PART NINE

TOPICS IN BUSINESS FINANCE

18 International Aspects of Financial Management

On January 1, 1999, a new currency was born: the euro. The euro became the common currency for the 12 European nations that make up the European Economic and Monetary Union (EMU). In an extraordinary turn of events, these 12 countries turned over their sovereign currencies, and control of their monetary policies, to the new European Central Bank. Although the euro came into existence as a traded currency in 1999, it wasn't until January 1, 2002, that it came into use as a day-to-day currency in the "euroland" countries.

Some of the major proponents of the switch to the euro were businesses, many of which felt that the union was necessary to compete with countries like the United States. As a result of it, currencies such as the French franc, the German deutsche mark, and the Italian lira will become footnotes in history. When the euro was launched in 1999, one euro would buy about $1.16. Although many believed the euro would soon become more valuable, the opposite happened. In the summer of 2002, one euro would buy slightly less than $1. In this chapter, we explore the role played by currencies and exchange rates, the forces that cause exchange rates to change over time, and a number of other key topics in international finance.

As businesses of all types have increased their reliance on international operations, all areas of business have been

AFTER READING THIS CHAPTER, YOU SHOULD HAVE A GOOD UNDERSTANDING OF:

- How exchange rates are quoted, what they mean, and the difference between spot and forward exchange rates.
- Purchasing power parity and interest rate parity and their implications for exchange rate changes.
- The different types of exchange rate risk and ways firms manage exchange rate risk.
- The impact of political risk on international business investing.

strongly affected. Human resources, production, marketing, accounting, and strategy, for example, all become much more complex when nondomestic considerations come into play. This chapter discusses one of the most important aspects of international business: the impact of shifting exchange rates and what companies (and individuals) can do to protect themselves against adverse exchange rate movements.

Companies with significant foreign operations are often called *international corporations* or *multinationals*. Such companies must consider many financial factors that do not directly affect purely domestic firms. These include foreign exchange rates, differing interest rates from country to country, complex accounting methods for foreign operations, foreign tax rates, and foreign government intervention.

The basic principles of corporate finance still apply to international corporations; like domestic companies, they seek to invest in projects that create more value for the shareholders (or owners) than they cost and to arrange financing that raises cash at the lowest possible cost. In other words, the net present value principle holds for both foreign and domestic operations, but it is usually more complicated to apply the NPV rule to foreign investments.

We won't have much to say here about the role of cultural and social differences in international business. We also will not be discussing the implications of differing political and economic systems. These factors are of great importance to international businesses, but it would take another book to do them justice. Consequently, we will focus only on some purely financial considerations in international finance and some key aspects of foreign exchange markets.

18.1 TERMINOLOGY

American Depository Receipt (ADR)
Security issued in the U.S. representing shares of a foreign stock, allowing that stock to be traded in the U.S.

See **www.adr.com** for more.

cross-rate
The implicit exchange rate between two currencies (usually non-U.S.) quoted in some third currency (usually the U.S. dollar).

Eurobonds
International bonds issued in multiple countries but denominated in a single currency (usually the issuer's currency).

A common buzzword for the student of business finance is *globalization.* The first step in learning about the globalization of financial markets is to conquer the new vocabulary. As with any specialty, international finance is rich in jargon. Accordingly, we get started on the subject with a highly eclectic vocabulary exercise.

The terms that follow are presented alphabetically, and they are not all of equal importance. We choose these particular ones because they appear frequently in the financial press or because they illustrate some of the colorful language of international finance.

1. An **American Depository Receipt**, or **ADR**, is a security issued in the United States that represents shares of a foreign stock, allowing that stock to be traded in the United States. Foreign companies use ADRs, which are issued in U.S. dollars, to expand the pool of potential U.S. investors. ADRs are available in two forms: company sponsored, which are listed on an exchange, and unsponsored, which usually are held by the investment bank that deals in the ADR. Both forms are available to individual investors, but only company-sponsored issues are quoted daily in newspapers.
2. The **cross-rate** is the implicit exchange rate between two currencies (usually non-U.S.) when both are quoted in some third currency, usually the U.S. dollar.
3. A **Eurobond** is a bond issued in multiple countries, but denominated in a single currency, usually the issuer's home currency. Such bonds have become an important way to raise capital for many international companies and governments. Eurobonds are issued outside the restrictions that apply to domestic offerings and are syndicated and traded mostly from London. Trading can and does take place anywhere there is a buyer and a seller.

4. **Eurocurrency** is money deposited in a financial center outside of the country whose currency is involved. For instance, Eurodollars—the most widely used Eurocurrency—are U.S. dollars deposited in banks outside the U.S. banking system.
5. **Foreign bonds**, unlike Eurobonds, are issued in a single country and are usually denominated in that country's currency. Often, the country in which these bonds are issued will draw distinctions between them and bonds issued by domestic issuers, including different tax laws, restrictions on the amount issued, and tougher disclosure rules.

   Foreign bonds often are nicknamed for the country where they are issued: Yankee bonds (United States), Samurai bonds (Japan), Rembrandt bonds (the Netherlands), and Bulldog bonds (Britain). Partly because of tougher regulations and disclosure requirements, the foreign-bond market hasn't grown in past years with the vigor of the Eurobond market. A substantial portion of all foreign bonds are issued in Switzerland.
6. **Gilts**, technically, are British and Irish government securities, although the term also includes issues of local British authorities and some overseas public-sector offerings.
7. The **London Interbank Offer Rate (LIBOR)** is the rate that most international banks charge one another for loans of Eurodollars overnight in the London market. LIBOR is a cornerstone in the pricing of money market issues and other debt issues by both government and corporate borrowers. Interest rates are frequently quoted as some spread over LIBOR, and they then float with the LIBOR rate.
8. There are two basic kinds of **swaps**: interest rate and currency. An interest rate swap occurs when two parties exchange a floating-rate payment for a fixed-rate payment or vice versa. Currency swaps are agreements to deliver one currency in exchange for another. Often both types of swaps are used in the same transaction when debt denominated in different currencies is swapped.

Eurocurrency
Money deposited in a financial center outside of the country whose currency is involved.

foreign bonds
International bonds issued in a single country, usually denominated in that country's currency.

gilts
British and Irish government securities.

London Interbank Offer Rate (LIBOR)
The rate most international banks charge one another for overnight Eurodollar loans.

For current LIBOR rates, see **www.hsh.com**.

swaps
Agreements to exchange two securities or currencies.

CONCEPT QUESTIONS

18.1a What are the differences between a Eurobond and a foreign bond?

18.1b What are Eurodollars?

18.2 FOREIGN EXCHANGE MARKETS AND EXCHANGE RATES

The **foreign exchange market** is undoubtedly the world's largest financial market. It is the market where one country's currency is traded for another's. Most of the trading takes place in a few currencies such as the U.S. dollar ($), the British pound sterling (£), and the Japanese yen (¥). Table 18.1 lists some of the more common currencies and their symbols.

The foreign exchange market is an over-the-counter market, so there is no single location where traders get together. Instead, market participants are located in the major commercial and investment banks around the world. They communicate using computer terminals, telephones, and other telecommunications devices. For example, one communications network for foreign transactions is the Society for Worldwide Interbank Financial Telecommunications (SWIFT), a Belgian not-for-profit cooperative. Using data

Information on doing business globally can be found at **www.internationalist.com/business**.

foreign exchange market
The market in which one country's currency is traded for another's.

TABLE 18.1

International currency symbols

Country	Currency	Symbol
Australia	Dollar	A$
Austria	Schilling	Sch
Belgium	Franc	BF
Canada	Dollar	Can$
Denmark	Krone	DKr
EMU	Euro	€
Finland	Markka	FM
France	Franc	FF
Germany	Deutsche mark	DM
Greece	Drachma	Dr
India	Rupee	Rs
Iran	Rial	RI
Italy	Lira	Lit
Japan	Yen	¥
Kuwait	Dinar	KD
Mexico	Peso	Ps
Netherlands	Guilder	FL
Norway	Krone	NKr
Saudi Arabia	Riyal	SR
Singapore	Dollar	S$
South Africa	Rand	R
Spain	Peseta	Pta
Sweden	Krona	Skr
Switzerland	Franc	SF
United Kingdom	Pound	£
United States	Dollar	$

Visit SWIFT at **www.swift.com**.

transmission lines, a bank in New York can send messages to a bank in London via SWIFT regional processing centers.

