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INTERNATIONAL CORPORATE FINANCE

Relatively few large companies operate in a single country, and companies based in the United States are no exception. In 2005, multinational companies based in the United States received a significant tax break with the passage of the American Jobs Creation Act. The act allowed multinational companies to return

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or “repatriate” profits earned overseas prior to 2003 back to the United States at a tax rate of only 5.25 percent.

Previously, the tax rates on repatriated profits were as high as 35 percent, which encouraged companies to invest profits from foreign operations in other countries, thereby avoiding the tax. The goal of the act was to encourage companies to move resources from foreign operations to the United States. Several large companies did just that. For example, Pfizer repatriated \$37 billion, IBM repatriated \$9.5 billion, and Coca-Cola repatriated \$6.1 billion. Of course, taxes are only one of the intricacies involved in global operations. In this chapter, we explore the role played by currencies and exchange rates, along with a number of other key topics in international finance.

Corporations with significant foreign operations are often called *international corporations* or *multinationals*. Such corporations 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, these firms seek to invest in projects that create more value for the shareholders 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, although it is usually more complicated to apply the NPV rule to foreign investments.

One of the most significant complications of international finance is foreign exchange. The foreign exchange markets provide important information and opportunities for an international corporation when it undertakes capital budgeting and financing decisions. As we will discuss, international exchange rates, interest rates, and inflation rates are closely related. We will spend much of this chapter exploring the connection between these financial variables.

We won't have much to say here about the role of cultural and social differences in international business. Neither will we 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.



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Terminology

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 the colorful nature of the language of international finance.

1. An **American Depositary Receipt (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 for a large and growing number of foreign companies: company sponsored, which are listed on an exchange, and unsponsored, which usually are held by the investment bank that makes a market 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 takes place anywhere there are 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), 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.
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

22.1

American Depositary Receipt (ADR)

A security issued in the United States representing shares of a foreign stock and allowing that stock to be traded in the United States.

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).

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.

swaps

Agreements to exchange two securities or currencies.



For current LIBOR rates, see www.bloomberg.com.

a cornerstone in the pricing of money market issues and other short-term 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.

Concept Questions

22.1a What are the differences between a Eurobond and a foreign bond?

22.1b What are Eurodollars?

22.2 Foreign Exchange Markets and Exchange Rates

foreign exchange market

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

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: the U.S. dollar (\$), the British pound sterling (£), the Japanese yen (¥), and the euro (€). Table 22.1 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

TABLE 22.1

International Currency Symbols

Country	Currency	Symbol
Australia	Dollar	A\$
Canada	Dollar	Can\$
Denmark	Krone	DKr
EMU	Euro	€
India	Rupee	Rs
Iran	Rial	RI
Japan	Yen	¥
Kuwait	Dinar	KD
Mexico	Peso	Ps
Norway	Krone	NKr
Saudi Arabia	Riyal	SR
Singapore	Dollar	S\$
South Africa	Rand	R
Sweden	Krona	SKr
Switzerland	Franc	SF
United Kingdom	Pound	£
United States	Dollar	\$

WORK THE WEB

You just returned from your dream vacation to Jamaica and feel rich because 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 2006.07.29 18:56:57 UTC.	
10,000.00 JMD	= 151.747 USD
Jamaica Dollars	United States Dollars
1 JMD = 0.0151747 USD	1 USD = 65.8993 JMD
Another Conversion? • Bookmark Us	

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

terminals, telephones, and other telecommunications devices. For example, one communications network for foreign transactions is maintained by the Society for Worldwide Interbank Financial Telecommunications (SWIFT), a Belgian not-for-profit cooperative. Using data 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:

1. Importers who pay for goods using foreign currencies.
2. Exporters who receive foreign currency and may want to convert to the 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 22.1 reproduces exchange rate quotations as they appeared in *The Wall Street Journal* in 2006. The first two columns (labeled “U.S. \$ equivalent”) give the number of dollars it takes to buy one unit of foreign currency. Because this is the price in dollars of a foreign currency, it is called a *direct* or *American quote* (remember that “Americans are direct”). For example, the Australian dollar is quoted at .7620, which means you can buy one Australian dollar with U.S. \$.7620.

The third and fourth columns show the *indirect*, or *European, exchange rate* (even though the currency may not be European). This is the amount of foreign currency per U.S.



