Rightarrow 8.75 = 15 - 12e + 0.004 (1437.5) \\
& \Rightarrow 12e = 15 + 5.75 - 8.75 = 12 \\
& \Rightarrow e = 1
\end{align*} \]

e) What are the balances in the current account and the capital account in this equilibrium? (2 marks)

\[ \begin{align*}
\text{NX} &= -150 + 300e - 0.1Y = -150 + 300 - 0.1 (1437.5) = 150 - 143.75 = 6.25 \\
\text{CF} &= 25 (i - i^*) = 25 (8.75 - 9) = -6.25
\end{align*} \]
f) Suppose the central bank devalues the domestic currency such that \( e = 1.5 \) now. What are the new equilibrium values of \( Y \) and \( i \)? [Hint: The use of a diagram might help you getting the answer to this question.] (3 marks)

A devaluation of the domestic currency causes NX to increase and thus both the IS and the BP curves shift down to the right. This is shown in the diagram on the right. At the initial equilibrium (point A), there is now a surplus in the external sector because of the improvement in the balance of the current account. The central bank, therefore, buys foreign currency to eliminate the surplus and the domestic money supply increases. Graphically, the increase in the money supply causes the LM curve to shift to the right. This process continues until a new equilibrium is reached at point B. The new equilibrium, therefore, is determined by the intersection of the IS and BP curves, and the money supply just changes as a result of the elimination of surpluses in the external sector by the central bank. So we have to equate the IS and BP curve to determine equilibrium income and equilibrium rate of interest.

When \( e = 1.5 \), the equations for the IS and BP curve become:

**IS:** \[ i = 22.5 + 15 e - 0.02 Y = 22.5 + 15 (1.5) - 0.02 Y = 45 - 0.02 Y \]

**BP:** \[ i = 15 - 12 e + 0.004 Y = 15 - 12 (1.5) + 0.004 Y = -3 + 0.004 Y \]

**IS = BP** \[ 45 - 0.02 Y = -3 + 0.004 Y \]
\[ 0.024 Y = 48 \]
\[ Y = 2000. \]

And thus \( i = 45 - 0.02 (2000) = 45 - 40 = 5 \).

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g) What is the size of the real supply of money in the new equilibrium of part f) above? (2 marks)

In equilibrium \( M/P = L \) and \( L = 0.2 Y - 10 i \).

Therefore, let's find the value of \( L \) when \( Y = 2000 \) and \( i = 5 \):

\[ L = 0.2 (2000) - 10 (5) = 400 - 50 = 350. \]

Therefore, in the new equilibrium \( M/P = 350 \).
PART III (48 marks)

Instructions: Answer the following questions in the space provided. Each question is worth 12 marks.

1. Answer true or false to the following statement: “If the BP curve is flatter than the LM curve, then an increase in government expenditure will have a larger impact on the rate of interest but a smaller impact on the level of output under fixed exchange rates than it will have under flexible exchange rates.” (Show your answer graphically and explain the economics.)

FALSE

An increase in government expenditure causes AE to increase (and thus the IS curve to shift up to IS'), creating in this way an excess demand in the goods market. Note that as income increases to eliminate the excess demand in the goods market, the demand for money also increases and thus the rate of interest rises. The increase in the rate of interest, in turn, causes the balance in the capital account to improve. This improvement in the capital account will have a different impact on the real sector of the economy depending on whether the exchange rate is fixed or flexible.

Flexible Exchange Rate. The improvement in the capital account creates an excess supply in the exchange market and the exchange rate depreciates. The depreciation of the exchange rate causes NX to decrease (i.e., a deterioration in the balance of the current account) and thus the IS curve shifts down to IS''. Since at each level of Y there is a deterioration in the current account, a corresponding improvement must occur in the capital account in order for BP = 0. Graphically, therefore, this represents a shift upwards of the BP curve and this process continues as long as Y keeps increasing to eliminate the excess demand in the goods market. Since the money market and the external sector are always in equilibrium, the economy is always at a point of intersection between the static LM curve and the moving BP curve, and thus here the adjustment path is a movement up along the LM curve. The final result is an increase in Y to Y2 and an increase in the rate of interest to i2.

