EC 349
International Finance
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# Suggested Solutions to Assignment 2 (Optional)

Total Marks: 100

## Part A True/ False/ Uncertain Questions [40 Marks]

*Explain why the following statement is True, False, or Uncertain according to economic principles. Use diagrams and / or numerical examples where appropriate. Unsupported answers will receive no marks. It is the explanation that is important. Each question is worth 10 marks.*

**A1.**
**In the short-run a temporary increase in home real money supply leads to an appreciation of home currency against the foreign currency. [Diagrams Required]**

**False**

In the short-run a temporary increase in home real money supply leads to a depreciation of home currency against the foreign currency.

Consider the U.S. as the home economy and the European Union as the foreign economy. Figure 14-8 of the textbook (8th edition) shows the simultaneous equilibrium in the U.S. money market and the foreign-exchange market. It also shows the effects of an increase in the U.S. money supply on the dollar interest rate and dollar/euro exchange rate. At the initial money supply $M^1_{US}$, the money market is in equilibrium at point 1 with an interest rate $R^1_{\$}$. Given the euro interest rate and the expected future exchange rate, a dollar interest rate of $R^1_{\$}$ implies that foreign exchange market equilibrium occurs at point 1′, with an exchange rate equal to $E^1_{\$/€}$.

Given the U.S. price level $P_{US}$ and the U.S. real GDP $Y_{US}$, an increase in the U.S. money supply from $M^1_{US}$ to $M^2_{US}$ sets in train the following sequence of events: (1) At the initial interest rate $R^1_{\$}$ there is an excess supply of money in the U.S. money market, so the dollar interest rate falls to $R^2_{\$}$ as the money market reaches its new equilibrium position (point 2). (2) Given the initial exchange rate $E^1_{\$/€}$, and the new, lower interest rate on dollars, $R^2_{\$}$, the expected return on euro deposits is greater than that on dollar deposits. Holders of dollar deposits therefore try to sell them for euro deposits, which are momentarily more attractive. (3) The dollar depreciates to $E^2_{\$/€}$, as holders of dollar

deposits bid for euro deposits. The foreign exchange market is once again in equilibrium at point $2'$ because the exchange rate's move to $E^2_{\$/€}$ causes a fall in the dollar's expected future depreciation rate sufficient to offset the fall in the dollar interest rate. We conclude that in the short run, an increase in the U.S. money supply causes its currency (U.S. dollar) to depreciate in the foreign exchange market.

**A2.**
**A permanent decrease in the domestic money supply results in overshooting of the domestic exchange rate in the short-run. [Diagrams Required]**

**True**

A permanent decrease or a permanent increase in the domestic money supply results in overshooting of the domestic exchange rate in the short-run.

Consider the U.S. as the home economy and the European Union as the foreign economy. Figure 14-12 of the textbook (8th edition) shows both the short-run (Figure 14-12a) and long-run (Figure 14-12b) effects of a permanent increase in the U.S. money supply. Figure 14-12a assumes the U.S. price level is initially given at $P^1_{US}$. An increase in the nominal money supply from $M^1_{US}$ to $M^2_{US}$ therefore raises the real money supply from $M^1_{US}/P^1_{US}$ to $M^2_{US}/P^1_{US}$ in the short run, lowering the interest rate from $R^1_{\$}$ (point 1) to $R^2_{\$}$ (point 2).
As a result, the vertical schedule, which measures the dollar return on dollar deposits, shifts leftward in the top part of panel (a). Because the U.S. money supply change is permanent, people expect a long-run increase in all dollar prices, including the exchange rate, which is the dollar price of euros. A rise in the expected future dollar/euro exchange rate (a future dollar depreciation) raises the expected dollar return on euro deposits; it thus shifts the downward-sloping schedule, which measures the expected dollar return on euro deposits, in the top part of Figure 14-12a to the right. The dollar depreciates against the euro, moving from an exchange rate of $E^1_{\$/€}$ (point $1'$) to $E^2_{\$/€}$ (point $2'$).

Figure 14-12b shows how the interest rate and exchange rate behave as the price level rises during the economy's adjustment to its long-run equilibrium. The price level begins to rise from the initially given level $P^1_{US}$, eventually reaching $P^2_{US}$. Because the long-run increase in the price level must be proportional to the increase in the money supply, the final real money supply, $M^2_{US}/P^2_{US}$, is shown equal to the initial real money supply, $M^1_{US}/P^1_{US}$. Since output is given and the real money supply has returned to its original level, the equilibrium interest rate must again equal $R^1_{\$}$ in the long run (point 4). The interest rate therefore rises from $R^2_{\$}$ (point 2) to $R^1_{\$}$ (point 4) as the price level rises from $P^1_{US}$ to $P^2_{US}$. In this process of adjustment the dollar gradually appreciates against the euro as the foreign exchange market moves to its long-run position at $4'$ along the down-ward sloping schedule. The market's path is just the path traced out by the vertical dollar