FIGURE 22.1

Exchange Rate Quotations

Key Currency Cross Rates							
	Dollar	Euro	Pound	SFranc	Peso	Yen	CdnDir
Canada	1.1377	1.4443	2.1133	0.9184	.10430	.00983	...
Japan	115.78	146.98	215.07	93.470	10.615	...	101.771
Mexico	10.9075	13.8471	20.262	8.8056	...	.09421	9.5877
Switzerland	1.2387	1.5725	2.3010	...	.11356	.01070	1.0888
U.K.	.53830	.6834	...	.4346	.04935	.00465	.47319
Euro	.78770	...	1.4633	.63592	.07222	.00680	.69240
U.S.	...	1.2695	1.8576	.80730	.09168	.00864	.87900

Late New York Trading Thursday, July 27, 2006

Source: Reuters

Country	U.S. \$ EQUIVALENT		CURRENCY PER U.S. \$	
	Thu	Wed	Thu	Wed
Argentina (Peso)-y	.3251	.3253	3.0760	3.0741
Australia (Dollar)	.7620	.7618	1.3123	1.3127
Bahrain (Dinar)	2.6525	2.6526	.3770	.3770
Brazil (Real)	.4566	.4560	2.1901	2.1930
Canada (Dollar)	.8790	.8812	1.1377	1.1348
1-month forward	.8799	.8821	1.1365	1.1337
3-months forward	.8817	.8838	1.1342	1.1315
6-months forward	.8842	.8865	1.1310	1.1280
Chile (Peso)	.001850	.001848	540.54	541.13
China (Renminbi)	.1254	.1252	7.9750	7.9845
Colombia (Peso)	.0004088	.0004064	2446.18	2460.63
Czech. Rep. (Koruna)				
Commercial rate	.04471	.04470	22.366	22.371
Denmark (Krone)	1.701	1.702	5.8789	5.8754
Ecuador (US Dollar)	1.0000	1.0000	1.0000	1.0000
Egypt (Pound)-y	.1739	.1741	5.7521	5.7432
Hong Kong (Dollar)	.1287	.1286	7.7721	7.7780
Hungary (Forint)	.004685	.004671	213.45	214.09
India (Rupee)	.02149	.02141	46.533	46.707
Indonesia (Rupiah)	.0001103	.0001097	9066	9116
Israel (Shekel)	.2259	.2256	4.4267	4.4326
Japan (Yen)	.008637	.008596	115.78	116.23
1-month forward	.008675	.008633	115.27	115.83
3-months forward	.008750	.008710	114.29	114.81
6-months forward	.008861	.008819	112.85	113.29
Jordan (Dinar)	1.4112	1.4112	.7086	.7086
Kuwait (Dinar)	3.4578	3.4576	.2892	.2892
Lebanon (Pound)	.0006634	.0006640	1507.39	1506.02
Malaysia (Ringgit)-b	.2723	.2717	3.6724	3.6805
Malta (Lira)	2.9571	2.9520	.3382	.3388
Mexico (Peso)				
Floating rate	.0917	.0914	10.9075	10.9397

July 27, 2006

The 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.

Country

New Zealand (Dollar) .6194 .6262 1.6145 1.5969

Norway (Krone) .1608 .1603 6.2189 6.2383

Pakistan (Rupee) .01653 .01658 60.496 60.314

Peru (new Sol) .3085 .3085 3.2415 3.2415

Philippines (Peso) .01942 .01934 51.493 51.706

Poland (Zloty) .3245 .3244 3.0817 3.0826

Russia (Ruble)-a .03731 .03712 26.803 26.940

Saudi Arabia (Riyal) .2666 .2666 3.7509 3.7509

Singapore (Dollar) .6328 .6326 1.5803 1.5808

Slovak Rep. (Koruna) .03344 .03331 29.904 30.021

South Africa (Rand) .1459 .1436 6.8540 6.9638

South Korea (Won) .0010501 .0010477 952.29 954.47

Sweden (Krona) .1375 .1373 7.2727 7.2833

Switzerland (Franc) .8073 .8050 1.2387 1.2422

1-month forward .8101 .8077 1.2344 1.2381

3-months forward .8154 .8132 1.2264 1.2297

6-months forward .8229 .8208 1.2152 1.2183

Taiwan (Dollar) .03054 .03050 32.744 32.787

Thailand (Baht) .02645 .02635 37.807 37.951

Turkey (New Lira)-d .6679 .6577 1.4973 1.5205

U.K. (Pound) 1.8576 1.8535 .5383 .5395

1-month forward 1.8588 1.8547 .5380 .5392

3-months forward 1.8613 1.8573 .5373 .5384

6-months forward 1.8646 1.8605 .5363 .5375

United Arab (Dirham) .2723 .2723 3.6724 3.6724

Uruguay (Peso)

