Problem Set 2 Answers

Chapter 4 #2, 3, 4, 5, 6, 7, and 9 (on pages 102-103)

2. a. When the Fed buys bonds, the dollars that it pays to the public for the bonds increase the monetary base, and this in turn increases the money supply. The money multiplier is not affected, assuming no change in the reserve–deposit ratio or the currency–deposit ratio.

b. When the Fed increases the interest rate, it pays banks to hold reserves. This gives banks an incentive to hold more reserves relative to deposits. The increase in the reserve deposit ratio will decrease the money multiplier. The decline in the money multiplier will lead to a decrease in the money supply. Since banks are holding more reserves (because they are making fewer loans), the monetary base will increase.

c. If the Fed reduces its lending to banks through the Term Auction Facility, then the monetary base will decrease, and this in turn will decrease the money supply. The money multiplier is not affected, assuming no change in the reserve–deposit ratio or the currency–deposit ratio.

d. If consumers lose confidence in ATMs and prefer to hold more cash, then the currency–deposit ratio will increase, and this will reduce the money multiplier. The money supply will fall because banks have fewer reserves to lend. The monetary base will increase because people are holding more currency, but will decrease because banks are holding fewer reserves. The net effect on the monetary base is zero.

e. If the Fed drops newly minted $100 bills from a helicopter, then this will increase the monetary base and the money supply. If any of the currency ends up in the bank, then there will be a further increase in the money supply. If people end up holding more currency relative to deposits, then the money multiplier would fall.

3. a. If all money is held as currency, then the money supply is equal to the monetary base. The money supply will be $1,000.

b. If all money is held as deposits, but banks hold 100 percent of deposits on reserve, then there are no loans. The money supply will be $1,000.

c. If all money is held as deposits and banks hold 20 percent of deposits on reserve, then the reserve–deposit ratio is 0.20. The currency–deposit ratio is 0, and the money multiplier will be 1/0.2, or 5. The money supply will be $5,000.

d. If people hold an equal amount of currency and deposits, then the currency–deposit ratio is 1. The reserve–deposit ratio is 0.2 and the money multiplier is \((1 + 1)/(1 + 0.2) = 1.67\). The money supply will be $1,666.67.

e. The money supply is proportional to the monetary base and is given by \(M = m \times B\), where \(M\) is the money supply, \(m\) is the money multiplier, and \(B\) is the monetary base. Since \(m\) is a constant number defined by the currency–deposit ratio and the reserve–deposit ratio, a 10-percent increase in the monetary base \(B\) will lead to a 10-percent increase in the money supply \(M\).

4. a. The money supply is equal to currency plus demand deposits or $5,000. The monetary base is equal to currency plus reserves. If we assume banks are not holding any excess reserves, then reserves must be 25 percent of deposits, or $1,000. In this case the monetary base is equal to $2,000. The money multiplier is equal to the money supply divided by the monetary base, or 2.5. Alternatively, the money multiplier can be calculated using the formula \(m = (cr+1)/(cr+rr)\), where \(cr\) is the currency deposit ratio (0.25) and \(rr\) is the reserve deposit ratio (0.25).
b. The bank balance sheet is illustrated below. If we assume the bank is not holding any excess reserves then reserves in the bank are 25 percent of deposits, or $1,000. This means outstanding loans must be $3,000.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>$1,000</td>
</tr>
<tr>
<td>Loans</td>
<td>$3,000</td>
</tr>
<tr>
<td>Deposits</td>
<td>$4,000</td>
</tr>
<tr>
<td>Loans</td>
<td>$3,000</td>
</tr>
</tbody>
</table>

Table 4-1

c. To increase the money supply the central bank should buy government bonds because this will increase reserves in the banking system, allowing loans, deposits, and the money supply to increase. We know that $M = mB$, so $\Delta M = m \times \Delta B$. If the central bank wants the money supply to increase by 10 percent then they want the change in the money supply to equal $400. We know the money multiplier is 2.5 so therefore the monetary base must increase by $160, meaning the central bank must buy $160 of government bonds.

