Assignment 4

Part A       Multiple-Choice Questions

To answer each question correctly, you have to choose the best answer from the given four choices.

1) Suppose the dollar is subject to a floating exchange rate system and that \( R \) is the number of dollars per unit of foreign exchange. If \( R \) increases, then the dollar
   A) depreciates.
   B) is revalued.
   C) is devalued.
   D) appreciates.
   E) both A and C

2) A firm that buys foreign exchange in order to take advantage of higher foreign interest rates is
   A) speculating.
   B) responding to fluctuations in the business cycle.
   C) engaging in interest rate arbitrage.
   D) demonstrating purchasing power parity.
   E) ignoring the nominal rate of exchange.

3) All else equal and given the current system of exchange rates, if the United States enters a period of exceptionally strong growth,
   A) the pressure on the dollar is to devalue.
   B) the pressure on the dollar is to revalue.
   C) the pressure on the dollar is to depreciate.
   D) the pressure on the dollar is to appreciate.
   E) both A and D

4) All else equal, if Canada raises its interest rates
   A) the dollar depreciates.
   B) the U.S. demand for Canadian dollars increases.
   C) the Canadian supply of Canadian dollars increases.
   D) both A and B
   E) both A and C
5) An American firm that buys foreign exchange because its managers expect the dollar to depreciate is  
A) increasing the supply of foreign exchange.  
B) increasing the demand for foreign exchange.  
C) speculating.  
D) both A and B  
E) both B and C

6) Suppose that the nominal exchange rate between the U.S. dollar and the Mexican peso is 0.10 dollars per peso. If Mexico's inflation is 10 percent and the United States' is 0 percent, from the U.S. point of view, the real exchange rate  
A) depreciates to 0.11 dollars per peso.  
B) appreciates to 0.09 dollars per peso.  
C) appreciates to 0.2 dollars per peso.  
D) appreciates to 0.11 dollars per peso.  
E) depreciates to 0.09 dollars per peso.

7) Suppose the exchange rates between the United States and Canada are in long run equilibrium as defined by the idea of purchasing power parity. If the law of one price holds perfectly, then differences between U.S. and Canadian rates of inflation would  
A) be completely offset by changes in the nominal exchange rate.  
B) lead to a change in the real purchasing power of each country's currency when it is converted to the other country's currency.  
C) have no effect on nominal exchange rates.  
D) violate the conditions for the law of one price.  
E) be completely offset by changes in the real exchange rate.

8) An increase in the U.S. demand for the Mexican peso  
A) causes the dollar to depreciate.  
B) causes a rise in the exchange rate.  
C) causes the peso to appreciate.  
D) causes Mexican goods to be relatively more expensive.  
E) all of the above

9) Which of the following would not be a cause for an increased American demand for the Mexican peso?  
A) The United States has lower interest rates than Mexico.  
B) The expectation by speculators that the value of the peso is edging up.  
C) Increased American demand for Mexican goods.  
D) More economic expansion in the United States.  
E) none of the above
10) Under a fixed exchange standard, if the domestic demand for foreign exchange increases
A) the central monetary authority must increase the supply of domestic money.
B) the fixed exchange standard will breakdown.
C) the central monetary authority must meet the demand out of its reserves.
D) the domestic currency must be depreciated.
E) inflation will increase.

11) Which of the following may NOT serve as a possible chain reaction for either fiscal or monetary policy?
A) $M \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \Rightarrow C \downarrow$ ....
B) $T \downarrow \Rightarrow Y \uparrow \Rightarrow C \uparrow \Rightarrow Y \uparrow \Rightarrow C \uparrow$ ....
C) $M \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Y \downarrow \Rightarrow C \downarrow$ ....
D) $G \uparrow \Rightarrow Y \uparrow \Rightarrow C \uparrow \Rightarrow Y \uparrow \Rightarrow C \uparrow$ ....
E) $M \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow \Rightarrow C \uparrow$ ....