interest schedule as it moves rightward because of the price level's gradual rise. In the long run (point 4′) the equilibrium exchange rate, $E^3_{\$/€}$, is higher than at the original equilibrium, point 1′. Like the price level, in the long run, the dollar/euro exchange rate has risen in proportion to the increase in the money supply. But the long-run equilibrium exchange rate, $E^3_{\$/€}$ (point 4′), is lower than the short-run equilibrium exchange rate, $E^2_{\$/€}$ (point 2′). In other words, in its initial depreciation after a money supply rise, the exchange rate jumps from $E^1_{\$/€}$ to $E^2_{\$/€}$, a depreciation greater than its long-run depreciation from $E^1_{\$/€}$ to $E^2_{\$/€}$ (see Figure 14-13d of the textbook).The exchange rate is said to overshoot when its immediate response to a disturbance is greater than its long-run response. So, we conclude that a permanent increase in the U.S. money supply leads to overshooting of the dollar/euro exchange rate in the short run. Overshooting is a direct consequence of the short-run rigidity of the price level. The economic explanation of overshooting comes from the interest parity condition.

**A3.**
**In the long-run, under the flexible-price monetary approach, a rise in the future rate of domestic money supply growth rate leads to an increase in domestic interest rates and price level, and results in an appreciation of domestic currency. [Diagrams Required]**

**False**

In the long-run , under the flexible-price monetary approach, a rise in the future rate of domestic money supply growth rate leads to an increase in domestic interest rates and price level, and results in a depreciation of domestic currency.

See Appendix to Chapter 15 of the textbook (pages 417-419 of the 8th edition) for the explanation and graph.

**A4.**
**According to the general model of long-run exchange rates which accounts for possible deviations from PPP by adding the real exchange rate as an additional determinant of the nominal exchange rate, an increase in relative U.S. output supply leads to a nominal depreciation of the dollar against the euro in the long run. [Diagrams Required]**

**Uncertain.**

According to the general model of long-run exchange rates which accounts for possible deviations from PPP by adding the real exchange rate as an additional determinant of the nominal exchange rate, an increase in relative U.S. output supply could lead to a nominal depreciation or appreciation of the dollar against the euro in the long run.

See Figure 15-4 and Pages 407 and 408 of the textbook (8th edition) for the explanation and graph.

## Part B Problem Solving Questions [60 Marks]

***Read each part of the question very carefully. Show all the steps of your calculations to get full marks.***

**B1. [20 Marks]**

**Suppose consumers in Canada and the United States only consume blue suede shoes (which are traded) and haircuts (which are not traded). The prices of those goods in each country for two years are given in the table below. All prices are quoted in the currency of the relevant country.**

| Year | Shoes in Canada (CDN $) | Haircuts in Canada (CDN $) | Shoes in U.S. (USD $) | Haircuts in U.S. (USD $) |
|---|---|---|---|---|
| 2001 | 100 | 30 | 80 | 28 |
| 2002 | 120 | 35 | 85 | 28.67 |

**For each year, the statistical agency in each country constructs a consumer price index which is a weighted average of the prices of the two goods in that country. The weights in the price indexes are given by the share of each good in the consumers' consumption baskets. Assume that Canadians spend 60% of their consumption expenditures on shoes while Americans spend 70% of their consumption expenditures on shoes. Assume that the nominal exchange rate is such that the Law of One Price holds for traded goods in every year.**

**A. Determine the nominal exchange rate (CDN$ per US$) in each year.**

**B. Determine the real exchange rate in each year.**

**C. Determine if absolute purchasing power parity holds and justify your answer. If it does not hold, give two reasons why it does not hold.**

**D. Determine if relative purchasing power parity holds and justify your answer.**

The following table gives the nominal exchange rate, consumer price indexes, and the real exchange rate in each year.

| Year | Nominal Exchange Rate ($E_{CDN\$/US\$}$) | Canadian CPI (CDN $) | U.S. CPI (USD $) | Real Exchange Rate ($q_{CDN\$/US\$}$) |
|---|---|---|---|---|
| 2001 | 1.25 | 72 | 64.4 | 1.12 |
| 2002 | 1.41 | 86 | 68.1 | 1.12 |

**A.**

The nominal exchange rate (s) in each year is determined by dividing the price of shoes in Canada by the price of shoes in the U.S.

**B.**

The price index in Canada in each year is calculated as follows:

$$CPI_{CAN} = 0.6 \times (CanadaShoe\,\mathrm{Price}) + 0.4 \times (CanadaHaircut\,\mathrm{Price}).$$

The price index in the U.S. in each year is calculated as follows:

$$CPI_{US} = 0.7 \times (U.S.Shoe\,\mathrm{Price}) + 0.3 \times (U.S.Haircut\,\mathrm{Price})$$

The real exchange rate in each year is calculated as follows:

$$q_{CDN\$/US\$} = \frac{E_{CDN\$/US\$} \times CPI_{US}}{CPI_{CAN}}$$

**C.**

Absolute purchasing power parity (PPP) holds when the real exchange rate equals one– that is, when a basket of goods (here, composed of shoes and haircuts) sells for the same price in two countries when converted to the same currency. Since the real exchange rate differs from one in each year, absolute PPP does not hold. Absolute PPP does not hold here because the Law of One Price does not hold for the non-traded good, haircuts, and because the weights which are used to calculate the baskets differ between the two countries.