5. a. Given that banks hold one third of their deposits on reserve, the reserve deposit ratio ($rr$) is $1/3$. Given that people hold one third of their money in currency and two thirds in deposits, we can express the currency deposit ratio as

$$cr = \frac{Cu}{D} = \frac{1}{3} \frac{M}{M} = \frac{1}{2}.$$ 

Therefore, the money multiplier is equal to

$$m = \frac{cr + 1}{cr + rr} = \frac{\frac{1}{2} + 1}{\frac{1}{2} + \frac{1}{3}} = 1.8.$$ 

The money supply is equal to the monetary base times the money multiplier, or $1,800.

b. If people hold half of their money in currency, then currency holdings are equal to deposits, and the currency deposit ratio is equal to 1. Therefore, the money multiplier is equal to 1.5, and the money supply is equal to $1,500.

c. The central bank wants to increase the money supply by $300 so they will need to buy government bonds. We know $\Delta M = m \times \Delta B$, so therefore $300 = 1.5 \times \Delta B$, and the central bank will want to buy $200 of government bonds.

6. The model of the money supply developed in Chapter 4 shows that

$$M = mB.$$ 

The money supply $M$ depends on the money multiplier $m$ and the monetary base $B$. The money multiplier can also be expressed in terms of the reserve–deposit ratio $rr$ and the currency–deposit ratio $cr$. Rewriting the money supply equation:

$$M = \left[ \frac{(cr + 1)}{(cr + rr)} \right] B.$$ 

This equation shows that the money supply depends on the currency–deposit ratio, the reserve–deposit ratio, and the monetary base.
To answer parts (a) through (c), we use the values for the money supply, the monetary base, the money multiplier, the reserve–deposit ratio, and the currency–deposit ratio from Table 4-2:

<table>
<thead>
<tr>
<th></th>
<th>August 1929</th>
<th>March 1933</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money supply</td>
<td>26.50</td>
<td>19.00</td>
</tr>
<tr>
<td>Monetary base</td>
<td>7.10</td>
<td>8.40</td>
</tr>
<tr>
<td>Money multiplier</td>
<td>3.70</td>
<td>2.30</td>
</tr>
<tr>
<td>Reserve–deposit ratio</td>
<td>0.14</td>
<td>0.21</td>
</tr>
<tr>
<td>Currency–deposit ratio</td>
<td>0.17</td>
<td>0.41</td>
</tr>
</tbody>
</table>

a. To determine what would happen to the money supply if the currency–deposit ratio had risen but the reserve–deposit ratio had remained the same, we need to recalculate the money multiplier and then plug this value into the money supply equation $M = mB$. To recalculate the money multiplier, use the 1933 value of the currency–deposit ratio and the 1929 value of the reserve–deposit ratio:

$$m = \frac{(cr_{1933} + 1)}{(cr_{1933} + rr_{1929})}$$

$$m = \frac{(0.41 + 1)}{(0.41 + 0.14)}$$

$$m = 2.56.$$  

To determine the money supply under these conditions in 1933:

$$M_{1933} = mB_{1933}.$$  

Plugging in the value for $m$ just calculated and the 1933 value for $B$:

$$M_{1933} = 2.56 \times 8.4$$

$$M_{1933} = 21.504.$$  

Therefore, under these circumstances, the money supply would have fallen from its 1929 level of 26.5 to 21.504 in 1933.

b. To determine what would have happened to the money supply if the reserve–deposit ratio had risen but the currency–deposit ratio had remained the same, we need to recalculate the money multiplier and then plug this value into the money supply equation $M = mB$. To recalculate the money multiplier, use the 1933 value of the reserve–deposit ratio and the 1929 value of the currency–deposit ratio:

$$m = \frac{(cr_{1929} + 1)}{(cr_{1929} + rr_{1933})}$$

$$m = \frac{(0.17 + 1)}{(0.17 + 0.21)}$$

$$m = 3.09.$$  

To determine the money supply under these conditions in 1933:

$$M_{1933} = mB_{1933}.$$  

Plugging in the value for $m$ just calculated and the 1933 value for $B$:

$$M_{1933} = 3.09 \times 8.4$$

$$M_{1933} = 25.96.$$  

Therefore, under these circumstances, the money supply would have fallen from its 1929 level of 26.5 to 25.96 in 1933.