12) Expenditure switching refers to
A) a switching of back and forth in the current account from a deficit to a surplus and vice versa.
B) a switching back and forth between investment and consumption expenditures.
C) a switching back and forth between domestic and foreign goods in response to changes in the interest rate.
D) a switching back and forth between domestic and foreign goods in response to changes in the exchange rate.
E) all of the above

13) The J-curve effect of a currency depreciation results is due to
A) the initial effect having positive effects on the current account balance.
B) exports and imports being totally unresponsive to changes in exchange rates.
C) the value of imports increasing by more than the value of exports at the time of devaluation.
D) decreases in the dollar price of imports.
E) none of the above

14) Suppose the Asian financial crisis decreased U.S. exports. In the aggregate demand/aggregate supply model, this would be represented as
A) a shift to the left of aggregate supply, which would result in less production for the U.S. economy.
B) a shift to the right of aggregate demand, leading to more spending and production in the U.S. economy.
C) a shift to the left of aggregate demand, leading to less spending and production in the U.S. economy.
D) a shift to the right of aggregate supply, which would result in more production for the U.S. economy.
15) An example of expansionary fiscal policy would be
A) a decrease in government spending to reduce budget deficits.
B) an increase in interest rates to encourage private savings.
C) an increase in tax collection to reduce budget deficits.
D) an increase in government spending on infrastructure to create jobs and improve the economy.
E) a decrease in interest rates to help stimulate the economy.
ANS KEY to PART A

1) A
2) C
3) C
4) D
5) E
6) A
7) A
8) E
9) D
10) C
11) C
12) D
13) C
14) C
15) D
Part C  Problem Solving Question

C1.

Consider the following simple, fixed price, open economy model of an economy with excess capacity:

\[ C = 60 + 0.80Y_d \quad T = 20 + 0.25Y \quad I = 56 \quad G = 40 \quad X = 37 \quad IM = 15 + 0.10Y \]

where, \( C \) is consumption, \( Y_d \) is disposable income, \( T \) is taxes, \( Y \) is real GDP, \( I \) is investment, \( G \) is government expenditures on goods and services, \( X \) is exports and \( IM \) is imports. Note that \( Y_d = Y - T \).

In addition, assume that the potential income of this economy is \( Y^* = 450 \).

(a) Solve for aggregate expenditures \((AE)\) as a function of \(Y\), and calculate the equilibrium level of real GDP. Illustrate your equilibrium in a diagram with \(AE\) on the vertical and \(Y\) on the horizontal axis. Find the value of the multiplier, the level of government budget balance and net exports.

(b) Calculate the inflationary or recessionary gap, if any, at the equilibrium level of real GDP you found in part (a). How should the government adjust its spending \((G)\) to completely remove this gap? Assume that government has changed its spending \((G)\) according to your recommendation. What are the new equilibrium level of real GDP, the government budget balance and net exports with this new level of \(G\)? Show the new equilibrium in your diagram.

(c) Now assume that, instead of changing \(G\) according to your recommendation, the government decides to reduce the tax rate to 7.5% to remove the existing output gap. Calculate the effects of this tax-cut on the aggregate expenditure function, multiplier, equilibrium level of real GDP, the government budget balance and net exports. Show the new equilibrium in a diagram.
a. Solve for aggregate expenditures (AE) as a function of Y, and calculate the equilibrium level of real GDP. Illustrate your equilibrium in a diagram with AE on the vertical and Y on the horizontal axis. Find the value of the multiplier, the level of government budget balance and net export. [6 marks]

Let $AE_1$ denote aggregate expenditures for part (a).

\[
AE_1 = C + I + G + X - IM \\
= 60 + 0.80Y_d + 56 + 40 + 37 - 15 - 0.10Y \\
= 60 + 0.80[Y-20-0.25Y] + 118 -0.10Y \\
= 178 + 0.80[0.75Y-20] - 0.10Y \\
= 178 +0.60Y -16 -0.10Y \\
= 162 + 0.5Y
\]

So, aggregate expenditures (AE) as a function of Y is $AE_1 = 162+0.5Y$

At the equilibrium, $Y = AE_1$

or, $Y = 162 + 0.5Y$

or, $0.5Y = 162$

or, $Y = 162/0.5$

So, $Y = 324$

Therefore, the equilibrium level of real GDP, $Y_1= 324$. This equilibrium of the economy is illustrated in Figure 1.

Multiplier = $1/ (1 - slope of AE_1 function)$

$= 1/ (1 - 0.5)$

$=2$

Therefore, the value of the multiplier is 2.
Government Budget balance = T – G
= 20 + 0.25Y1 – 40
= 20 + 0.25(324) – 40
= 101-40
= 61

Therefore, the government has a budget surplus of 61.

Net Export =X – IM
= 37 – (15 + 0.10Y1)
= 22 – 0.10 (324)
= -10.4

Therefore, the level of net export is -10.4 (trade or current account deficit of 10.4).

b. Calculate the inflationary or recessionary gap, if any, at the equilibrium level of real GDP you found in part (a). How should the government adjust its spending (G) to completely remove this gap? Assume that government has changed its spending (G) according to your recommendation. What are the new equilibrium level of real GDP, the government budget balance and net export with this new level of G? Show the new equilibrium in your diagram.