The many different types of participants in the foreign exchange market include the following:

For an on-line currency calculator, go to **www.bloomberg.com/markets/currency/currcalc.html**.

1. Importers who pay for goods in foreign currencies.
2. Exporters who receive foreign currency and may want to convert to their domestic currency.
3. Portfolio managers who buy or sell foreign stocks and bonds.
4. Foreign exchange brokers who match buy and sell orders.
5. Traders who "make a market" in foreign currencies.
6. Speculators who try to profit from changes in exchange rates.

Exchange Rates

An **exchange rate** is simply the price of one country's currency expressed in terms of another country's currency. In practice, almost all trading of currencies takes place in terms of the U.S. dollar. For example, both the Swiss franc and the Japanese yen are traded with their prices quoted in U.S. dollars. Exchange rates are constantly changing. Our nearby *Work the Web* box shows you how to get up-to-the-minute rates.

exchange rate
The price of one country's currency expressed in terms of another country's currency.

Exchange Rate Quotations Figure 18.1 reproduces exchange rate quotations as they appear in *The Wall Street Journal*. The first two columns (labeled "U.S. $ equiv.") give the number of dollars it takes to buy one unit of foreign currency. For example, the

WORK THE WEB

You just returned from your dream vacation to Jamaica and feel rich since you have 10,000 Jamaican dollars left over. You now need to convert this to U.S. dollars. How much will you have? You can look up the current exchange rate and do the conversion yourself, or simply work the Web. We went to www.xe.com and used the currency converter on the site to find out. This is what we found:

xe.com Universal Currency Converter™ Results

Live mid-market rates as of 2002.06.02 20:46:37 GMT.

10,000.00 JMD Jamaica Dollars = **208.725 USD** United States Dollars

1 JMD = 0.0208725 USD | 1 USD = 47.9100 JMD

Another Conversion? | Euro Info

Looks like you left Jamaica just before you ran out of money.

FIGURE 18.1

Exchange rate quotations

Key Currency Cross Rates

Late New York Trading Tuesday, July 9, 2002

	Dollar	Euro	Pound	SFranc	Peso	Yen	CdnDlr
Canada	1.5120	1.5037	2.3419	1.0205	.15350	.01283	...
Japan	117.89	117.24	182.60	79.569	11.969	...	77.970
Mexico	9.8500	9.7958	15.257	6.6482	...	.08355	6.5146
Switzerland	1.4816	1.4735	2.2949	...	.15042	.01257	.9799
U.K.	.64560	.6421	...	.4358	.06555	.00548	.42700
Euro	1.00550	...	1.5575	.67868	.10208	.00853	.66503
U.S.	...	.9945	1.5489	.67495	.10152	.00848	.66138

Source: Reuters

Exchange Rates

The New York foreign exchange mid-range rates below apply to trading among banks in amounts of $1 million and more, as quoted at 4 p.m. Eastern time by Reuters and other sources. Retail transactions provide fewer units of foreign currency per dollar.

	U.S. $ EQUIVALENT		CURRENCY PER U.S. $	
Country	Tue.	Mon.	Tue.	Mon.
Argentina (Peso)-y	.2817	.2817	3.5500	3.5500
Australia (Dollar)	.5682	.5647	1.7598	1.7707
Bahrain (Dinar)	2.6525	2.6525	.3770	.3770
Brazil (Real)	.3506	.3495	2.8525	2.8610
Britain (Pound)	1.5489	1.5388	.6456	.6499
1-month forward	1.5462	1.5360	.6467	.6510
3-months forward	1.5405	1.5304	.6491	.6534
6-months forward	1.5313	1.5214	.6530	.6573
Canada (Dollar)	.6614	.6565	1.5120	1.5233
1-month forward	.6608	.6560	1.5133	1.5245
3-months forward	.6596	.6547	1.5161	1.5274
6-months forward	.6574	.6527	1.5211	1.5322
Chile (Peso)	.001434	.001430	697.45	699.15
China (Renminbi)	.1208	.1208	8.2766	8.2767
Colombia (Peso)	.0004051	.0004055	2468.50	2466.00
Czech. Rep. (Koruna)				
Commercial rate	.03417	.03373	29.267	29.644
Denmark (Krone)	.1339	.1330	7.4700	7.5210
Ecuador (US Dollar)	1.0000	1.0000	1.0000	1.0000
Hong Kong (Dollar)	.1282	.1282	7.8000	7.8000
Hungary (Forint)	.003938	.003944	253.96	253.56
India (Rupee)	.02050	.02050	48.770	48.790
Indonesia (Rupiah)	.0001122	.0001124	8910	8900
Israel (Shekel)	.2109	.2090	4.7410	4.7840
Japan (Yen)	.008482	.008435	117.89	118.55
1-month forward	.008496	.008450	117.70	118.35
3-months forward	.008522	.008475	117.34	118.00
6-months forward	.008565	.008517	116.75	117.41
Jordan (Dinar)	1.4104	1.4184	.7090	.7050

	U.S. $ EQUIVALENT		CURRENCY PER U.S. $	
Country	Tue.	Mon.	Tue.	Mon.
Kuwait (Dinar)	3.3190	3.3234	.3013	.3009
Lebanon (Pound)	.0006607	.0006607	1513.50	1513.50
Malaysia (Ringgit)-b	.2632	.2632	3.8000	3.8000
Malta (Lira)	2.3923	2.3798	.4180	.4202
Mexico (Peso)				
Floating rate	.1015	.1008	9.8500	9.9210
New Zealand (Dollar)	.4928	.4915	2.0292	2.0346
Norway (Krone)	.1359	.1353	7.3560	7.3930
Pakistan (Rupee)	.01663	.01663	60.115	60.145
Peru (new Sol)	.2825	.2830	3.5395	3.5330
Philippines (Peso)	.01982	.01982	50.445	50.445
Poland (Zloty)	.2370	.2389	4.2190	4.1850
Russia (Ruble)-a	.03167	.03170	31.577	31.550
Saudi Arabia (Riyal)	.2666	.2666	3.7509	3.7509
Singapore (Dollar)	.5696	.5682	1.7555	1.7600
Slovak Rep. (Koruna)	.02238	.02223	44.680	44.986
South Africa (Rand)	.1001	.0984	9.9915	10.1590
South Korea (Won)	.0008531	.0008403	1172.20	1190.00
Sweden (Krona)	.1079	.1077	9.2715	9.2810
Switzerland (Franc)	.6749	.6720	1.4816	1.4880
1-month forward	.6754	.6724	1.4807	1.4871
3-months forward	.6761	.6732	1.4791	1.4855
6-months forward	.6772	.6743	1.4767	1.4830
Taiwan (Dollar)	.03009	.02998	33.230	33.360
Thailand (Baht)	.02423	.02414	41.265	41.420
Turkey (Lira)	.00000060	.00000059	1668000	1690000
United Arab (Dirham)	.2723	.2723	3.6730	3.6730
Uruguay (Peso)				
Financial	.05067	.05031	19.735	19.875
Venezuela (Bolivar)	.000740	.000740	1350.50	1350.50
SDR	1.3240	1.3151	.7553	.7604
Euro	.9945	.9878	1.0055	1.0124

Special Drawing Rights (SDR) are based on exchange rates for the U.S., British, and Japanese currencies. Source: International Monetary Fund.

a-Russian Central Bank rate. b-Government rate. y-Floating rate.

Source: The Wall Street Journal, July 10, 2002. © Dow Jones & Co. Reprinted with permission.

Australian dollar is quoted at .5682, which means that you can buy one Australian dollar with .5682 U.S. dollar.

The second column shows the amount of foreign currency per U.S. dollar. The Australian dollar is quoted here at 1.7598, so you can get 1.7598 Australian dollars for one U.S. dollar. Naturally, this second exchange rate is just the reciprocal of the first one; 1/.5682 = 1.7598, allowing for a rounding error.