c. From the calculations in parts (a) and (b), it is clear that the decline in the currency–deposit ratio was most responsible for the drop in the money multiplier and, therefore, the money supply.
7. a. The introduction of a tax on checks makes people more reluctant to use checking accounts as a means of exchange. Therefore, they hold more cash for transactions purposes, raising the currency–deposit ratio \( cr. \)

b. The money supply falls because the money multiplier, \( \frac{cr + 1}{cr + rr} \), is decreasing in \( cr. \) Intuitively, the higher the currency–deposit ratio, the lower the proportion of the monetary base that is held by banks in the form of reserves and, hence, the less money banks can create.

c. The check tax was not a good policy to implement in the middle of the Great Depression because it resulted in a decrease in the money supply as people preferred to pay in currency rather than write a check. Banks had fewer reserves and were able to make fewer loans.

9. a. JPM’s balance sheet is illustrated below. We know reserves are equal to $3,000 because total assets must equal total liabilities.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities and Owners’ Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves $3,000</td>
<td>Deposits $14,000</td>
</tr>
<tr>
<td>Loans $10,000</td>
<td>Debt $4,000</td>
</tr>
<tr>
<td>Securities $7,000</td>
<td>Capital (owners’ equity) $2,000</td>
</tr>
</tbody>
</table>

The leverage ratio is the ratio of a bank’s total assets to its bank capital, or 10.

b. If the value of the bank’s assets fall by 5 percent due to loan default, and deposits and debt do not change, then the value of owners’ equity will fall by 5 percent of the asset value. Loans and owner’s equity both fall by $500. Owners’ equity (JPM’s capital) fell by 25 percent.

<table>
<thead>
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<th>Assets</th>
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<tbody>
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<td>Debt $4,000</td>
</tr>
<tr>
<td>Securities $7,000</td>
<td>Capital (owners’ equity) $1,500</td>
</tr>
</tbody>
</table>

Chapter 5 #1, 2, 3, and 4 (on pages 133-34) and Appendix problem #1 (on page 137)

1. a. To find the growth rate of nominal GDP, we start with the quantity equation \( MV = PY \), and note that \( PY \) is equal to nominal GDP, or the value of the goods and services produced measured in current dollars. If we express this formula in percentage change form we have:

\[
\% \text{ Change in } M + \% \text{ Change in } V = \% \text{ Change in } PY.
\]

If we assume the percentage change in velocity is zero, then the percentage change in nominal GDP is equal to the percentage change in the money supply, or 8 percent.

b. To find the inflation rate, express the quantity equation in percentage change form:

\[
\% \text{ Change in } M + \% \text{ Change in } V = \% \text{ Change in } P + \% \text{ Change in } Y.
\]

Rearranging this equation tells us that the inflation rate is given by:

\[
\% \text{ Change in } P = \% \text{ Change in } M + \% \text{ Change in } V - \% \text{ Change in } Y.
\]

Substituting the information given in the problem, we thus find:
% Change in $P = 8\% + 0\% - 3\%$
= 5\%.

c. The real interest rate is 4 percent: the nominal interest rate of 9 percent minus the inflation rate of 5 percent.

2. The money demand function is given as

$$\left(\frac{M}{P}\right)^d = kY.$$  

a. To find the average inflation rate the money demand function can be expressed in terms of growth rates:

$$\% \text{ Growth } M^d - \% \text{ Growth } P = \% \text{ Growth } Y.$$  

The parameter $k$ is a constant, so it can be ignored. The percentage change in nominal money demand $M^d$ is the same as the growth in the money supply because nominal money demand has to equal nominal money supply. If nominal money demand grows 12 percent and real income ($Y$) grows 4 percent then the growth of the price level or the inflation rate is 8 percent.

b. From the answer to part (a), it follows that an increase in real income growth will result in a lower average inflation rate. For example, if real income grows at 6 percent and money supply growth remains at 12 percent, then inflation falls to 6 percent. In this case, a larger money supply is required to support a higher level of GDP, resulting in lower inflation.