Financial .04180 .04180 23.923 23.923

Venezuela (Bolivar) .000466 .000466 2145.92 2145.92

SDR 1.4822 1.4720 .6747 .6793

Euro 1.2695 1.2703 .7877 .7872

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. d-Rebased as of Jan. 1, 2005. y-Floating rate.

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dollar. The Australian dollar is quoted here at 1.3123, so you can get 1.3123 Australian dollars for one U.S. dollar. Naturally, this second exchange rate is just the reciprocal of the first one (possibly with a little rounding error), $1/.7620 = 1.3123$.

Cross-Rates and Triangle Arbitrage Using the U.S. dollar as the common denominator in quoting exchange rates greatly reduces the number of possible cross-currency quotes. For example, with five major currencies, there would potentially be 10 exchange rates instead of just 4.¹ Also, the fact that the dollar is used throughout decreases inconsistencies in the exchange rate quotations.

¹There are four exchange rates instead of five because one exchange rate would involve the exchange of a currency for itself. More generally, it might seem that there should be 25 exchange rates with five currencies. There are 25 different combinations, but, of these, 5 involve the exchange of a currency for itself. Of the remaining 20, half are redundant because they are just the reciprocals of another exchange rate. Of the remaining 10, 6 can be eliminated by using a common denominator.

A Yen for Euros**EXAMPLE 22.1**

Suppose you have \$1,000. Based on the rates in Figure 22.1, how many Japanese yen can you get? Alternatively, if a Porsche costs €100,000 (recall that € 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 115.78. Your \$1,000 will thus get you:

$$\$1,000 \times 115.78 \text{ yen per } \$1 = 115,780 \text{ yen}$$

Because the exchange rate in terms of dollars per euro (first column) is 1.2695, you will need:

$$€100,000 \times \$1.2695 \text{ per } € = \$126,950$$

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 observe the following for the euro (€) and the Swiss franc (SF):

$$€ \text{ per } \$1 = 1.00$$

$$\text{SF per } \$1 = 2.00$$

Suppose the cross-rate is quoted as:

$$€ \text{ per SF} = .40$$

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:

$$\$100 \times \text{SF } 2 \text{ per } \$1 = \text{SF } 200$$

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

$$\text{SF } 200 \times € .4 \text{ per SF } 1 = €80$$

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

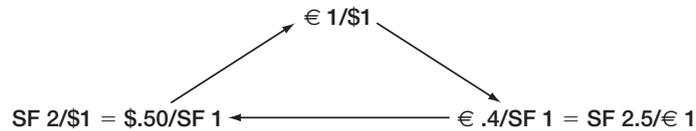
$$\$100 \times €1 \text{ per } \$1 = €100$$

What we see is that the euro has two prices, €1 per \$1 and € .80 per \$1, with the price we pay depending on how we get the euros.

To make money, we want to buy low and sell high. The important thing to note is that euros are cheaper if you buy them with dollars because you get 1 euro instead of just .8. You should proceed as follows:

1. Buy 100 euros for \$100.
2. Use the 100 euros to buy Swiss francs at the cross-rate. Because it takes .4 euros to buy a Swiss franc, you will receive $€100 / .4 = \text{SF } 250$.
3. Use the SF 250 to buy dollars. Because the exchange rate is SF 2 per dollar, you receive $\text{SF } 250 / 2 = \$125$, 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 because a dollar will buy you either 1 euro or 2 Swiss francs, the cross-rate must be:

$$(\text{€}1/\$1)/(\text{SF } 2/\$1) = \text{€}1/\text{SF } 2$$

That is, the cross-rate must be one euro per two Swiss francs. If it were anything else, there would be a triangle arbitrage opportunity.