EXAMPLE 18.1 On the Mark

Get up-to-the-minute exchange rates at **www.xe.com** and **www.exchangerate.com**.

Suppose you have $1,000. Based on the rates in Figure 18.1, how many Japanese yen can you get? Alternatively, if a Porsche costs € 200,000 (€ is the symbol for the euro), how many dollars will you need to buy it?

The exchange rate in terms of yen per dollar (third column) is 117.89. Your $1,000 will thus get you:

$1,000 × 117.89 yen per $1 = 117,890 yen

Since the exchange rate in terms of dollars per euro (first column) is .9945, you will need:

€ 200,000 × .9945 $ per euro = $198,900

Cross-Rates and Triangle Arbitrage Using the U.S. dollar as the common denominator in quoting exchange rates greatly reduces the number of necessary cross-currency quotes. For example, with five major currencies, there would potentially be 10 exchange rates instead of just 4. Also, the fact that the dollar is used throughout cuts down on inconsistencies in the exchange rate quotations.

Earlier, we defined the cross-rate as the exchange rate for a non-U.S. currency expressed in terms of another non-U.S. currency. For example, suppose we observed the following for the Mexican peso (Ps) and the Swiss franc (SF):

Ps per $1 = 10.00
SF per $1 = 2.00

Suppose the cross-rate is quoted as:

Ps per SF = 4.00

Current and historical foreign exchange data are available at many web sites. A particularly good site is maintained by the Federal Reserve Bank of St. Louis. Go to **www.stls.frb.org** and find their "FRED®" link for up-to-date exchange rate data.

What do you think?

The cross-rate here is inconsistent with the exchange rates. To see this, suppose you have $100. If you convert this to Swiss francs, you will receive:

$100 × SF 2 per $1 = SF 200

If you convert this to pesos at the cross-rate, you will have:

SF 200 × Ps 4 per SF 1 = Ps 800

However, if you just convert your dollars to pesos without going through francs, you will have:

$100 × Ps 10 per $1 = Ps 1,000

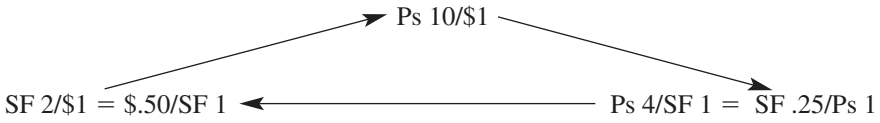
What we see is that the peso has two prices, Ps 10 per $1 and Ps 8 per $1, depending on how we get the pesos.

To make money, we want to buy low, sell high. The important thing to note is that pesos are cheaper if you buy them with dollars because you get 10 pesos instead of just 8. You should proceed as follows:

For international news and events, visit **www.ft.com**.

1. Buy 1,000 pesos for $100.
2. Use the 1,000 pesos to buy Swiss francs at the cross-rate. Since it takes four pesos to buy a franc, you will receive Ps 1,000/4 = SF 250.
3. Use the SF 250 to buy dollars. Since the exchange rate is SF 2 per dollar, you receive SF 250/2 = $125, for a round-trip profit of $25.
4. Repeat Steps 1 through 3.

This particular activity is called *triangle arbitrage* because the arbitrage involves moving through three different exchange rates:



To prevent such opportunities, it is not difficult to see that since a dollar will buy you either 10 pesos or two francs, the cross-rate must be:

(Ps 10/$1)/(SF 2/$1) = Ps 5/SF 1

That is, five pesos per franc. If it were anything else, there would be a triangle arbitrage opportunity.

Shedding Some Pounds EXAMPLE 18.2

Suppose the exchange rates for the British pound and Swiss franc are:

Pounds per $1 = .60
SF per $1 = 2.00

The cross-rate is three francs per pound. Is this consistent? Explain how to go about making some money.

The cross-rate should be SF 2.00/£.60 = SF 3.33 per pound. You can buy a pound for SF 3 in one market, and you can sell a pound for SF 3.33 in another. So we want to first get some francs, then use the francs to buy some pounds, and then sell the pounds. Assuming you had $100, you could:

1. Exchange dollars for francs: $100 × 2 = SF 200.
2. Exchange francs for pounds: SF 200/3 = £66.67.
3. Exchange pounds for dollars: £66.67/.60 = $111.12.

This would result in an $11.12 round-trip profit.

Types of Transactions

There are two basic types of trades in the foreign exchange market: spot trades and forward trades. A **spot trade** is an agreement to exchange currency "on the spot," which actually means that the transaction will be completed, or settled, within two business days. The exchange rate on a spot trade is called the **spot exchange rate**. Implicitly, all of the exchange rates and transactions we have discussed so far have referred to the spot market.

spot trade
An agreement to trade currencies based on the exchange rate today for settlement within two business days.

spot exchange rate
The exchange rate on a spot trade.

forward trade
Agreement to exchange currency at some time in the future.

forward exchange rate
The agreed-upon exchange rate to be used in a forward trade.

A **forward trade** is an agreement to exchange currency at some time in the future. The exchange rate that will be used is agreed upon today and is called the **forward exchange rate**. A forward trade will normally be settled sometime in the next 12 months.

If you look back at Figure 18.1, you will see forward exchange rates quoted for some of the major currencies. For example, the spot exchange rate for the Swiss franc is SF 1 = $.6749. The six-month forward exchange rate is SF 1 = $.6772. This means that you can buy a Swiss franc today for $.6749, or you can agree to take delivery of a Swiss franc in six months and pay $.6772 at that time.

Notice that the Swiss franc is more expensive in the forward market ($.6772 versus $.6749). Since the Swiss franc is more expensive in the future than it is today, it is said to be selling at a *premium* relative to the dollar. For the same reason, the dollar is said to be selling at a *discount* relative to the Swiss franc.

Why does the forward market exist? One answer is that it allows businesses and individuals to lock in a future exchange rate today, thereby eliminating any risk from unfavorable shifts in the exchange rate.

EXAMPLE 18.3 Looking Forward

Suppose you are expecting to receive a million British pounds in six months, and you agree to a forward trade to exchange your pounds for dollars. Based on Figure 18.1, how many dollars will you get in six months? Is the pound selling at a discount or a premium relative to the dollar?

In Figure 18.1, the spot exchange rate and the six-month forward rate in terms of dollars per pound are $1.5489 = £1 and $1.5313 = £1, respectively. If you expect £1 million in six months, then you will get £1 million × $1.5313 per £ = $1.5313 million. Since it is less expensive to buy a pound in the forward market than in the spot market ($1.5313 versus $1.5489), the pound is selling at a discount relative to the dollar.

As we mentioned earlier, it is standard practice around the world (with a few exceptions) to quote exchange rates in terms of the U.S. dollar. This means that rates are quoted as the amount of currency per U.S. dollar. For the remainder of this chapter, we will stick with this form. Things can get extremely confusing if you forget this. Thus, when we say things like "the exchange rate is expected to rise," it is important to remember that we are talking about the exchange rate quoted as units of foreign currency per U.S. dollar.

CONCEPT QUESTIONS

18.2a What is triangle arbitrage?

18.2b What do we mean by the three-month forward exchange rate?

18.2c If we say that the exchange rate is SF 1.90, what do we mean?

18.3 PURCHASING POWER PARITY

Now that we have discussed what exchange rate quotations mean, we can address an obvious question: What determines the level of the spot exchange rate? In addition, we know that exchange rates change through time. A related question is thus, What determines the

rate of change in exchange rates? At least part of the answer in both cases goes by the name of **purchasing power parity (PPP)**, and it is the idea that the exchange rate adjusts to keep purchasing power constant among currencies. As we discuss next, there are two forms of PPP: *absolute* and *relative.*

purchasing power parity (PPP)
The idea that the exchange rate adjusts to keep purchasing power constant among currencies.

Absolute Purchasing Power Parity

The basic idea behind *absolute purchasing power parity* is that a commodity costs the same regardless of what currency is used to purchase it or where it is selling. This is a very straightforward concept. If a beer costs £2 in London, and the exchange rate is £.60 per dollar, then a beer costs £2/.60 = $3.33 in New York. In other words, absolute PPP says that $1 will buy you the same number of, say, cheeseburgers, anywhere in the world.

