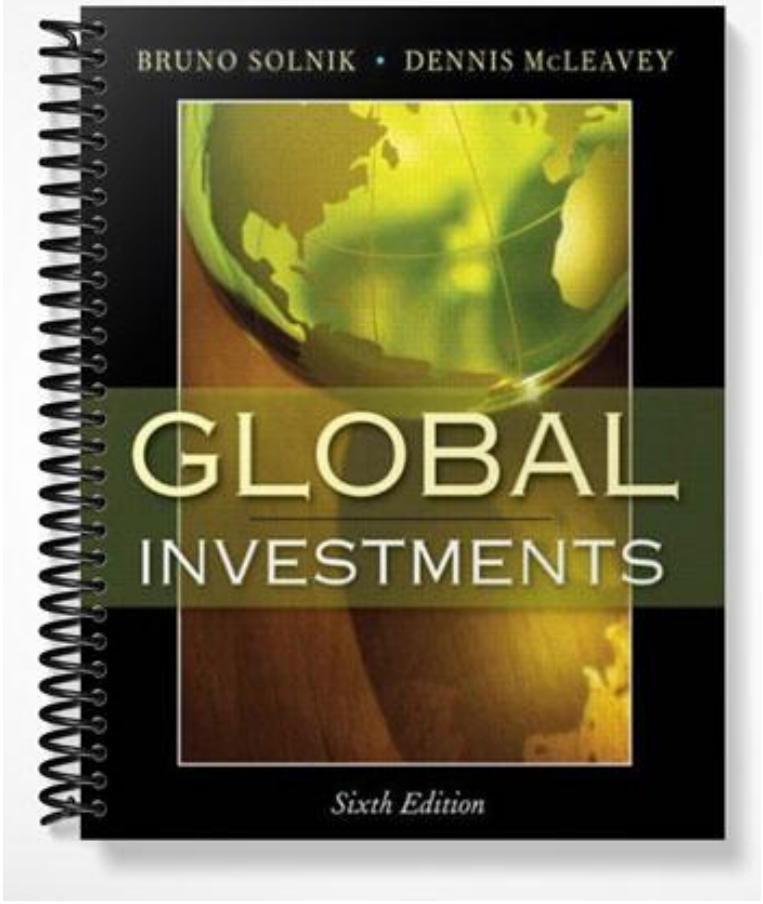
SOLUTIONS MANUAL



Chapter 2
Foreign Exchange Parity Relations

1. Because the interest rate in A is greater than the interest rate in B, α is expected to depreciate relative to β, and should trade with a forward discount. Accordingly, the correct answer is (c).

2. Because the exchange rate is given in €:$ terms, the appropriate expression for the interest rate parity relation is

$$\frac{F}{S} = \frac{1 + r_{\$}}{1 + r_{€}}$$

($r_{\$}$ is a part of the numerator and $r_{€}$ is a part of the denominator).

   a. The one-year €:$ forward rate is given by

$$€:\$ = 1.1795 \frac{1.05}{1.04} = 1.1908$$

   b. The one-month €:$ forward rate is given by

$$€:\$ = 1.1795 \frac{1 + (0.04/12}{1 + (0.03/12)} = 1.1805$$

   Of course, these are central rates, and bid-ask rates could also be determined on the basis of bid-ask rates for the spot exchange and interest rates.

3. a. bid €:¥ = (bid $:¥) × (bid €:$) = 108.10 × 1.1865 = 128.2607.
   ask €:¥ = (ask $:¥) × (ask €:$) = 108.20 × 1.1870 = 128.4334.

   b. Because the exchange rate is in €:$ terms, the appropriate expression for the interest rate parity relation is $F/S = (1 + r_{\$})/(1 + r_{€})$.

$$€:\$3\text{-month ask} = (\text{spot ask } €:\$) \frac{1 + (\text{ask } r_{\$})}{1 + (\text{bid } r_{€})} = 1.1870 \frac{1 + (0.0525/4)}{1 + (0.0325/4)}$$
$$= 1.1929$$

   Thus, the €:$3-month forward ask exchange rate is: 1.1929.

   c. bid $:€ = 1/ask €:$ = 1 / 1.1929 = 0.8383.
   Thus, the 3-month forward bid exchange rate is $:€ = 0.8383.