The output gap = Y – Y*
= 324 – 450
= -126

Therefore, there is a recessionary gap of 126

To remove this recessionary gap, the real GDP has to be increased by 126. The government can achieve this output target by increasing its spending (G). To know by how much G has to be increased, we can use the following “multiplier equation”.

\[ \text{Change in } Y = \text{Multiplier } \times (\text{Change in } G) \]
\[ \text{or, } \frac{\text{Change in } G}{\text{Multiplier}} = \frac{\text{Change in } Y}{2} \]
So, Change in G = 63

Therefore, the government has to increase G by 63 to remove the recessionary gap of 126. The new level of G is 103.
Let \( AE_2 \) denote aggregate expenditures for part (b). If the government increases its spending by 63, the total autonomous aggregate expenditures will also increase by 63. As a result, aggregate expenditure as a function of \( Y \) will change to:

\[
AE_2 = 162 + 63 + 0.5Y
\]

\[
\text{So, } AE_2 = 225 + 0.5Y
\]

At the equilibrium, \( Y = AE_2 \)

\[
\text{or, } Y = 225 + 0.5Y
\]

\[
\text{or, } 0.5Y = 225
\]

\[
\text{or, } Y = 225 / 0.5
\]

\[
\text{So, } Y = 450
\]

*Therefore, the equilibrium level of real GDP, \( Y_2 = 450 \). This new equilibrium of the economy is illustrated in Figure 1.*

Government Budget balance = \( T - G \)

\[
= 20 + 0.25Y_2 - 103
\]

\[
= 20 + 0.25(450) - 103
\]

\[
= 132.5 - 103
\]

\[
= 29.5
\]

*Therefore, the government budget surplus decreases to 29.5.*

Net Export = \( X - IM \)

\[
= 37 - (15 + 0.10Y_2)
\]

\[
= 22 - 0.10(450)
\]

\[
= 22 - 45
\]

\[
= -23
\]

*Therefore, the level of net export is -23 (trade deficit increases to 23).*
c. Now assume that, instead of changing G according to your recommendation, the government decides to reduce the tax rate to 7.5% to remove the existing output gap. Calculate the effects of this tax-cut on the aggregate expenditure function, multiplier, equilibrium level of real GDP, the government budget balance and net export. Show the new equilibrium in a diagram. [8 marks]

With the new reduced tax rate of 7.5%, the tax function changes to:

\[ T = 20 + 0.075Y \]

Let \( AE_3 \) denote aggregate expenditures for part (c).

\[ AE_3 = C + I + G + X - IM \]
\[ = 60 + 0.80Y_d + 56 + 40 + 37 - 15 - 0.10Y \]
\[ = 60 + 0.80[Y-20-0.075Y] + 118 -0.10Y \]
\[ = 178 + 0.80[0.925Y-20] - 0.10Y \]
\[ = 178 +0.74Y -16 -0.10Y \]
\[ = 162 + 0.64Y \]

**So, the Aggregate expenditure(AE) as a function of Y is \( AE_3 = 162+0.5Y \)**

At the equilibrium, \( Y = AE_3 \)

or, \( Y = 162 + 0.64Y \)

or, \( 0.36Y = 162 \)

or, \( Y = 162/0.36 \)

\( Y = 450 \)

**Therefore, the equilibrium level of real GDP, \( Y_3 = 324. This new equilibrium of the economy is illustrated in Figure 1.**

Multiplier = \( 1/ (1 - \text{slope of } AE_1 \text{ function}) \)

\[ = 1/ (1 - 0.36) \]
\[ = 2.78 \]

**Therefore, the new value of the multiplier is 2.78.**
Government Budget balance \[ = T - G \]
\[ = 20 + 0.075Y_3 - 40 \]
\[ = 20 + 0.075(450) - 40 \]
\[ = 53.75 - 40 \]
\[ = 13.75 \]

*Therefore, the government budget surplus decreases to 13.75.*

Net Export \[ = X - IM \]
\[ = 37 - (15 + 0.10Y_2) \]
\[ = 22 - 0.10(450) \]
\[ = 22 - 45 \]
\[ = -23 \]

*Therefore, the level of net export is -23 (current account or trade deficit increases to 23 compared to the trade deficit found in part (a)).*

**C2.**

Indicate how each of the following transactions is entered into the Canadian balance of payments accounts and determine the effect of the transaction on the balances of the current account, the financial account, and the capital account, and on the official settlements balance.

**A.** A U.S. tourist visits Canada and buys $100 CDN worth of maple syrup to take home, paying Canadian cash for the purchase.