More formally, let S_0 be the spot exchange rate between the British pound and the U.S. dollar today (Time 0), and remember that we are quoting exchange rates as the amount of foreign currency per dollar. Let P_{US} and P_{UK} be the current U.S. and British prices, respectively, on a particular commodity, say, apples. Absolute PPP simply says that:

$$P_{UK} = S_0 \times P_{US}$$

This tells us that the British price for something is equal to the U.S. price for that same something, multiplied by the exchange rate.

The rationale behind PPP is similar to that behind triangle arbitrage. If PPP did not hold, arbitrage would be possible (in principle) if apples were moved from one country to another. For example, suppose apples in New York are selling for $4 per bushel, while in London the price is £2.40 per bushel. Absolute PPP implies that:

$$\begin{aligned} P_{UK} &= S_0 \times P_{US} \\ £2.40 &= S_0 \times \$4 \\ S_0 &= £2.40/\$4 = £.60 \end{aligned}$$

That is, the implied spot exchange rate is £.60 per dollar. Equivalently, a pound is worth $1/£.60 = $1.67.

Suppose, instead, that the actual exchange rate is £.50. Starting with $4, a trader could buy a bushel of apples in New York, ship it to London, and sell it there for £2.40. Our trader could then convert the £2.40 into dollars at the prevailing exchange rate, S_0 = £.50, yielding a total of £2.40/.50 = $4.80. The round-trip gain is 80 cents.

Because of this profit potential, forces are set in motion to change the exchange rate and/or the price of apples. In our example, apples would begin moving from New York to London. The reduced supply of apples in New York would raise the price of apples there, and the increased supply in Britain would lower the price of apples in London.

In addition to moving apples around, apple traders would be busily converting pounds back into dollars to buy more apples. This activity increases the supply of pounds and simultaneously increases the demand for dollars. We would expect the value of a pound to fall. This means that the dollar is getting more valuable, so it will take more pounds to buy one dollar. Since the exchange rate is quoted as pounds per dollar, we would expect the exchange rate to rise from £.50.

For absolute PPP to hold absolutely, several things must be true:

1. The transaction costs of trading apples—shipping, insurance, spoilage, and so on—must be zero.
2. There must be no barriers to trading apples, such as tariffs, taxes, or other political barriers such as VRAs (voluntary restraint agreements).

3. Finally, an apple in New York must be identical to an apple in London. It won't do for you to send red apples to London if the English eat only green apples.

Given the fact that the transaction costs are not zero and that the other conditions are rarely exactly met, it is not surprising that absolute PPP is really applicable only to traded goods, and then only to very uniform ones.

For this reason, absolute PPP does not imply that a Mercedes costs the same as a Ford or that a nuclear power plant in France costs the same as one in New York. In the case of the cars, they are not identical. In the case of the power plants, even if they were identical, they are expensive and very difficult to ship. On the other hand, we would be very surprised to see a significant violation of absolute PPP for gold. See our nearby *Reality Bytes* box for an interesting example of PPP violations.

Relative Purchasing Power Parity

As a practical matter, a relative version of purchasing power parity has evolved. *Relative purchasing power parity* does not tell us what determines the absolute level of the exchange rate. Instead, it tells what determines the *change* in the exchange rate over time.

The Basic Idea Suppose the British pound–U.S. dollar exchange rate is currently $S_0 = £.50$. Further suppose that the inflation rate in Britain is predicted to be 10 percent over the coming year and (for the moment) the inflation rate in the United States is predicted to be zero. What do you think the exchange rate will be in a year?

If you think about it, a dollar currently costs .50 pound in Britain. With 10 percent inflation, we expect prices in Britain to generally rise by 10 percent. So we expect that the price of a dollar will go up by 10 percent, and the exchange rate should rise to $£.50 \times 1.1 = £.55$.

If the inflation rate in the United States is not zero, then we need to worry about the *relative* inflation rates in the two countries. For example, suppose the U.S. inflation rate is predicted to be 4 percent. Relative to prices in the United States, prices in Britain are rising at a rate of $10\% - 4\% = 6\%$ per year. So we expect the price of the dollar to rise by 6 percent, and the predicted exchange rate is $£.50 \times 1.06 = £.53$.

The Result In general, relative PPP says that the change in the exchange rate is determined by the difference in the inflation rates of the two countries. To be more specific, we will use the following notation:

S_0 = Current (Time 0) spot exchange rate (foreign currency per dollar)
$E(S_t)$ = Expected exchange rate in t periods
h_{US} = Inflation rate in the United States
h_{FC} = Foreign country inflation rate

Based on our discussion just above, relative PPP says that the expected percentage change in the exchange rate over the next year, $[E(S_1) - S_0]/S_0$, is:

$$[E(S_1) - S_0]/S_0 = h_{FC} - h_{US} \quad \textbf{[18.1]}$$

In words, relative PPP simply says that the expected percentage change in the exchange rate is equal to the difference in inflation rates. If we rearrange this slightly, we get:

$$E(S_1) = S_0[1 + (h_{FC} - h_{US})] \quad \textbf{[18.2]}$$

REALITY BYTES

McPricing

As we discussed in the chapter, absolute purchasing power parity (PPP) does not seem to hold in practice. One of the more famous violations of absolute PPP is the Big Mac index constructed by *The Economist.* To construct the index, prices for a Big Mac in different countries are gathered from McDonald's. Below you will find the 2001 Big Mac index from www.economist.com (we will leave it to you to find the most recent index).

The hamburger standard

	Big Mac prices		Implied PPP* of the dollar	Actual $ exchange rate 17/04/01	Under(–)/ over(+) valuation against the dollar, %
	in local currency	in dollars			
United States†	$2.54	2.54	–	–	–
Argentina	Peso2.50	2.50	0.98	1.00	-2
Australia	A$3.00	1.52	1.18	1.98	-40
Brazil	Real3.60	1.64	1.42	2.19	-35
Britain	£1.99	2.85	1.28‡	1.43‡	12
Canada	C$3.33	2.14	1.31	1.56	-16
Chile	Peso1260	2.10	496	601	-17
China	Yuan9.90	1.20	3.90	8.28	-53
Czech Rep	Koruna56.00	1.43	22.0	39.0	-44
Denmark	DKr24.75	2.93	9.74	8.46	15
Euro area	2.57	2.27	0.99§	0.88§	-11
France	FFr18.5	2.49	7.28	7.44	-2
Germany	DM5.10	2.30	2.01	2.22	-9
Italy	Lire4300	1.96	1693	2195	-23
Spain	Pta395	2.09	156	189	-18
Hong Kong	HK$10.70	1.37	4.21	7.80	-46
Hungary	Forint399	1.32	157	303	-48
Indonesia	Rupiah14700	1.35	5787	10855	-47
Japan	¥294	2.38	116	124	-6
Malaysia	M$4.52	1.19	1.78	3.80	-53
Mexico	Peso21.9	2.36	8.62	9.29	-7
New Zealand	NZ$3.60	1.46	1.42	2.47	-43
Philippines	Peso59.00	1.17	23.2	50.3	-54
Poland	Zloty5.90	1.46	2.32	4.03	-42
Russia	Rouble35.00	1.21	13.8	28.9	-52
Singapore	S$3.30	1.82	1.30	1.81	-28
South Africa	Rand9.70	1.19	3.82	8.13	-53
South Korea	Won3000	2.27	1181	1325	-11
Sweden	SKr24.0	2.33	9.45	10.28	-8
Switzerland	SFr6.30	3.65	2.48	1.73	44
Taiwan	NT$70.0	2.13	27.6	32.9	-16
Thailand	Baht55.0	1.21	21.7	45.5	-52

*Purchasing-power parity: local price divided by price in United States
†Average of New York, Chicago, San Francisco and Atlanta ‡Dollars per pound §Dollars per euro
Source: McDonald's; *The Economist*

As you can see from the index, absolute PPP does not seem to hold, at least for the Big Mac. In fact, in only 6 of the 29 currencies surveyed by *The Economist* is the exchange rate within 10 percent of that predicted by absolute PPP. The largest disparity is the Philippines, where the currency is apparently undervalued by 54 percent. Almost one-half of the currencies are "incorrectly" priced by more than 40 percent. Why?