d. Because the exchange rate is in \$:¥ terms, the appropriate expression for the interest rate parity relation is $F/S = (1 + r_{¥})/1 + r_{\$}$.

$$\text{\$:¥3-month bid} = (\text{spot ask \$:¥})\frac{1+(\text{bid } r_{¥})}{1+(\text{ask } r_{\$})} = 108.10\frac{1+(0.0125/4)}{(0.0325/4)} = 107.03$$

$$\text{\$:¥3-month ask} = (\text{spot ask \$:¥})\frac{1+(\text{ask } r_{¥})}{1+(\text{bid } r_{\$})} = 108.20\frac{1+(0.0150/4)}{(0.0500/4)} = 107.26$$

Thus, the \$:¥ 3-month forward exchange rate is: 107.03 – 107.26.

Note: The interest rates one uses in all such computations are those that result in a lower forward bid (so, bid interest rates in the numerator and ask rates in the denominator) and a higher forward ask (so, ask interest rates in the numerator and bid rates in the denominator).

4. a. For six months, $r_{SFr} = 1.50\%$ and $r_{\$} = 1.75\%$. Because the exchange rate is in \$:SFr terms, the appropriate expression for the interest rate parity relation is

$$\frac{F}{S} = \frac{1+r_{SFr}}{1+r_{\$}}, \quad \text{or} \quad \frac{F}{S}(1+r_{\$}) = (1+r_{SFr})$$

The left side of this expression is

$$\frac{F}{S}(1+r_{\$}) = \frac{1.6558}{1.6627}(1+0.0175) = 1.0133$$

The right side of the expression is: $1 + r_{SFr} = 1.0150$. Because the left and right sides are not equal, IRP is not holding.

b. Because IRP is not holding, there is an arbitrage possibility: Because 1.0133 < 1.0150, we can say that the SFr interest rate quote is more than what it should be as per the quotes for the other three variables. Equivalently, we can also say that the \$ interest rate quote is less than what it should be as per the quotes for the other three variables. Therefore, the arbitrage strategy should be based on borrowing in the \$ market and lending in the SFr market. The steps would be as follows:

- Borrow \$1,000,000 for six months at 3.5% per year. Need to pay back \$1,000,000 × (1 + 0.0175) = \$1,017,500 six months later.
- Convert \$1,000,000 to SFr at the spot rate to get SFr 1,662,700.
- Lend SFr 1,662,700 for six months at 3% per year. Will get back SFr 1,662,700 × (1 + 0.0150) = SFr 1,687,641 six months later.
- Sell SFr 1,687,641 six months forward. The transaction will be contracted as of the current date but delivery and settlement will only take place six months later. So, six months later, exchange SFr 1,687,641 for SFr 1,687,641/SFr 1.6558/\$ = \$1,019,230.

The arbitrage profit six months later is 1,019,230 – 1,017,500 = \$1,730.

5. a. For three months, $r_{\$} = 1.30\%$ and $r_{¥} = 0.30\%$. Because the exchange rate is in \$:¥ terms, the appropriate expression for the interest rate parity relation is

$$\frac{F}{S} = \frac{1+r_{¥}}{1+r_{\$}}, \quad \text{or} \quad \frac{F}{S}(1+r_{\$}) = (1+r_{¥})$$

The left side of this expression is

$$\frac{F}{S}(1+r_{\$}) = \frac{107.30}{108.00}(1+0.0130) = 1.0064.$$

The right side of this expression is: $1 + r_{¥} = 1.0030$. Because the left and right sides are not equal, IRP is not holding.

b. Because IRP is not holding, there is an arbitrage possibility. Because 1.0064 > 1.0030, we can say that the $ interest rate quote is more than what it should be as per the quotes for the other three variables. Equivalently, we can also say that the ¥ interest rate quote is less than what it should be as per the quotes for the other three variables. Therefore, the arbitrage strategy should be based on lending in the $ market and borrowing in the ¥ market. The steps would be as follows:

- Borrow the yen equivalent of $1,000,000. Because the spot rate is ¥108 per $, borrow $1,000,000 × ¥108/$ = ¥108,000,000. Need to pay back ¥108,000,000 × (1 + 0.0030) = ¥108,324,000 three months later.
- Exchange ¥108,000,000 for $1,000,000 at the spot exchange rate.
- Lend $1,000,000 for three months at 5.20% per year. Will get back $1,000,000 × (1 + 0.0130) = $1,013,000 three months later.
- Buy ¥108,324,000 three months forward. The transaction will be contracted as of the current date, but delivery and settlement will only take place three months later. So, three months later, get ¥108,324,000 for ¥108,324,000 / (¥107.30 per $) = $1,009,543.