**D.**

Relative PPP holds when the real exchange rate is constant over time. We see that this is the case here so relative PPP does hold. This occurs because movements in the relative prices of the goods offset movements in the nominal exchange rate, leaving the real exchange rate constant at 1.12.

**B2.**

**Imagine a world before automatic teller machines (ATMs) were invented so if you needed cash you had to wait in a long line at the bank for a teller. Consider the model of exchange rate determination with short-run nominal rigidities and in which money market equilibrium holds every period, UIRP holds every period, and PPP holds in the long-run. Assume that the economy is initially in the long-run equilibrium.**

**Now suppose that ATMs are introduced in the home country so the home demand for real balances decreases (that is, for the same interest rate and output level, people want to hold less money than before ATMs were invented). Assume that this invention does not change consumers' discount rates nor does it change real output. Assume further that ATMs are not introduced into the foreign country.**

**Explain what happens to home and foreign interest rates, home and foreign prices, and the exchange rate (measured as units of home currency per one unit of foreign currency) in the short-, medium-, and long-run when ATMs are invented. Support your answer with a graph of the home money market equilibrium and a graph of the foreign exchange market equilibrium.**

The fall in home demand for real balances due to the introduction of ATMs leads to excess supply of money in the home country at the initial home interest rate. The home interest rate then must fall to clear the home money market. This is shown in Figure 1 as a downward shift in the home demand for real balances curve and a fall in the home interest rate from $R_h^1$ to $R_h^2$.

The fall in the home interest rate decreases the return on the home asset. To guarantee that investors continue to invest in the home asset, they must have to give up more home currency to acquire foreign currency in the spot market for foreign investment, thereby lowering the return to the foreign investment. That is, the home currency must experience a current depreciation (a rise in the spot rate).

Furthermore, since the demand for money has decreased permanently, we expect the long-run price of money to fall. That is, we expect the price of home goods to rise in the long-run. Since PPP holds in the long-run, this implies that investors expect that the long-run nominal exchange rate will be higher because it will equal the ratio of the home price to the foreign price. Thus, investors' expectations of the future nominal exchange rate are higher than they were before the introduction of ATMs. Through UIRP this causes the current spot rate to increase and a home currency depreciation.

The effect of the two forces described in the previous two paragraphs on the asset market equilibrium are shown in Figure 1 as (1) a leftward shift in the home asset return schedule to ( $R_h^2$ ) and (2) an upward shift in the foreign asset return schedule. Both of these effects cause the current spot rate to rise from $E_{h/f}^1$ to $E_{h/f}^2$ in the short run.
In the medium-run, the home price slowly begins to increase for the reasons described above. As the home price rises, the home real money supply ( $M_h^s / P_h$ ) begins to fall, creating excess demand for real balances in the home market. Thus, the home interest rate begins to rise to bring about home money market equilibrium. This rise in home interest rates in the medium-run causes the exchange rate to fall to satisfy UIRP. These effects are shown in Figures 2.

In the long-run, the home price will have risen the right amount so that the home money market clears at the long-run interest (that is, at the interest rate that prevailed before the introduction of ATMs). The long-run spot rate settles to an equilibrium level above the initial spot rate but below the short-run spot rate. The long-run equilibrium is depicted in Figures 3.

Thus, to summarize, the introduction of ATMs causes a situation of exchange rate over-shooting. The home currency initially experiences a large depreciation (a large rise in the spot rate) followed by a series of appreciations in the medium run until the spot rate settles at its long-run level above the initial level. Therefore, the home country experiences a long-run depreciation of its currency.

There are no effects on foreign interest rates or the foreign money market equilibrium.

**B3. [20 Marks]**

**1) Explain how each of the following transactions would enter the Canadian balance of payment accounts. Discuss only transactions described. Do not be concerned with possible offsetting transactions.**

- **(i) The Canadian government sells military equipment to a foreign government.**
- **(ii) The Bank of Canada sells yen to, and buys dollars from, a Swiss bank.**
- **(iii) A Canadian bank receives the interest on its loans to Brazil.**

**(i)** Export of merchandise: credit (+) entry in current account.
**(ii)** Decrease in Canadian official reserve assets: credit (+) entry in financial account.
**(iii)** Investment income receipt from abroad: credit (+) entry in current account.

**2) For each transaction described in part (a) that by itself changes the sum of the Canadian current account balance, financial account balance and capital account balance, give an example of an offsetting transaction that would leave the sum of these three balances unchanged.**

There are many possible answers; an example for each is given here.

**(i)** The Canadian government buys cars from the foreign country: debit (–) entry in current account.
**(ii)** The Bank of Canada sells dollars to, and buys deutsche marks from, the Bundesbank (the central bank of Germany): debit (–) entry in financial account.
**(iii)** That Canadian bank re-invests its interest earnings and buys more Brazilian government bonds: debit (-) entry in financial account.