There are several reasons. First, a Big Mac is not really transportable. Yes, you can load a ship with Big Macs and send it to Switzerland where the currency is supposedly overvalued by 44 percent. But do you really think people would buy your Big Macs? Probably not. Even though it is relatively easy to transport a Big Mac, it would be relatively expensive, and the product would suffer in quality along the way.

Also, if you look, the price of the Big Mac is the average price from New York, Chicago, San Francisco, and Atlanta. The reason is that the Big Mac does not sell for the same price in the United States, where presumably they are all purchased with the dollar. The cost of living and competition are only a few of the factors that will affect the price of a Big Mac in the United States. Since Big Macs are not priced the same in the same currency, would we expect absolute PPP to hold across currencies?

Finally, differing tastes can account for the apparent discrepancy. In the United States, hamburgers and fast food have become a staple of the American diet. In other countries, hamburgers have not become as entrenched. We might expect the price of the Big Mac to be lower in the United States since there is much more fast food competition.

Having examined the Big Mac, we should say that absolute PPP will hold more closely for easily transportable items. For instance, there are many companies with stock listed on both the NYSE and the stock exchange of another country. If you examine the share prices on the two exchanges, you will find that the price of the stock is almost exactly what absolute PPP would predict. The reason is that a share of stock in a particular company is (usually) exactly the same wherever you buy it and whatever currency is used.

This result makes a certain amount of sense, but care must be used in quoting the exchange rate.

In our example involving Britain and the United States, relative PPP tells us that the exchange rate will rise by $h_{FC} - h_{US} = 10\% - 4\% = 6\%$ per year. Assuming that the difference in inflation rates doesn't change, the expected exchange rate in two years, $E(S_2)$, will therefore be:

$$\begin{aligned} E(S_2) &= E(S_1) \times (1 + .06) \\ &= .53 \times 1.06 \\ &= .562 \end{aligned}$$

Notice that we could have written this as:

$$\begin{aligned} E(S_2) &= .53 \times 1.06 \\ &= (.50 \times 1.06) \times 1.06 \\ &= .50 \times 1.06^2 \end{aligned}$$

In general, relative PPP says that the expected exchange rate at some time in the future, $E(S_t)$, is:

$$E(S_t) = S_0 \times [1 + (h_{FC} - h_{US})]^t \quad \textbf{[18.3]}$$

Because we don't really expect absolute PPP to hold for most goods, we will focus on relative PPP in any future discussion. Henceforth, when we refer to PPP without further qualification, we mean relative PPP.

EXAMPLE 18.4 It's All Relative

Suppose the Japanese exchange rate is currently 105 yen per dollar. The inflation rate in Japan over the next three years will run, say, 2 percent per year, while the U.S. inflation rate will be 6 percent. Based on relative PPP, what will the exchange rate be in three years?

Since the U.S. inflation rate is higher, we expect that a dollar will become less valuable. The exchange rate change will be 2% − 6% = −4% per year. Over three years, the exchange rate will fall to:

$$\begin{aligned} E(S_3) &= S_0 \times [1 + (h_{FC} - h_{US})]^3 \\ &= 105 \times [1 + (-.04)]^3 \\ &= 92.90 \text{ yen per dollar} \end{aligned}$$

Currency Appreciation and Depreciation We frequently hear things like "the dollar strengthened (or weakened) in financial markets today" or "the dollar is expected to appreciate (or depreciate) relative to the pound." When we say that the dollar strengthens, or appreciates, we mean that the value of a dollar rises, so it takes more foreign currency to buy a dollar.

What happens to the exchange rates as currencies fluctuate in value depends on how exchange rates are quoted. Since we are quoting them as units of foreign currency per dollar, the exchange rate moves in the same direction as the value of the dollar: It rises as the dollar strengthens, and it falls as the dollar weakens.

Relative PPP tells us that the exchange rate will rise if the U.S. inflation rate is lower than the foreign country's. This happens because the foreign currency depreciates in value and therefore weakens relative to the dollar.

CONCEPT QUESTIONS

18.3a What does absolute PPP say? Why might it not hold for many types of goods?

18.3b According to relative PPP, what determines the change in exchange rates?

EXCHANGE RATES AND INTEREST RATES 18.4

The next issue we need to address is the relationship between spot exchange rates, forward exchange rates, and nominal interest rates. To get started, we need some additional notation:

F_t = Forward exchange rate for settlement at time t
R_{US} = U.S. nominal risk-free interest rate
R_{FC} = Foreign country nominal risk-free interest rate

As before, we will use S_0 to stand for the spot exchange rate. You can take the U.S. nominal risk-free rate, R_{US}, to be the T-bill rate.

Covered Interest Arbitrage

Suppose we observe the following information about U.S. and Swiss currency in the market:

S_0 = SF 2.00 R_{US} = 10%
F_1 = SF 1.90 R_S = 5%

where R_S is the nominal risk-free rate in Switzerland. The period is one year, so F_1 is the 360-day forward rate.

Do you see an arbitrage opportunity here? There is one. Suppose you have $1 to invest, and you want a riskless investment. One option you have is to invest the $1 in a riskless U.S. investment such as a 360-day T-bill. We will call this Strategy 1. If you do this, then, in one period, your $1 will be worth:

$$\begin{aligned}\text{\$ value in 1 period} &= \$1(1 + R_{US}) \\ &= \$1.10\end{aligned}$$

Alternatively, you can invest in the Swiss risk-free investment. To do this, you need to convert your $1 to francs and simultaneously execute a forward trade to convert francs back to dollars in one year. We will call this Strategy 2. The necessary steps would be as follows:

1. Convert your $1 to $\$1 \times S_0 = \text{SF } 2.00$.
2. At the same time, enter into a forward agreement to convert francs back to dollars in one year. Since the forward rate is SF 1.90, you get $1 for every SF 1.90 that you have in one year.
3. Invest your SF 2.00 in Switzerland at R_S. In one year, you will have:

$$\begin{aligned}\text{SF value in 1 year} &= \text{SF } 2.00 \times (1 + R_S) \\ &= \text{SF } 2.00 \times 1.05 \\ &= \text{SF } 2.10\end{aligned}$$

4. Convert your SF 2.10 back to dollars at the agreed-upon rate of SF 1.90 = $1. You end up with:

$$\begin{aligned}\text{\$ value in 1 year} &= \text{SF } 2.10/1.90 \\ &= \$1.1053\end{aligned}$$

For exchange rates and even pictures of non-U.S. currencies, see **www.travlang.com/money**.

Notice that the value in one year from this strategy can be written as:

$$\begin{aligned}\$ \text{ value in 1 year} &= \$1 \times S_0 \times (1 + R_S)/F_1 \\ &= \$1 \times 2.00 \times 1.05/1.90 \\ &= \$1.1053\end{aligned}$$

The return on this investment is apparently 10.53 percent. This is higher than the 10 percent we get from investing in the United States. Since both investments are risk-free, there is an arbitrage opportunity.

To exploit the difference in interest rates, you need to borrow, say, $5 million at the lower U.S. rate and invest it at the higher Swiss rate. What is the round-trip profit from doing this? To find out, we can work through the steps above:

How are the international markets doing? Find out at **cbs.marketwatch.com**.

1. Convert the $5 million at SF 2.00 = $1 to get SF 10 million.
2. Agree to exchange francs for dollars in one year at SF 1.90 to the dollar.
3. Invest the SF 10 million for one year at $R_S = 5\%$. You end up with SF 10.5 million.
4. Convert the SF 10.5 million back to dollars to fulfill the forward contract. You receive SF 10.5 million/1.90 = $5,526,316.
5. Repay the loan with interest. You owe $5 million plus 10 percent interest, for a total of $5.5 million. You have $5,526,316, so your round-trip profit is a risk-free $26,316.

The activity that we have illustrated here goes by the name of *covered interest arbitrage*. The term *covered* refers to the fact that we are covered in the event of a change in the exchange rate since we lock in the forward exchange rate today.