c. The parameter $k$ defines how much money people want to hold for every dollar of income. The parameter $k$ is inversely related to the velocity of money. All else remaining the same, if people are holding fewer dollars, then each dollar must be used more times to purchase the same quantity of goods and services.

d. If velocity growth is positive, then all remaining else the same inflation will be higher. From the quantity equation we know that:

$$\% \text{ Growth } M + \% \text{ Growth } V = \% \text{ Growth } P + \% \text{ Growth } Y.$$  

Suppose that the money supply grows by 12 percent and real income grows by 4 percent. When velocity growth is zero, inflation is 8 percent. Suppose now that velocity grows 2 percent; this will cause prices to grow by 10 percent. Inflation increases because the same quantity of money is being used more often to purchase the same amount of goods. In this case, the money supply should grow more slowly to compensate for the positive growth in velocity.

3. a. To find an expression for the velocity of money, start with the quantity equation $MV = PY$, and rewrite this as $M/P = Y/V$. In equilibrium real money supply $M/P$ is equal to real money demand so:

$$\frac{Y}{v} = \frac{.2Y}{\frac{1}{12}}$$

$$\frac{.2v}{\frac{1}{12}}$$

$$v = 5\frac{1}{12}.$$  

Velocity depends positively on the nominal interest rate because when nominal interest rates are higher, there is an incentive to hold less money. If people are holding less money, then the dollars they are holding will be used more often and velocity will increase.
b. If the nominal interest rate is 4 percent then velocity is equal to 10.

c. We can rewrite the real money demand equation as:

\[ M^d = P \times \frac{2Y}{i^2} \]

In equilibrium nominal money demand is equal to nominal money supply so \( M^d \) is equal to $1,200. Given output \( Y \) is 1,000 and the nominal interest rate is 4 percent we find the price level is 12.

d. According to the Fisher effect, a 5 percent increase in expected inflation will increase the nominal interest rate by 5%, so the new nominal interest rate is 9 percent.

e. The new velocity of money is 15.

f. The new price level is 18. The increase in the expected inflation rate will reduce the real demand for money. As a result the price level must rise to balance real money supply and real money demand, given nominal money supply did not change. This follows from the equation:

\[ \text{Real Money Demand} = \frac{M}{P}. \]

g. The money supply should be set at 800.

4. The money demand function is given as

\[ \left( \frac{M}{P} \right)^d = L(i, Y) = \frac{Y}{5i}. \]

a. If output \( Y \) grows at rate \( g \), then real money balances \( (M/P)^d \) must also grow at rate \( g \), given that the nominal interest rate \( i \) is a constant.

b. To find the velocity of money, start with the quantity equation \( MV = PY \) and rewrite the equation as \( V = (PY)/M = (P/M)Y \). Now, note that \( P/M \) is the inverse of the real money supply, which is equal to real money demand. Therefore, the velocity of money is \( V = (5i/Y) \times Y \), or \( V = 5i \).

c. If the nominal interest rate is constant, then the velocity of money must be constant.

d. A one-time increase in the nominal interest rate will cause a one-time increase in the velocity of money. There will be no further changes in the velocity of money.

e. To achieve a target inflation rate of \( \pi \) the nominal money supply must grow at rate \( \pi \). For a given level of real output \( Y \) and a given velocity of money \( v \), the percentage change in the money supply \( M \) will equal the percentage change in the price level \( P \).

Appendix to Chapter 5

1. With constant money growth at rate \( \mu \), the question tells us that the Cagan model implies that \( p_t = m_t + \gamma \mu \). This question draws out the implications of this equation.

   a. One way to interpret this result is to rearrange to find:

   \[ m_t - p_t = -\gamma \mu. \]
That is, real balances depend on the money growth rate. As the growth rate of money rises, real balances fall. This makes sense in terms of the model in this chapter, since faster money growth implies faster inflation, which makes it less desirable to hold money balances.

b. With unchanged growth in the money supply, the increase in the level of the money supply \( m_t \) increases the price level \( \pi \), one-for-one.

c. With unchanged current money supply \( m_t \), a change in the growth rate of money \( \mu \) changes the price level in the same direction.