EXAMPLE 22.2

Shedding Some Pounds

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

$$\text{Pounds per } \$1 = .60$$

$$\text{SF per } \$1 = 2.00$$

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

The cross-rate should be $\text{SF } 2.00/\text{£}0.60 = \text{SF } 3.33$ 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 have \$100, you could:

1. Exchange dollars for francs: $\$100 \times 2 = \text{SF } 200$.
2. Exchange francs for pounds: $\text{SF } 200/3 = \text{£}66.67$.
3. Exchange pounds for dollars: $\text{£}66.67/.60 = \$111.12$.

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.

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 22.1, you will see forward exchange rates quoted for some of the major currencies. For example, the spot exchange rate for the Swiss franc is $\text{SF } 1 = \$.8073$. The 180-day (6-month) forward exchange rate is $\text{SF } 1 = \$.8229$. This means you can buy a Swiss franc today for \$.8073, or you can agree to take delivery of a Swiss franc in 180 days and pay \$.8229 at that time.

Notice that the Swiss franc is more expensive in the forward market (\$.8229 versus \$.8073). Because the Swiss franc is more expensive in the future than it is today, it is said



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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

An 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.

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.

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 22.1, 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 22.1, the spot exchange rate and the 180-day forward rate in terms of dollars per pound are $\$1.8576 = \text{£}1$ and $\$1.8646 = \text{£}1$, respectively. If you expect $\text{£}1$ million in 180 days, you will get $\text{£}1 \text{ million} \times \$1.8646 \text{ per pound} = \1.8646 million . Because it is more expensive to buy a pound in the forward market than in the spot market ($\$1.8646$ versus $\$1.8576$), the pound is said to be selling at a premium relative to the dollar.

EXAMPLE 22.3

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 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 dollar.

Concept Questions

22.2a What is triangle arbitrage?

22.2b What do we mean by the 90-day forward exchange rate?

22.2c If we say that the exchange rate is SF 1.90, what do we mean?

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, because we know that exchange rates change through time, we can ask the related question, 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)**: 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*.

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 straightforward concept. If a beer costs $\text{£}2$ in London, and the exchange rate is $\text{£}.60$ per

22.3

purchasing power parity (PPP)

The idea that the exchange rate adjusts to keep purchasing power constant among currencies.

dollar, then a beer costs $\text{£}2/.60 = \$3.33$ 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 thing 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 are selling in New York for \$4 per bushel, whereas in London the price is $\text{£}2.40$ per bushel. Absolute PPP implies that:

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

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

Suppose that, instead, the actual exchange rate is $\text{£}.50$. Starting with \$4, a trader could buy a bushel of apples in New York, ship it to London, and sell it there for $\text{£}2.40$. Our trader could then convert the $\text{£}2.40$ into dollars at the prevailing exchange rate, $S_0 = \text{£}.50$, yielding a total of $\text{£}2.40/.50 = \$4.80$. The round-trip gain would be 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 would increase the supply of pounds and simultaneously increase the demand for dollars. We would expect the value of a pound to fall. This means that the dollar would be getting more valuable, so it would take more pounds to buy one dollar. Because the exchange rate is quoted as pounds per dollar, we would expect the exchange rate to rise from $\text{£}.50$.

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

1. The transactions costs of trading apples—shipping, insurance, spoilage, and so on—must be zero.
2. There must be no barriers to trading apples—no tariffs, taxes, or other political barriers.
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 transactions 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 would be very difficult to ship. On the other hand, we would be surprised to see a significant violation of absolute PPP for gold.

As an example of a violation of absolute PPP, in 2006 the euro was going for about \$1.28. Porsche's new, and very desirable, Carrera GT sold for about \$485,000 in the United States. This converted to a euro price of €379,906 before tax and €431,373 after tax. The price of the car in Germany was €450,000, which means that if German residents could ship the car for less than €19,000, they would be better off buying it in the United States.

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 $S_0 = \text{£}0.50$. 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, you see that a dollar currently costs .50 pounds 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 $\text{£}0.50 \times 1.1 = \text{£}0.55$.

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 $\text{£}0.50 \times 1.06 = \text{£}0.53$.

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

$$[E(S_1) - S_0]/S_0 = h_{FC} - h_{US} \quad [22.1]$$

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:

$$E(S_1) = S_0 \times [1 + (h_{FC} - h_{US})] \quad [22.2]$$

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 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:

$$E(S_t) = S_0 \times [1 + (h_{FC} - h_{US})]^t \quad [22.3]$$

As we will see, this is a very useful relationship.