Fixed Exchange Rate. The improvement in the capital account causes a surplus to arise in the exchange market and the Bank of Canada buys foreign currency to prevent a depreciation of the exchange rate. As the Bank of Canada buys foreign currency, the money supply increases. Therefore, the LM curve shifts to the right and this process continues as long as Y keeps increasing to eliminate the excess demand in the goods market (i.e., until the LM curve moves all the way to LM' as shown on the diagram). Note that the BP curve remains in the same position since the exchange rate is fixed. Also note that the money market is always in equilibrium (due to changes in the rate of interest) and so is the external sector (due to the intervention of the Bank of Canada). Therefore, the economy is always at a point of intersection between the static BP curve and the moving LM curve, and thus the adjustment path is a movement up along the LM curve. The final result is an increase in Y to Y3 and an increase in the rate of interest to i3.
2. Consider an open economy—e.g., China—with fixed exchange rates and no capital mobility. At the present level of income this economy shows a situation of internal balance and a large surplus in the external sector. What policy should the government implement if it wants to maintain the level of income, the exchange rate, and the interest rate unchanged in the short run? (Show your answer graphically and explain the economics.)

The economy is initially in equilibrium at income $Y_1$ and rate of interest $i_1$. This is shown in the left-hand side diagram below. At $Y_1$ there is a surplus in the external sector equal to the vertical distance between the $X$ and $Q$ curves (at $Y_1$). This is shown in the right-hand side diagram below. Given the level of the fixed exchange rate, equilibrium in the external sector (i.e., $BP = NX = 0$) would be achieved at $Y_2$. Note that the fact that the government doesn’t want $Y$ to increase suggests that the economy might be at, or very close to, full employment in the initial equilibrium.

The surplus in the external sector (i.e., $NX > 0$) translates into a surplus in the exchange market, thus putting pressure on the exchange rate to depreciate. Since the central bank wants to keep the value of the exchange rate ($e$) fixed, it will buy foreign currency to eliminate this surplus in the exchange market. Consequently, the domestic money supply increases and the $LM$ curve shifts to $LM'$. Therefore, the rate of interest drops to $i_2$ (point B) and an excess demand arises in the goods market. As a result, $Y$ increases and the demand for money also rises thus increasing the rate of interest. Note that the adjustment path follows a movement up along the $LM'$ curve until the excess demand in the goods market is eliminated at $Y_2$ (point C). Also note that as $Y$ increases, $Q$ also increases until the surplus in the external sector is eliminated at $Y_2$.

If, in addition to $e$, the government also wishes to keep $Y$ and $i$ unchanged (e.g., in order to eliminate inflationary pressure in the economy), the central bank will have to implement sterilization policy—i.e., it will have to decrease the money supply to the previous level through either an open market operation (sale) or the imposition of higher minimum reserve requirements to the commercial banks. In this way the money supply will decrease and the $LM'$ curve will move back to $LM$, thus eliminating in the short run the situation of excess demand in the goods market. Of course, this is a short-run solution and it will have to be repeated period after period as long as the surplus in the external sector remains.
3. Describe the main characteristics that differentiate a “balance-sheet-recession” from a more “typical” recession. Comment on the relative effectiveness of expansionary monetary and fiscal policy during balance-sheet-recessions.

A “typical” recession usually arises as a result of: (1) the central bank implementing contractionary monetary policy to reduce inflationary pressure in the economy (and, most particularly, to reduce the public’s expectations of inflation); or (2) overinvestment (and thus overproduction) by the business sector due to overoptimistic expectations about the future state of aggregate demand. The source of a “balance-sheet” recession is different—it’s neither related to a situation of insufficient aggregate demand forced by the central bank nor to a situation of excessive aggregate supply due to overinvestment and overproduction.

A balance-sheet recession is related to a situation of insufficient aggregate demand but not to one caused by the implementation of contractionary monetary policy. It arises when asset prices collapse (i.e., an asset bubble bursts) and households and businesses suddenly find themselves with their liabilities far outweighing their assets. Understandably, in this situation households and businesses stop borrowing and start paying down their debt, i.e., they start deleveraging. This is the classical “paradox of drift” in action, which causes aggregate demand to fall and the economy to move into recession.

What type of government action is required to get the economy out of recessions?

In the case of a typical recession, expansionary monetary policy might be quite effective in restoring household consumption expenditure to pre-recession levels. And this is particularly so when the recession was “created” by the central bank itself by implementing contractionary monetary policy in an attempt to curb inflation. Moreover, combining expansionary monetary policy with expansionary fiscal policy might accelerate the recovery by helping to restore both the business sector’s and households’ confidence and boost both investment and consumption.