**B.** A U.S. tourist visits Canada and buys $100 CDN worth of maple syrup to take home, paying $73 U.S. cash for the purchase.

**C.** A Canadian resident receives $60 USD when a U.S. treasury bill that she originally paid $50 USD for matures. She puts the cash under her mattress.

**D.** Consider the same transaction as in part (C), but the Canadian sells the $60 USD to the Bank of Canada in exchange for Canadian currency.

**E.** Canadian banks forgive $1 billion CDN in debt owed to them by the government of Brazil.
C2(A).

The export of the maple syrup from Canada is entered as a $100 credit to the Canadian current account. The transfer of the Canadian cash from the U.S. resident to the Canadian resident is a decrease in the holdings of a domestic asset (the Canadian cash) by a foreign resident. This is entered as a debit of $100 into the Canadian financial account. The current account balance rises by $100 while the financial account balance falls by $100. All other balances remain unchanged.

C2(B).

The export of the maple syrup from Canada is entered as a $100 credit to the Canadian current account. The transfer of the U.S. cash from the U.S. resident to the Canadian resident is an increase in the holdings of a foreign asset (the U.S. cash) by a domestic resident. This is entered as a debit equal to the Canadian dollar equivalent of $73 U.S. dollars into the Canadian financial account. Let us assume that the exchange rate at the time of the transaction is .73 USD per one unit of Canadian currency so that the debit to the financial account enters as $100 CDN. The current account balance rises by $100 while the financial account balance falls by $100. All other balances remain unchanged.

C2(C).

The cashing-in of the U.S. treasury bill by the Canadian resident represents a decrease in foreign assets held by a domestic resident and is a credit of $50 USD to the Canadian financial account. The interest payment is interest income received by a domestic resident from a foreign source and enters as a credit of $10 USD in the Canadian current account. The payment of the U.S. cash is an increase in foreign assets held by a domestic resident and enters as a debit of $60 USD in the Canadian financial account. Thus, the current account rises by $10 USD and the financial account decreases by $10 USD. All other account balances are unaffected.

C2(D).

The cashing-in of the U.S. treasury bill and the interest payment are entered as described in (C) above, noting that the entries in the financial account are to the non-reserve portion of the financial account. Now, when the investor sells the U.S. dollars to the Bank of Canada, the foreign asset (the U.S. dollars), is transferred from a domestic resident to the central bank and the transaction affects the sub-accounts of the financial account. The transaction is entered as a credit of $60 USD to the reserve portion of the financial account and as a debit of $60 USD to the non-reserve portion of the financial account. Therefore, turning to the final effects on balances, we see that the current account increases by $10 USD and the financial account decreases by $10 USD. Furthermore, the official settlements balance (a sub-account of the financial account) which is the sum of the current account balance, the capital account balance, the non-reserve portion of the
financial account balance, and the statistical discrepancy decreases by $60 USD because the current account balance increases by $10 USD while the non-reserve portion of the financial account decreases by $70 USD (-$10 from the initial transaction plus -$60 from the sale of the currency to the Bank of Canada). All other account balances are unaffected.

C2(E).

In this case the Canadian banks make a capital transfer of $1 billion CDN to the government of Brazil and this enters as a debit in the Canadian capital account. The Brazilian debt is an asset to the Canadian banks and when they forgive $1 billion CDN of that debt, their holdings of a foreign asset fall. Hence, this is a decrease in foreign assets held by a domestic agent and enters as a $1 billion CDN credit to the Canadian financial account. Thus, the capital account balance falls by $1 billion CDN and the financial account rises by $1 billion. The balances of all other accounts are unaffected.
C3.

Use the asset approach to exchange rate determination discussed in class to answer the following questions. The interest rate on US$-denominated assets maturing in one year is 10\% and the interest rate on comparable Canadian$-denominated assets is 8\%.

A. Consider two possible expectations for the direct spot exchange rate between the Canadian dollar and the U.S. dollar (Canadian dollars per one U.S. dollar) in one year: (1) the spot rate will fall by 5 Canadian cents or (2) the spot rate will rise by 3 Canadian cents (note that these changes are in absolute levels, \textit{not} in percentage terms). Determine the current equilibrium spot rate under each scenario. Explain which expectation for the future spot rate makes sense, justify your answer, and provide economic intuition for your result.

B. Using the expectation scenario from part (A) that makes sense, determine the equilibrium spot rate when the US interest rate rises to 12\%. Determine whether the Canadian dollar appreciated or depreciated in response to this change and provide economic intuition for your finding.