d. When the central bank reduces the rate of money growth \( \mu \), the price level will immediately fall. To offset this decline in the price level, the central bank can increase the current level of the money supply \( m_t \), as we found in part (b). These answers assume that, at each point in time, private agents expect the growth rate of money to remain unchanged. So the change in policy takes them by surprise—but once it happens, it is completely credible. A practical problem is that the private sector might not find it credible that an increase in the current money supply signals a decrease in future money growth rates. In that case, they might expect future money supply rates to be adjusted by the rise in current money supply rates, leading to incorrect future predictions.

e. If money demand does not depend on the expected rate of inflation, then the price level changes only when the money supply itself changes. That is, changes in the growth rate of money \( \mu \) do not affect the price level. In part (d), the central bank can keep the current price level \( \pi_t \) constant simply by keeping the current money supply \( m_t \), constant.

Chapter 6 #2, 4, 7, 9, and 11 (on pages 170-172) and Appendix problem #1 (on page 182)

2. a. We are given output \( Y \), taxes \( T \), and government spending \( G \). The consumption function allows us to solve for consumption \( C \).

Private saving is 
\[
S_{\text{private}} = Y - C - T = 8,000 - (500 + 2/3(8,000-2,000)) - 2,000 = 1,500
\]

Public saving is 
\[
S_{\text{public}} = T - G = 2,000 - 2,500 = -500
\]

National saving is the amount of output that is not purchased for current consumption by households or the government. Hence, national saving is given by:
\[
S = Y - C - G
\]
\[
= 8,000 - [500 + (2/3)(8,000 - 2,000)] - 2,500
\]
\[
= 1,000.
\]

Investment depends negatively on the interest rate, which equals the world rate \( r^* \) of 8. Thus,
\[
I = 900 - 50 \times 8
\]
\[
= 500.
\]

Net exports equals the difference between saving and investment. Thus,
\[
NX = S - I
\]
\[
= 1,000 - 500
\]
\[
= 500.
\]

Having solved for net exports, we can now find the exchange rate that clears the foreign-exchange market:
\[
NX = 1,500 - 250 \times \epsilon
\]
\[
500 = 1,500 - 250 \times \epsilon
\]
\[ \varepsilon = 4. \]

b. Performing the same analysis with the new value of government spending we find:

Private saving = \( Y - C - T = 1,500 \)
Public saving = \( T - G = 2,000 - 2,000 = 0 \)

\[
S = Y - C - G \\
= 8,000 - [500 + (2/3)(8,000 - 2,000)] - 2,000 \\
= 1,500 \\
\]

\[
I = 900 - 50 \times 8 \\
= 500 \\
\]

\[
NX = S - I \\
= 1,500 - 500 \\
= 1,000 \\
\]

\[
NX = 1,500 - 250 \times \varepsilon \\
1,000 = 1,500 - 250 \times \varepsilon \\
\varepsilon = 2. \]

The decrease in government spending increases national saving, but with an unchanged world real interest rate, investment remains the same. Therefore, national saving now exceeds domestic investment by a larger amount, so the excess saving will flow abroad in the form of net capital outflow. The real exchange rate will decrease, the nominal exchange rate will depreciate, and this will cause net exports to rise.

c. Repeating the same steps with the new interest rate,

Private saving = \( Y - C - T = 1,500 \)
Public saving = \( T - G = 2,000 - 2,500 = -500 \)

\[
S = Y - C - G \\
= 8,000 - [500 + (2/3)(8,000 - 2,000)] - 2,500 \\
= 1,000 \\
\]

\[
I = 900 - 50 \times 3 \\
= 750 \\
\]

\[
NX = S - I \\
= 1,000 - 750 \\
= 250 \\
\]

\[
NX = 1,500 - 250 \times \varepsilon \\
250 = 1,500 - 250 \times \varepsilon \\
\varepsilon = 5. \]

Saving is unchanged from part (a), but the lower world interest rate increases investment. The increase in investment will reduce the amount of capital outflow and the real exchange rate will increase. The nominal exchange rate will appreciate and net exports will fall.