The arbitrage profit three months later is 1,013,000 – 1,009,543 = $3,457.

6. At the given exchange rate of 5 pesos/$, the cost in Mexico in dollar terms is $16 for shoes, $36 for watches, and $120 for electric motors. Thus, compared with the United States, shoes and watches are cheaper in Mexico, and electric motors are more expensive in Mexico. Therefore, Mexico will import electric motors from the United States, and the United States will import shoes and watches from Mexico. Accordingly, the correct answer is (d).

7. Consider two countries, A and B. Based on relative PPP,

$$\frac{S_1}{S_0} = \frac{1+I_A}{1+I_B}$$

where S_1 and S_0 are the expected and the current exchange rates between the currencies of A and B, and I_A and I_B are the inflation rates in A and B. If A and B belong to the group of countries that introduces the same currency, then one could think of both S_1 and S_0 being one. Then, I_A and I_B should both be equal for relative PPP to hold. Thus, introduction of a common currency by a group of countries would result in the convergence of the inflation rates among these countries. A similar argument could be applied to inflation among the various states of the United States.

8. Based on relative PPP,

$$\frac{S_1}{S_0} = \frac{1+I_{\text{Switzerland}}}{1+I_{\text{US}}}$$

where S_1 is the expected \$:SFr exchange rate one year from now, S_0 is the current \$:SFr exchange rate, and $I_{\text{Switzerland}}$ and I_{US} are the expected annual inflation rates in Switzerland and the United States, respectively. So,

$$\frac{S_1}{1.60} = \frac{1+0.02}{1+0.05} \quad \text{and} \quad S_1 = 1.60(1.02/1.05) = \text{SFr } 1.55/\$.$$

9. a. A Japanese consumption basket consists of two-thirds sake and one-third TV sets. The price of sake in yen is rising at a rate of 10% per year. The price of TV sets is constant. The Japanese consumer price index inflation is therefore equal to

$$\frac{2}{3}(10\%) + \frac{1}{3}(0\%) = 6.67\%$$

b. Relative PPP states that

$$\frac{S_1}{S_0} = \frac{1+I_{\text{FC}}}{1+I_{\text{DC}}}.$$

Because the exchange rate is given to be constant, we have $S_0 = S_1$, which implies $S_1/S_0 = 1$. As a result, in our example, PPP would hold if $1 + I_{\text{FC}} = 1 + I_{\text{DC}}$ (i.e., $I_{\text{FC}} = I_{\text{DC}}$). Because the Japanese inflation rate is 6.67% and the American inflation rate is 0%, we do not have $I_{\text{FC}} = I_{\text{DC}}$, and PPP does not hold.

10. a. i. The law of one price is that, assuming competitive markets and no transportation costs or tariffs, the same goods should have the same real prices in all countries after converting prices to a common currency.

ii. Absolute PPP, focusing on baskets of goods and services, states that the same basket of goods should have the same price in all countries after conversion to a common currency. Under absolute PPP, the equilibrium exchange rate between two currencies would be the rate that equalizes the prices of a basket of goods between the two countries. This rate would correspond to the ratio of average price levels in the countries. Absolute PPP assumes no impediments to trade and identical price indexes that do not create measurement problems.

iii. Relative PPP holds that exchange rate movements reflect differences in price changes (inflation rates) between countries. A country with a relatively high inflation rate will experience a proportionate depreciation of its currency's value vis-à-vis that of a country with a lower rate of inflation. Movements in currencies provide a means for maintaining equivalent purchasing power levels among currencies in the presence of differing inflation rates.