C. Suppose, instead, that the spot rate is expected to decrease by $\alpha$ percent over the next year. Explain whether or not you can determine the equilibrium spot rate in this scenario and justify your answer. Determine the value of $\alpha$ which is consistent with our model.

D. Suppose interest rates are as given initially (10\% and 8\%) and the current spot rate equals 2 Canadian$ per U.S.$$. Calculate the forward discount or forward premium.
Consider the U.S. as a foreign country and Canada as a home country. Recall that uncovered interest parity (UIRP) can be written as follows:

$$ R_{CDNs} = R_{US$} + \frac{E^e_{CDNs/US$} - E_{CDNs/US$}}{E_{CDNs/US$}} $$

Under the first scenario for expectations we have $E^e_{CDNs/US$} - E_{CDNs/US$} = -0.05$.

Substituting this into the UIRP equation gives

$$ R_{CDNs} = R_{US$} + \frac{-0.05}{E_{CDNs/US$}} $$

Substituting in the interest rates given in the problem into this equation gives

$E_{CDNs/US$} = 2.5$

Under the second scenario for expectations we have $E^e_{CDNs/US$} - E_{CDNs/US$} = 0.03$.

Substituting this into the UIRP equation gives

$$ R_{CDNs} = R_{US$} + \frac{0.03}{E_{CDNs/US$}} $$

Substituting in the interest rates given in the problem into this equation gives

$E_{CDNs/US$} = -1.5$

Since exchange rates must be positive, only the first scenario for expectations makes sense. The economic reason is that since the foreign (U.S.) interest rate is above the home (Canada) interest rate, investors would be willing to invest in the home asset (which is paying the lower rate of return) only if they expect the home currency to appreciate in the future. Hence, the only expectations which are consistent with foreign interest rates above home interest rates is a belief that the future spot rate will be below the current spot rate, that is $E^e < E$. This is consistent with the first scenario but not the second.

C3 (B).

Substituting $R_{US$} = 0.12$ and $R_{CDNs} = 0.08$ into equation (1) above gives us a new spot rate of $E_{CDNs/US$} = 1.25$ which is below the spot rate of 2.5 calculated in part (A). Hence the rise in the U.S. interest rate led to an appreciation of the Canadian dollar. At first glance, this seems inconsistent with the comparative statics exercise we did in class that stated that *ceteris paribus*, a rise in $R_{US$} should lead to a rise in $E_{CDNs/US$}, that is a
depreciation of the home currency. So, why do we get the opposite result in this example? In this exercise, we are not holding expectations of the future spot rate constant. So, this is not a ceteris paribus exercise. The intuition, then, is that an increase in the U.S. interest rate increases the spread between home and foreign interest rates, making the home investment less attractive. Thus, investors will be willing to continue to hold the home asset only if they believe there will be a larger appreciation of the home currency. Given the way we have formulated expectations here, the only way they could believe there will be a larger appreciation in the future is if the current spot rate falls. Thus the result will be a fall in the current spot rate or a current appreciation of the home currency.

C3 (C).

Our expectation of the future spot rate in this case can be written as,

\[
\frac{E_{CDNS/USD} - E_{CDNS/USD}}{E_{CDNS/USD}} = -\alpha.
\]

Substituting this into the UIRP equation gives:

\[
R_{CDNS} = R_{USD} - \alpha.
\]

Note that the current spot rate, \(E_{CDNS/USD}\) drops out of this equation and we are left with

\[
\alpha = R_{USD} - R_{CDNS}.
\]  

Therefore, we cannot determine the equilibrium spot rate, we can only determine the equilibrium percentage depreciation. This occurs because the relative spread in the interest rate can be supported by many different current exchange rates but only by a unique percentage depreciation. Substituting in for the interest rates into the equation (2), we derive

\[
\alpha = 0.02.
\]
C3 (D).

We first calculate the forward rate, $F_{CDN/US}$, using covered interest parity (CIRP):

$$R_{CDN} = R_{US} + \frac{F_{CDN/US} - E_{CDN/US}}{E_{CDN/US}}$$

or

$$0.08 = 0.10 + \frac{F_{CDN/US} - 2}{2}$$

or

$$F_{CDN/US} = 1.96$$

We calculate the forward discount rate as follows:

$$FD = \left(\frac{F_{CDN/US} - E_{CDN/US}}{E_{CDN/US}}\right) \times 100 = \left(\frac{1.96 - 2}{2}\right) \times 100 = -2.0\%.$$  

Since the forward rate (1.96) is below the current spot rate (2.00), the U.S. dollar is said to be at forward discount of 2\%. 