4. The increase in government spending decreases government saving and, thus, decreases national saving. This shifts the saving schedule to the left, as in Figure 6-8. Given the world interest rate \( r^* \), the decrease in domestic saving causes the trade balance to fall.
Figure 6-9 shows the impact of this increase in government purchases on the real exchange rate. The decrease in national saving causes the $S - I$ schedule to shift to the left, lowering the supply of dollars to be invested abroad. The lower supply of dollars causes the equilibrium real exchange rate to rise. As a result, domestic goods become more expensive relative to foreign goods, which causes exports to fall and imports to rise. In other words, as we determined in Figure 6-8, the trade balance falls.

The answer to this question does depend on whether this is a local war or a world war. A world war causes many governments to increase expenditures; this increases the world interest rate $r^*$. The effect on a country’s external accounts depends on the size of the change in the world interest rate relative to the size of the decrease in saving. For example, an increase in the world interest rate could cause a country to have a smaller trade deficit, as in Figure 6-10, or even a trade surplus, as in Figure 6-11.
7. The predicted and actual exchange rate in Hagrid are equal to 1 since Hagrid is the country that all other countries are being compared to. The price of butterbeer in Hermiona is equal to 400 galleons. We are given the predicted exchange rate of 80 galleons per fluffy and this is equal to the price of butterbeer in galleons divided by 5 fluffies per butterbeer in Hagrid. In Potterstan the predicted exchange rate is 12 sickles per fluffy, calculated as 60 sickles per butterbeer divided by 5 fluffies per butterbeer. In Ronland we do not have enough information to determine the actual exchange rate.

9. a. If the countries that institute an investment tax credit are large enough to shift the world investment demand schedule, then the tax credits shift the world investment demand schedule
upward, as in Figure 6-14.

b. The world interest rate increases from $r^*_1$ to $r^*_2$ because of the increase in world investment demand; this is shown in Figure 6-15. (Remember that the world is a closed economy.)

c. The increase in the world interest rate increases the required rate of return on investments in Oceana. Because the investment schedule slopes downward, we know that a higher world interest rate means lower investment, as in Figure 6-15.

d. Given that our saving has not changed, the higher world interest rate means that our trade balance increases, as in Figure 6-16.
e. The increase in the world interest rate reduces domestic investment, which increases the supply of dollars that are available to invest abroad. The domestic currency becomes less valuable, and domestic goods become less expensive relative to foreign goods. The real exchange rate falls, as is shown in Figure 6-17.

11. a. The Fisher equation says that

\[ i = r + \pi^e \]

where

- \( i \) = the nominal interest rate
- \( r \) = the real interest rate (same in both countries)
- \( \pi^e \) = the expected inflation rate.

Plugging in the values given in the question for the nominal interest rates for each country, we find:

\[ 12 = r + \pi^e_{\text{Can}} \]
\[ 8 = r + \pi^e_{\text{US}} \]

This implies that

\[ \pi^e_{\text{Can}} - \pi^e_{\text{US}} = 4. \]

Because we know that the real interest rate \( r \) is the same in both countries, we conclude that expected inflation in Canada is four percentage points higher than in the United States.
b. As in the text, we can express the nominal exchange rate as

\[ e = \varepsilon \times (P_{\text{Can}}/P_{\text{US}}), \]

where

\[ \varepsilon = \text{the real exchange rate} \]
\[ P_{\text{Can}} = \text{the price level in Canada} \]
\[ P_{\text{US}} = \text{the price level in the United States}. \]

The change in the nominal exchange rate can be written as:

\[ \% \text{ Change in } e = \% \text{ Change in } \varepsilon + (\pi_{\text{Can}} - \pi_{\text{US}}). \]

We know that if purchasing-power parity holds, then a dollar must have the same purchasing power in every country. This implies that the percent change in the real exchange rate \( \varepsilon \) is zero because purchasing-power parity implies that the real exchange rate is fixed. Thus, changes in the nominal exchange rate result from differences in the inflation rates in the United States and Canada. In equation form this says:

\[ \% \text{ Change in } e = (\pi_{\text{Can}} - \pi_{\text{US}}). \]

Because people know that purchasing-power parity holds, they expect this relationship to hold. In other words, the expected change in the nominal exchange rate equals the expected inflation rate in Canada minus the expected inflation rate in the United States. That is,

\[ \text{Expected } \% \text{ change in } e = \pi_{\text{Can}}^e - \pi_{\text{US}}^e. \]