Relative PPP assumes that prices adjust quickly and price indexes properly measure inflation rates. Because relative PPP focuses on changes and not absolute levels, relative PPP is more likely to be satisfied than the law of one price or absolute PPP.

b. i. Relative PPP is not consistently useful in the short run because of the following: (1) Relationships between month-to-month movements in market exchange rates and PPP are not consistently strong, according to empirical research. Deviations between the rates can persist for extended periods. (2) Exchange rates fluctuate minute by minute because they are set in the financial markets. Price levels, in contrast, are sticky and adjust slowly. (3) Many other factors can influence exchange rate movements rather than just inflation.

ii. Research suggests that over the long term, a tendency exists for market and PPP rates to move together, with market rates eventually moving toward levels implied by PPP.

11. a. If the treasurer is worried that the franc might appreciate in the next three months, she could hedge her foreign exchange exposure by trading this risk against the premium included in the forward exchange rate. She could buy 10 million Swiss francs on the three-month forward market at the rate of SFr 1.5320 per €. The transaction will be contracted as of the current date, but delivery and settlement will only take place three months later.

    b. Three months later, the company received the 10 million Swiss francs at the forward rate of SFr 1.5320 per € agreed on earlier. Thus, the company needed (SFr 10,000,000)/(SFr 1.5320 per €), or €6,527,415. If the company had not entered into a forward contract, the company would have received the 10 million Swiss francs at the spot rate of SFr 1.5101 per €. Thus, the company would have needed (SFr 10,000,000) / (SFr 1.5101 per €), or €6,622,078. Therefore, the company benefited by the treasurer's action, because €6,622,078 – €6,527,415 = €94,663 were saved.

12. The nominal interest rate is approximately the sum of the real interest rate and the expected inflation rate over the term of the interest rate. Even if the international Fisher relation holds, and the real interest rates are equal among countries, the expected inflation can be very different from one country to another. Therefore, there is no reason why nominal interest rates should be equal among countries.

13. Because the Australian dollar is expected to depreciate relative to the dollar, we know from the combination of international Fisher relation and relative PPP that the nominal interest rate in Australia is greater than the nominal interest rate in the United States. Further, the nominal interest rate in the United States is greater than that in Switzerland. Thus, the nominal interest rate in Australia has to be greater than the nominal interest rate in Switzerland. Therefore, we can say from the combination of international Fisher relation and relative PPP that the Australian dollar is expected to depreciate relative to the Swiss franc.

14. According to the approximate version of the international Fisher relation, $r_{\text{Sweden}} - r_{\text{US}} = I_{\text{Sweden}} - I_{\text{US}}$. So, $8 - 7 = 6 - I_{\text{US}}$, which means that $I_{\text{US}} = 5\%$.

    According to the approximate version of relative PPP,

$$\frac{S_1 - S_0}{S_0} = I_{\text{Sweden}} - I_{\text{US}}$$

    where, S_1 and S_0 are in \$:SKr terms. $I_{\text{Sweden}} - I_{\text{US}} = 6 - 5 = 1\%$, or 0.01. So, $(6 - S_0)/S_0 = 0.01$. Solving for S_0, we get $S_0 =$ SKr 5.94 per \$.

    According to the approximate version of IRP,

$$\frac{F - S_0}{S_0} = r_{\text{Sweden}} - r_{\text{US}}$$

    where, F and S_0 are in \$:SKr terms. $r_{\text{Sweden}} - r_{\text{US}} = 8 - 7 = 1\%$, or 0.01. So, $(F - 5.94)/5.94 = 0.01$. Solving for F, we get $F =$ SKr 6 per \$.

    Because we are given the expected exchange rate, we could also have arrived at this answer by using the foreign exchange expectations relation.

15. According to the international Fisher relation,

$$\frac{1+r_{\text{Switzerland}}}{1+r_{\text{UK}}}=\frac{1+I_{\text{Switzerland}}}{1+I_{\text{UK}}}$$

So,

$$\frac{1+r_{\text{Switzerland}}}{1+0.12}=\frac{1+0.04}{1+0.10}$$

therefore, $r_{\text{Switzerland}} = 0.0589$, or 5.89%.

According to relative PPP,

$$\frac{S_1}{S_0}=\frac{1+I_{\text{Switzerland}}}{1+I_{\text{UK}}}$$

where, S_1 and S_0 are in £:SFr terms.

So,

$$\frac{S_1}{3}=\frac{1+0.04}{1+0.10}.$$

Solving for S_1 we get S_1 = SFr 2.8364 per £.