Interest Rate Parity

If we assume that significant covered interest arbitrage opportunities do not exist, then there must be some relationship between spot exchange rates, forward exchange rates, and relative interest rates. To see what this relationship is, note that, in general, Strategy 1 above, investing in a riskless U.S. investment, gives us $(1 + R_{US})$ for every dollar we invest. Strategy 2, investing in a foreign risk-free investment, gives us $S_0 \times (1 + R_{FC})/F_1$ for every dollar we invest. Since these have to be equal to prevent arbitrage, it must be the case that:

$$1 + R_{US} = S_0 \times (1 + R_{FC})/F_1$$

interest rate parity (IRP)
The condition stating that the interest rate differential between two countries is equal to the percentage difference between the forward exchange rate and the spot exchange rate.

Rearranging this a bit gets us the famous **interest rate parity (IRP)** condition:

$$F_1/S_0 = (1 + R_{FC})/(1 + R_{US}) \quad \textbf{[18.4]}$$

There is a very useful approximation for IRP that illustrates very clearly what is going on and is not difficult to remember. If we define the percentage forward premium or discount as $(F_1 - S_0)/S_0$, then IRP says that this percentage premium or discount is *approximately* equal to the difference in interest rates:

$$(F_1 - S_0)/S_0 = R_{FC} - R_{US} \quad \textbf{[18.5]}$$

Very loosely, what IRP says is that any difference in interest rates between two countries for some period is just offset by the change in the relative value of the currencies, thereby eliminating any arbitrage possibilities. Notice that we could also write:

$$F_1 = S_0 \times [1 + (R_{FC} - R_{US})] \quad \textbf{[18.6]}$$

In general, if we have t periods instead of just one, the IRP approximation will be written as:

$$F_t = S_0 \times [1 + (R_{FC} - R_{US})]^t \quad \textbf{[18.7]}$$

Parity Check EXAMPLE 18.5

Suppose the exchange rate for Japanese yen, S_0, is currently ¥120 = $1. If the interest rate in the United States is R_{US} = 10% and the interest rate in Japan is R_J = 5%, then what must the one-year forward rate be to prevent covered interest arbitrage?

From IRP, we have:

$$\begin{aligned} F_1 &= S_0 \times [1 + (R_J - R_{US})] \\ &= ¥120 \times [1 + (.05 - .10)] \\ &= ¥120 \times .95 \\ &= ¥114 \end{aligned}$$

Notice that the yen will sell at a premium relative to the dollar (why?).

CONCEPT QUESTIONS

18.4a What is interest rate parity?

18.4b Do you expect that interest rate parity will hold more closely than purchasing power parity? Why?

EXCHANGE RATE RISK 18.5

exchange rate risk
The risk related to having international operations in a world where relative currency values vary.

Exchange rate risk is the natural consequence of international operations in a world where relative currency values move up and down. As we discuss next, there are three different types of exchange rate risk, or exposure: short-run exposure, long-run exposure, and translation exposure.

Short-Run Exposure

The day-to-day fluctuations in exchange rates create short-run risks for international firms. Most such firms have contractual agreements to buy and sell goods in the near future at set prices. When different currencies are involved, such transactions have an extra element of risk.

For example, imagine that you are importing imitation pasta from Italy and reselling it in the United States under the Impasta brand name. Your largest customer has ordered 10,000 cases of Impasta. You place the order with your supplier today, but you won't pay until the goods arrive in 60 days. Your selling price is $6 per case. Your cost is 8,400 Italian lira per case, and the exchange rate is currently Lit 1,500, so it takes 1,500 lira to buy $1.[1]

At the current exchange rate, your cost in dollars from filling the order is Lit 8,400/1,500 = $5.6 per case, so your pretax profit on the order is 10,000 × ($6 − 5.6) = $4,000. However, the exchange rate in 60 days will probably be different, so your profit will depend on what the future exchange rate turns out to be.

For example, if the rate goes to Lit 1,600, your cost is Lit 8,400/1,600 = $5.25 per case. Your profit goes to $7,500. If the exchange rate goes to, say, Lit 1,400, then your cost is Lit 8,400/1,400 = $6, and your profit is zero.

[1]Of course, Italy is part of the EMU, so the lira no longer exists.

The short-run exposure in our example can be reduced or eliminated in several ways. The most obvious way is to enter into a forward exchange agreement to lock in an exchange rate. For example, suppose the 60-day forward rate is Lit 1,580. What will be your profit if you hedge?

If you hedge, you lock in an exchange rate of Lit 1,580. Your cost in dollars will thus be Lit 8,400/1,580 = $5.32 per case, so your profit will be 10,000 × ($6 − 5.32) = $6,800.

Long-Run Exposure

In the long run, the value of a foreign operation can fluctuate because of unanticipated changes in relative economic conditions. For example, imagine that we own a labor-intensive assembly operation located in another country to take advantage of lower wages. Through time, unexpected changes in economic conditions can raise the foreign wage levels to the point where the cost advantage is eliminated or even becomes negative.

Hedging long-run exposure is more difficult than hedging short-term risks. For one thing, organized forward markets don't exist for such long-term needs. Instead, the primary option that firms have is to try to match up foreign currency inflows and outflows. The same thing goes for matching foreign currency–denominated assets and liabilities. For example, a firm that sells in a foreign country might try to concentrate its raw material purchases and labor expense in that country. That way, the dollar values of its revenues and costs will move up and down together.

Similarly, a firm can reduce its long-run exchange risk by borrowing in the foreign country. Fluctuations in the value of the foreign subsidiary's assets will then be at least partially offset by changes in the value of the liabilities.

Translation Exposure

When a U.S. company calculates its accounting net income and EPS for some period, it must "translate" everything into dollars. This can create some problems for the accountants when there are significant foreign operations. In particular, two issues arise:

1. What is the appropriate exchange rate to use for translating each balance sheet account?
2. How should balance sheet accounting gains and losses from foreign currency translation be handled?

To illustrate the accounting problem, suppose that we started a small foreign subsidiary in Lilliputia a year ago. The local currency is the gulliver, abbreviated GL. At the beginning of the year, the exchange rate was GL 2 = $1, and the balance sheet in gullivers looked like this:

Assets	GL 1,000	Liabilities	GL 500
		Equity	500

At two gullivers to the dollar, the beginning balance sheet in dollars was:

Assets	$500	Liabilities	$250
		Equity	250

Lilliputia is a quiet place, and nothing at all actually happened during the year. As a result, net income was zero (before consideration of exchange rate changes). However, the

exchange rate did change to 4 gullivers = $1, perhaps because the Lilliputian inflation rate is much higher than the U.S. inflation rate.

Since nothing happened, the accounting ending balance sheet in gullivers is the same as the beginning one. However, if we convert it to dollars at the new exchange rate, we get:

Assets	$250	Liabilities	$125
		Equity	125

Notice that the value of the equity has gone down by $125, even though net income was exactly zero. Despite the fact that absolutely nothing really happened, there is a $125 accounting loss. How to handle this $125 loss has been a controversial accounting question.

One obvious and consistent way to handle this loss is simply to report the loss on the parent's income statement. During periods of volatile exchange rates, this kind of treatment can dramatically impact an international company's reported EPS. This is purely an accounting phenomenon, but, even so, such fluctuations are disliked by some financial managers.

The current approach to translation gains and losses is based on rules set out in Financial Accounting Standards Board (FASB) Statement Number 52, issued in December 1981. For the most part, FASB 52 requires that all assets and liabilities be translated from the subsidiary's currency into the parent's currency using the exchange rate that currently prevails.

Any translation gains and losses that occur are accumulated in a special account within the shareholders' equity section of the balance sheet. This account might be labeled something like "unrealized foreign exchange gains (losses)." These gains and losses are not reported on the income statement. As a result, the impact of translation gains and losses will not be recognized explicitly in net income until the underlying assets and liabilities are sold or otherwise liquidated.

Managing Exchange Rate Risk

For a large multinational firm, the management of exchange rate risk is complicated by the fact that there can be many different currencies involved for many different subsidiaries. It is very likely that a change in some exchange rate will benefit some subsidiaries and hurt others. The net effect on the overall firm depends on its net exposure.