In part (a), we found that the difference in expected inflation rates is 4 percent. Therefore, the expected change in the nominal exchange rate \( e \) is 4 percent.

c. The problem with your friend’s scheme is that it does not take into account the change in the nominal exchange rate \( e \) between the U.S. and Canadian dollars. Given that the real interest rate is fixed and identical in the United States and Canada, and given purchasing-power parity, we know that the difference in nominal interest rates accounts for the expected change in the nominal exchange rate between U.S. and Canadian dollars. In this example, the Canadian nominal interest rate is 12 percent, while the U.S. nominal interest rate is 8 percent. We conclude from this that the expected change in the nominal exchange rate is 4 percent. Therefore,

\[ e \text{ this year} = 1 \text{ C$/US$}. \]
\[ e \text{ next year} = 1.04 \text{ C$/US$}. \]

Assume that your friend borrows 1 U.S. dollar from an American bank at 8 percent, exchanges it for 1 Canadian dollar, and puts it in a Canadian Bank. At the end of the year your friend will have $1.12 in Canadian dollars. But to repay the American bank, the Canadian dollars must be converted back into U.S. dollars. The $1.12 (Canadian) becomes $1.08 (American), which is the amount owed to the U.S. bank. So in the end, your friend breaks even. In fact, after paying for transaction costs, your friend loses money.

Appendix to Chapter 6

1. a. As shown in Figure 6-18, an increase in government purchases reduces national saving. This reduces the supply of loans and raises the equilibrium interest rate. This causes both domestic investment and net capital outflow to fall. The fall in net capital outflow reduces the supply of
dollars to be exchanged into foreign currency, so the exchange rate appreciates and the trade balance falls.

Figure 6-18

b. As shown in Figure 6-19, the increase in demand for exports shifts the net exports schedule outward. Since nothing has changed in the market for loanable funds, the interest rate remains the same, which in turn implies that net capital outflow remains the same. The shift in the net exports schedule causes the exchange rate to appreciate. The rise in the exchange rate makes U.S. goods more expensive relative to foreign goods, which depresses exports and stimulates imports. In the end, the increase in demand for American goods does not affect the trade balance.
Figure 6-19

A. The Market for Loanable Funds

B. Net Capital Outflow

C. The Market for Foreign Exchange
c. As shown in Figure 6-20, the U.S. investment demand schedule shifts inward. The demand for loans falls, so the equilibrium interest rate falls. The lower interest rate increases net capital outflow. Despite the fall in the interest rate, domestic investment falls; we know this because $I + CF$ does not change, and $CF$ rises. The rise in net capital outflow increases the supply of dollars in the market for foreign exchange. The exchange rate depreciates, and net exports rise.
d. As shown in Figure 6-21, the increase in saving increases the supply of loans and lowers the equilibrium interest rate. This causes both domestic investment and net capital outflow to rise. The increase in net capital outflow increases the supply of dollars to be exchanged into foreign currency, so the exchange rate depreciates and the trade balance rises.

Figure 6-21
e. The reduction in the willingness of Americans to travel abroad reduces imports, since foreign travel counts as an import. As shown in Figure 6-22, this shifts the net exports schedule outward. Since nothing has changed in the market for loanable funds, the interest rate remains the same, which in turn implies that net capital outflow remains the same. The shift in the net exports schedule causes the exchange rate to appreciate. The rise in the exchange rate makes U.S. goods more expensive relative to foreign goods, which depresses exports and stimulates imports. In the end, the fall in Americans’ desire to travel abroad does not affect the trade balance.

**Figure 6-22**

A. The Market for Loanable Funds

B. Net Capital Outflow

C. The Market for Foreign Exchange
f. As shown in Figure 6-23, the net capital outflow schedule shifts in. This reduces demand for loans, so the equilibrium interest rate falls and investment rises. Net capital outflow falls, despite the fall in the interest rate; we know this because \( I + CF \) is unchanged and investment rises. The fall in net foreign investment reduces the supply of dollars to be exchanged into foreign currency, so the exchange rate appreciates and the trade balance falls.