In the case of a balance-sheet recession, expansionary monetary policy will tend to be quite ineffective. Here is not that households and businesses are not borrowing (and thus not spending) because the rate of interest is too high but rather because their liabilities are too high relative to the value of their assets (i.e., they are overleveraged). Therefore, in this case monetary policy becomes ineffective even before the rate of interest falls to very low levels and a more “typical” liquidity trap arises. Moreover, private banks are also deleveraging and thus are also unwilling to lend even if the rate of interest is falling—and thus, in any case, only the lucky few will be able to benefit from lower borrowing costs.

So what should the government do during a balance-sheet recession?

When the entire private sector is bent on reducing liabilities by paying down debt, the government must move in the opposite direction—when the entire private sector is striving to save, the government must dis-save. But fiscal stimulus will not have much effect as long as the financial system is deleveraging. Therefore, the government (and the central bank) must first “clean” the balance-sheet of the banks—for example, by buying some of their risky assets (i.e., risky loans) as it was done both in Canada and the U.S. in 2008-09. Once this problem is more or less solved, the government deficit has to be large enough to offset both the decline in industry investment and the rise in household saving. The stimulus package has to be large enough to convince households and businesses that it will not only slow or stop the decline but that it will also help to “jump start” the economy. In other words, the stimulus package must be enough to restore the private sector’s confidence in the economy in order for households and businesses to start spending once again.

What is the most effective composition of such a stimulus package? The point of the stimulus package is to increase spending in the short run with little or no inflationary impact in the long run. Therefore, increasing expenditure on infrastructure is certainly a prime candidate, as is a more generous employment insurance program and other low income households’ support programs. Tax cuts, however, will be rather ineffective. Tax cuts will produce considerably less spending per dollar than these other programs since households and business might use the additional disposable income to pay off debts rather than to increase expenditure.
4. Assuming imperfect capital mobility and fixed exchange rates, explain the impact on the Canadian economy of a decrease in the international rate of interest. In your answer, clearly indicate the effect on income, rate of interest, current account and capital account. (Show your answer with the help of an IS-LM-BP diagram and explain the economics. Assume that the economy is initially in external balance and that a recessionary gap exists.)

As shown in the diagram below, the economy is initially in equilibrium at point A. Since point A is also a point on the BP curve, initially there is also external balance in the economy. Given the assumption of imperfect capital mobility, the BP curve is positively sloped and the domestic rate of interest might be higher or lower than the international rate when BP = 0. A decrease in the international rate of interest will cause the BP curve to shift down by exactly the size of the decrease in \(i^*\) (to BP') as shown in the diagram.

Let's analyze the initial impact of this decrease in the international rate of interest. The drop in \(i^*\) leaves the balance in the current account unchanged but causes the balance in the capital account to improve. Therefore, at point A there is now a surplus in the external sector. To prevent the exchange rate from depreciating as a result of the excess supply in the exchange market, the Bank of Canada buys foreign currency and the money supply increases. Graphically, this causes the LM curve to shift to the right to LM'. The increase in the money supply causes the domestic rate of interest to fall to \(i_1'\) and thus equilibrium in the external sector is restored. Note that the domestic rate of interest falls exactly by the size of the decrease in \(i^*\). There is now equilibrium in the money market and the external sector, i.e., the economy is at a point on both the LM curve and the BP curve (point B on the diagram). At point B, however, there is now an excess demand in the goods market (this point is below the IS curve, indicating that \(AE > Y\) due to the fall of the domestic rate of interest). Output/income will thus increase to eliminate this excess demand.

As output starts to increase, the demand for money increases and the rate of interest rises to restore equilibrium in the money market. The increase in the rate of interest also improves the balance in the capital account (while leaving the balance in the current account unchanged), and thus the external sector moves to a situation of a surplus again. The Bank of Canada, therefore, buys foreign currency and the domestic money supply increases. Graphically, this causes the LM curve to shift to the right. 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 up along the BP' curve—the economy always being at a point of intersection between the 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 demand in the goods market is also eliminated and thus a new equilibrium for the economy as a whole is reached. This is shown at point C on the diagram below.

Therefore, under the assumption of imperfect capital mobility and fixed exchange rates, a decrease in the international rate of interest causes income to increase, the rate of interest to fall (but by less than the decrease in \(i^*\)), the balance in the current account to deteriorate because of the increase in imports resulting from the increase in \(Y\), and the balance in the capital account to improve because of the higher decrease in \(i^*\) relative to the decrease in the domestic rate of interest.