According to IRP,

$$\frac{F}{S_0}=\frac{1+r_{\text{Switzerland}}}{1+r_{\text{UK}}}$$

where, F and S_0 are in £:SFr terms.

So,

$$\frac{F}{3}=\frac{1+0.0589}{1+0.12}.$$

Solving for F, we get F = SFr 2.8363 per £. This is the same as the expected exchange rate in one year, with the slight difference due to rounding.

16. During the 1991–1996 period, the cumulative inflation rates were about 25 percent in Malaysia, 61 percent in the Philippines, and 18 percent in the United States. Over this period, based on relative PPP, one would have expected the Malaysian ringgit to depreciate by about 7 percent relative to the United States dollar (the inflation differential). In reality, the Malaysian ringgit *appreciated* by about 8 percent. Similarly, in view of the very high inflation differential between the Philippines and the United States, one would have expected the Philippine peso to depreciate considerably relative to the dollar. But it did not. Thus, according to PPP, both currencies had become strongly overvalued.

17. a. According to PPP, the current exchange rate should be

$$S_1 = S_0 = \frac{PI_1^{\text{Pif}}/PI_0^{\text{Pif}}}{PI_1^{\$}/PI_0^{\$}}$$

where subscript 1 refers to the value now, subscript 0 refers to the value 20 years ago, *PI* refers to price index, and *S* is the $:pif exchange rate. Thus, the current exchange rate based on PPP should be

$$S_1 = 2\left(\frac{200/100}{400/100}\right) = \text{pif 1 per \$.}$$

b. As per PPP, the pif is overvalued at the prevailing exchange rate of pif 0.9 per $.

18. Exports equal 10 million pifs and imports equal $7 million (6.3 million pifs). Accordingly, the trade balance is 10 − 6.3 = 3.7 million pifs.

- Balance of services includes the $0.5 million spent by tourists (0.45 million pifs).
- Net income includes $0.1 million or 0.09 million pifs received by Paf investors as dividends, minus 1 million pifs paid out by Paf as interest on Paf bonds (− 0.91 million pifs).
- Unrequited transfers include $0.3 million (0.27 million pifs) received by Paf as foreign aid.
- Portfolio investment includes the $3 million or 2.7 million pifs spent by Paf investors to buy foreign firms. So, portfolio investment = −2.7 million pifs.

Based on the preceding,

- Current account = 3.24 (= 3.70 + 0.45 − 0.91)
- Capital account = 0.27
- Financial account = −2.7

The sum of current account, capital account, and financial account is 0.81. By definition of balance of payments, the sum of the current account, the capital account, the financial account, and the change in official reserves must be equal to zero. Therefore, official reserve account = −0.81.

The following summarizes the effect of the transactions on the balance of payments.

Current account		*3.24*
Trade balance	3.70	
Balance of services	0.45	
Net income	− 0.91	
Capital account		*0.27*
Unrequited transfers	0.27	
Financial account		*− 2.70*
Portfolio investment	− 2.70	
Official reserve account		*− 0.81*

19. a. A traditional flow market approach would suggest that the home currency should depreciate because of increased inflation. An increase in domestic consumption could also lead to increased imports and a deficit in the balance of trade. This deficit should lead to a weakening of the home currency in the short run.

b. The asset market approach claims that this scenario is good for the home currency. Foreign capital investment is attracted by the high returns caused by economic growth and high interest rates. This capital inflow leads to an appreciation of the home currency.

20. a. i. The immediate effect of reducing the budget deficit is to reduce the demand for loanable funds because the government needs to borrow less to bridge the gap between spending and taxes.

ii. The reduced public-sector demand for loanable funds has the direct effect of lowering nominal interest rates, because lower demand leads to lower cost of borrowing,

iii. The direct effect of the budget deficit reduction is a depreciation of the domestic currency and the exchange rate. As investors sell lower yielding Country M securities to buy the securities of other countries, Country M's currency will come under pressure and Country M's currency will depreciate.

b. i. In the case of a credible, sustainable, and large reduction in the budget deficit, reduced inflationary expectations are likely because the central bank is less likely to monetize the debt by increasing the money supply. Purchasing power parity and international Fisher relationships suggest that a currency should strengthen against other currencies when expected inflation declines.

ii. A reduction in government spending would tend to shift resources into private-sector investments, in which productivity is higher. The effect would be to increase the expected return on domestic securities.