For example, suppose a firm has two divisions. Division A buys goods in the United States for dollars and sells them in Britain for pounds. Division B buys goods in Britain for pounds and sells them in the United States for dollars. If these two divisions are of roughly equal size in terms of their inflows and outflows, then the overall firm obviously has little exchange rate risk.

In our example, the firm's net position in pounds (the amount coming in less the amount going out) is small, so the exchange rate risk is small. However, if one division, acting on its own, were to start hedging its exchange rate risk, then the overall firm's exchange rate risk would go up. The moral of the story is that multinational firms have to be conscious of the overall position that the firm has in a foreign currency. For this reason, management of exchange rate risk is probably best handled on a centralized basis.

CONCEPT QUESTIONS

18.5a What are the different types of exchange rate risk?

18.5b How can a firm hedge short-run exchange rate risk? Long-run exchange rate risk?

18.6 POLITICAL RISK

political risk
Risk related to changes in value that arise because of political actions.

One final element of risk in international investing is **political risk**. Political risk is related to changes in value that arise as a consequence of political actions. This is not a problem faced only by international firms. For example, changes in U.S. tax laws and regulations may benefit some U.S. firms and hurt others, so political risk exists nationally as well as internationally.

Some countries do have more political risk than others, however. When firms have operations in these riskier countries, the extra political risk may lead them to require higher returns on overseas investments to compensate for the risk that funds will be blocked, critical operations interrupted, and contracts abrogated. In the most extreme case, the possibility of outright confiscation may be a concern in countries with relatively unstable political environments.

Political risk also depends on the nature of the business; some businesses are less likely to be confiscated because they are not particularly valuable in the hands of a different owner. An assembly operation supplying subcomponents that only the parent company uses would not be an attractive "takeover" target, for example. Similarly, a manufacturing operation that requires the use of specialized components from the parent is of little value without the parent company's cooperation.

Natural resource developments, such as copper mining or oil drilling, are just the opposite. Once the operation is in place, much of the value is in the commodity. The political risk for such investments is much higher for this reason. Also, the issue of exploitation is more pronounced with such investments, again increasing the political risk.

Political risk can be hedged in several ways, particularly when confiscation or nationalization is a concern. The use of local financing, perhaps from the government of the foreign country in question, reduces the possible loss because the company can refuse to pay on the debt in the event of unfavorable political activities. Based on our discussion above, structuring the operation in such a way that it requires significant parent company involvement to function is another way to reduce political risk.

CONCEPT QUESTIONS

18.6a What is political risk?

18.6b What are some ways of hedging political risk?

SUMMARY AND CONCLUSIONS

The international firm has a more complicated life than the purely domestic firm. Management must understand the connection between interest rates, foreign currency exchange rates, and inflation, and it must become aware of a large number of different financial market regulations and tax systems. This chapter was intended to be a concise introduction to some of the financial issues that come up in international investing.

Our coverage was necessarily brief. The main topics we discussed included:

1. Some basic vocabulary. We briefly defined some exotic terms such as *LIBOR* and *Eurocurrency.*

2. The basic mechanics of exchange rate quotations. We discussed the spot and forward markets and how exchange rates are interpreted.
3. The fundamental relationships between international financial variables:
   a. Absolute and relative purchasing power parity, or PPP.
   b. Interest rate parity, or IRP.

   Absolute purchasing power parity states that $1 should have the same purchasing power in each country. This means that an orange costs the same whether you buy it in New York or in Tokyo.

   Relative purchasing power parity means that the expected percentage change in exchange rates between the currencies of two countries is equal to the difference in their inflation rates.

   Interest rate parity implies that the percentage difference between the forward exchange rate and the spot exchange rate is equal to the interest rate differential. We showed how covered interest arbitrage forces this relationship to hold.
4. Exchange rate and political risk. We described the various types of exchange rate risk and discussed some commonly used approaches to managing the effect of fluctuating exchange rates on the cash flows and value of the international firm. We also discussed political risk and some ways of managing exposure to it.

CHAPTER REVIEW AND SELF-TEST PROBLEMS

18.1 Relative Purchasing Power Parity. The inflation rate in the United States is projected at 6 percent per year for the next several years. The Australian inflation rate is projected to be 2 percent during that time. The exchange rate is currently A$ 2.2. Based on relative PPP, what is the expected exchange rate in two years?

18.2 Covered Interest Arbitrage. The spot and 360-day forward rates on the Swiss franc are SF 1.8 and SF 1.7, respectively. The risk-free interest rate in the United States is 8 percent, and the risk-free rate in Switzerland is 5 percent. Is there an arbitrage opportunity here? How would you exploit it?

Answers to Chapter Review and Self-Test Problems

18.1 From relative PPP, the expected exchange rate in two years, $E(S_2)$, is:

$$E(S_2) = S_0 \times [1 + (h_A - h_{US})]^2$$

where h_A is the Australian inflation rate. The current exchange rate is A$ 2.2, so the expected exchange rate is:

$$\begin{aligned} E(S_2) &= \text{A\$ } 2.2 \times [1 + (.02 - .06)]^2 \\ &= \text{A\$ } 2.2 \times .96^2 \\ &= \text{A\$ } 2.03 \end{aligned}$$

18.2 From interest rate parity, the forward rate should be (approximately):

$$\begin{aligned} F_1 &= S_0 \times [1 + (R_S - R_{US})] \\ &= 1.8 \times [1 + .05 - .08] \\ &= 1.75 \end{aligned}$$

Since the forward rate is actually SF 1.7, there is an arbitrage opportunity.

To exploit the arbitrage opportunity, we first note that dollars are selling for SF 1.7 each in the forward market. From IRP, this is too cheap because they should be selling for SF 1.75. So, we want to arrange to buy dollars with Swiss francs in the forward market. To do this, we can:

1. Today: Borrow, say, $10 million for 360 days. Convert it to SF 18 million in the spot market, and buy a forward contract at SF 1.7 to convert it back to dollars in 360 days. Invest the SF 18 million at 5 percent.
2. In one year: Your investment has grown to SF 18 × 1.05 = SF 18.9 million. Convert this to dollars at the rate of SF 1.7 = $1. You will have SF 18.9 million/1.7 = $11,117,647. Pay off your loan with 8 percent interest at a cost of $10 million × 1.08 = $10,800,000 and pocket the difference of $317,647.

CRITICAL THINKING AND CONCEPTS REVIEW

18.1 Spot and Forward Rates. Suppose the exchange rate for the Swiss franc is quoted as SF 1.50 in the spot market and SF 1.53 in the 90-day forward market.

- **a.** Is the dollar selling at a premium or a discount relative to the franc?
- **b.** Does the financial market expect the franc to strengthen relative to the dollar? Explain.
- **c.** What do you suspect is true about relative economic conditions in the United States and Switzerland?

18.2 Purchasing Power Parity. Suppose the rate of inflation in Russia will run about 3 percent higher than the U.S. inflation rate over the next several years. All other things being the same, what will happen to the ruble versus dollar exchange rate? What relationship are you relying on in answering?

18.3 Exchange Rates. The exchange rate for the Australian dollar is currently A$1.40. This exchange rate is expected to rise by 10 percent over the next year.

- **a.** Is the Australian dollar expected to get stronger or weaker?
- **b.** What do you think about the relative inflation rates in the United States and Australia?
- **c.** What do you think about the relative nominal interest rates in the United States and Australia? Relative real rates?

18.4 Yankee Bonds. Which of the following most accurately describes a Yankee bond?

- **a.** A bond issued by General Motors in Japan with the interest payable in U.S. dollars.
- **b.** A bond issued by General Motors in Japan with the interest payable in yen.
- **c.** A bond issued by Toyota in the United States with the interest payable in yen.
- **d.** A bond issued by Toyota in the United States with the interest payable in dollars.
- **e.** A bond issued by Toyota worldwide with the interest payable in dollars.

18.5 Exchange Rates. Are exchange rate changes necessarily good or bad for a particular company?

18.6 International Risks. Duracell International confirmed in October 1995 that it was planning to open battery-manufacturing plants in China and India. Manufacturing in these countries allows Duracell to avoid import duties of between 30 and 35 percent that have made alkaline batteries prohibitively

expensive for some consumers. What additional advantages might Duracell see in this proposal? What are some of the risks to Duracell?

18.7 Multinational Corporations. Given that many multinationals based in many countries have much greater sales outside their domestic markets than within them, what is the particular relevance of their domestic currency?

18.8 Exchange Rate Movements. Are the following statements true or false? Explain why.

a. If the general price index in Great Britain rises faster than that in the United States, we would expect the pound to appreciate relative to the dollar.

b. Suppose you are a German machine tool exporter and you invoice all of your sales in foreign currency. Further suppose that the European monetary authorities begin to undertake an expansionary monetary policy. If it is certain that the easy money policy will result in higher inflation rates in "Euroland" relative to those in other countries, then you should use the forward markets to protect yourself against future losses resulting from the deterioration in the value of the euro.

c. If you could accurately estimate differences in the relative inflation rates of two countries over a long period of time, while other market participants were unable to do so, you could successfully speculate in spot currency markets.

18.9 Exchange Rate Movements. Some countries encourage movements in their exchange rate relative to those of some other country as a short-term means of addressing foreign trade imbalances. For each of the following scenarios, evaluate the impact the announcement would have on an American importer and an American exporter doing business with the foreign country.

a. Officials in the administration of the United States government announce that they are comfortable with a rising Mexican peso relative to the dollar.

b. British monetary authorities announce that they feel the pound has been driven too low by currency speculators relative to the dollar.

c. The Brazilian government announces that it will print billions of new cruzeiros and inject them into the economy in an effort to reduce the country's 40 percent unemployment rate.

QUESTIONS AND PROBLEMS

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Spreadsheet Templates 4, 6, 7

Basic
(Questions 1–10)

1. Using Exchange Rates. Take a look back at Figure 18.1 to answer the following questions:

a. If you have $100, how many Polish zlotys can you get?

b. How much is one euro worth?

c. If you have five million euros, how many dollars do you have?

d. Which is worth more, a New Zealand dollar or a Singapore dollar?

e. Which is worth more, a Mexican peso or a Chilean peso?

f. How many Swiss francs can you get for a euro? What do you call this rate?

g. Per unit, what is the most valuable currency of those listed? The least valuable?

2. Using the Cross-Rate. Use the information in Figure 18.1 to answer the following questions:

a. Which would you rather have, $100 or £100? Why?

b. Which would you rather have, $100 Canadian or £100? Why?

c. What is the cross-rate for Canadian dollars in terms of British pounds? For British pounds in terms of Canadian dollars?

3. **Forward Exchange Rates.** Use the information in Figure 18.1 to answer the following questions:

a. What is the six-month forward rate for the Japanese yen in yen per U.S. dollar? Is the yen selling at a premium or a discount? Explain.

b. What is the three-month forward rate for the Canadian dollar in U.S. dollars per Canadian dollar? Is the dollar selling at a premium or a discount? Explain.

c. What do you think will happen to the value of the dollar relative to the yen and the Canadian dollar, based on the information in the figure? Explain.

4. **Using Spot and Forward Exchange Rates.** Suppose the spot exchange rate for the Canadian dollar is Can$1.20 and the six-month forward rate is Can$1.23.

a. Which is worth more, a U.S. dollar or a Canadian dollar?

b. Assuming absolute PPP holds, what is the cost in the United States of an Elkhead beer if the price in Canada is Can$3.10? Why might the beer actually sell at a different price in the United States?

c. Is the U.S. dollar selling at a premium or a discount relative to the Canadian dollar?

d. Which currency is expected to appreciate in value?

e. Which country do you think has higher interest rates—the United States or Canada? Explain.

5. **Cross-Rates and Arbitrage.** Suppose the Japanese yen exchange rate is ¥110 = $1, and the British pound exchange rate is £1 = $1.65.

a. What is the cross-rate in terms of yen per pound?

b. Suppose the cross-rate is ¥160 = £1. Is there an arbitrage opportunity here? If there is, explain how to take advantage of the mispricing.

6. **Interest Rate Parity.** Use Figure 18.1 to answer the following questions. Suppose interest rate parity holds, and the current risk-free rate in the United States is 5 percent per six months. What must the six-month risk-free rate be in Canada? In Japan? In Switzerland?

7. **Interest Rates and Arbitrage.** The treasurer of a major U.S. firm has $30 million to invest for three months. The annual interest rate in the United States is .30 percent per month. The interest rate in Great Britain is .45 percent per month. The spot exchange rate is £.59, and the three-month forward rate is £.61. Ignoring transaction costs, in which country would the treasurer want to invest the company's funds? Why?

8. **Inflation and Exchange Rates.** Suppose the current exchange rate for the Russian ruble is ruble 29.15. The expected exchange rate in three years is ruble 31.02. What is the difference in the annual inflation rates for the United States and Russia over this period? Assume that the anticipated rate is constant for both countries. What relationship are you relying on in answering?

9. **Exchange Rate Risk.** Suppose your company imports computer motherboards from Singapore. The exchange rate is given in Figure 18.1. You have just placed an order for 30,000 motherboards at a cost to you of 239.50 Singapore dollars each. You will pay for the shipment when it arrives in 90 days. You can sell the motherboards for $150 each. Calculate your profit if the exchange rate goes up or down by 10 percent over the next 90 days. What is the break-even exchange rate?

What percentage rise or fall does this represent in terms of the Singapore dollar versus the U.S. dollar?

Intermediate
(Questions 11–16)

10. **Exchange Rates and Arbitrage.** Suppose the spot and six-month forward rates on the won are won 1110.25 and won 1132.10, respectively. The annual risk-free rate in the United States is 6 percent, and the annual risk-free rate in South Korea is 9 percent.
    a. Is there an arbitrage opportunity here? If so, how would you exploit it?
    b. What must the six-month forward rate be to prevent arbitrage?
11. **Spot versus Forward Rates.** Suppose the spot and three-month forward rates for the yen are ¥108 and ¥106, respectively.
    a. Is the yen expected to get stronger or weaker?
    b. What would you estimate is the difference between the inflation rates of the United States and Japan?
12. **Expected Spot Rates.** Suppose the spot exchange rate for the Hungarian forint is HUF 271. Interest rates in the United States are 4 percent per year. They are triple that in Hungary. What do you predict the exchange rate will be in one year? In two years? In five years? What relationship are you using?
13. **Calculating Cross-Rates.** Calculate the ¥/€ cross-rate given ¥127.41 = $1 and €1.13546 = $1.
14. **Cross-Rates and Arbitrage.** The £ trades at $1.4286 in London and $1.4097 in New York. How much profit could you earn on each trade with $10,000?
15. **Purchasing Power Parity and Exchange Rates.** According to purchasing power parity, if a Big Mac sells for $1.99 in the United States and krone 17.40 in Iceland, what is the krone/$ exchange rate?
16. **Inflation and Exchange Rates.** Suppose the spot and three-month forward rates for the yen are ¥126 and ¥122, respectively. What would you estimate the difference in inflation rates to be between Japan and the United States?

What's On the Web?

18.1 **Purchasing Power Parity.** One of the more famous examples of a violation of absolute purchasing power parity is the Big Mac index calculated by *The Economist.* This index calculates the dollar price of a McDonald's Big Mac in different countries. You can find the Big Mac index by going to www.economist.com, following the "Markets & Data" link and then the "Big Mac index" link. Using the most recent index, which country has the most expensive Big Macs? Which country has the cheapest Big Macs? Why is the price of a Big Mac not the same in every country?

18.2 **Inflation and Exchange Rates.** Go to www.marketvector.com and follow the "Exchange Rates" link. Select the "Australian Dollar" link. Is the U.S. dollar expected to appreciate or depreciate compared to the Australian dollar over the next six months? What is the difference in the annual inflation rates for the United States and Australia over this period? Assume that the anticipated rate is constant for both countries. What relationship are you relying on in answering?

18.3 **Interest Rate Parity.** Go to the *Financial Times* site at www.ft.com, click on the "Markets" link and then the "Currencies" link. Find the current exchange rate between the U.S. dollar and the euro. Next, follow the "World Currencies" link and the "Money rates" link to find the U.S. dollar LIBOR and the Euro LIBOR interest rates. What must the one-year forward rate be to prevent arbitrage? What principle are you relying on in your answer?