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

EXAMPLE 22.4

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, whereas the U.S. inflation rate will be 6 percent. Based on relative PPP, what will the exchange rate be in three years?

Because 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:

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

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. Because 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

22.3a What does absolute PPP say? Why might it not hold for many types of goods?

22.3b According to relative PPP, what determines the change in exchange rates?

Interest Rate Parity, Unbiased Forward Rates, and the International Fisher Effect

22.4

The next issue we need to address is the relationship between spot exchange rates, forward exchange rates, and 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

F_1 = SF 1.90

R_{US} = 10%

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. If you do this, then, in one period, your \$1 will be worth:

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

Alternatively, you can invest in the Swiss risk-free investment. To do this, you need to convert your \$1 to Swiss francs and simultaneously execute a forward trade to convert francs back to dollars in one year. 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 Swiss francs back to dollars in one year. Because the forward rate is SF 1.90, you will 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 resulting from this strategy can be written as:

$$\begin{aligned}\$ \text{ value in 1 year} &= \$1 \times S_0 \times (1 + R_S)/F_1 \\ &= \$1 \times 2 \times 1.05/1.90 \\ &= \$1.1053\end{aligned}$$

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. Because 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 outlined previously:

1. Convert the \$5 million at $SF 2 = \$1$ to get SF 10 million.
2. Agree to exchange Swiss 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 because 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, from the preceding discussion, 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. Because these have to be equal to prevent arbitrage, it must be the case that:

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

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

$$F_1/S_0 = (1 + R_{FC})/(1 + R_{US}) \quad [22.4]$$

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:

$$(F_1 - S_0)/S_0 = R_{FC} - R_{US} \quad [22.5]$$

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:

$$F_1 = S_0 \times [1 + (R_{FC} - R_{US})] \quad [22.6]$$

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

$$F_t = S_0 \times [1 + (R_{FC} - R_{US})]^t \quad [22.7]$$

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.

Parity Check

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 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?).

EXAMPLE 22.5

FORWARD RATES AND FUTURE SPOT RATES

In addition to PPP and IRP, we need to discuss one more basic relationship. What is the connection between the forward rate and the expected future spot rate? The **unbiased forward rates (UFR)** condition says that the forward rate, F_1 , is equal to the *expected* future spot rate, $E(S_1)$:

$$F_1 = E(S_1)$$

With t periods, UFR would be written as:

$$F_t = E(S_t)$$

Loosely, the UFR condition says that, on average, the forward exchange rate is equal to the future spot exchange rate.

If we ignore risk, then the UFR condition should hold. Suppose the forward rate for the Japanese yen is consistently lower than the future spot rate by, say, 10 yen. This means that anyone who wanted to convert dollars to yen in the future would consistently get more yen by not agreeing to a forward exchange. The forward rate would have to rise to interest anyone in a forward exchange.

Similarly, if the forward rate were consistently higher than the future spot rate, then anyone who wanted to convert yen to dollars would get more dollars per yen by not agreeing to a forward trade. The forward exchange rate would have to fall to attract such traders.

For these reasons, the forward and actual future spot rates should be equal to each other on average. What the future spot rate will actually be is uncertain, of course. The UFR condition may not hold if traders are willing to pay a premium to avoid this uncertainty. If the condition does hold, then the 180-day forward rate that we see today should be an unbiased predictor of what the exchange rate will actually be in 180 days.

PUTTING IT ALL TOGETHER

We have developed three relationships, PPP, IRP, and UFR, that describe the interaction between key financial variables such as interest rates, exchange rates, and inflation rates. We now explore the implications of these relationships as a group.

unbiased forward rates (UFR)

The condition stating that the current forward rate is an unbiased predictor of the future spot exchange rate.



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

Uncovered Interest Parity To start, it is useful to collect our international financial market relationships in one place:

$$\text{PPP: } E(S_1) = S_0 \times [1 + (h_{FC} - h_{US})]$$

$$\text{IRP: } F_1 = S_0 \times [1 + (R_{FC} - R_{US})]$$

$$\text{UFR: } F_1 = E(S_1)$$

We begin by combining UFR and IRP. Because we know that $F_1 = E(S_1)$ from the UFR condition, we can substitute $E(S_1)$ for F_1 in IRP. The result is:

$$\text{UIP: } E(S_1) = S_0 \times [1 + (R_{FC} - R_{US})] \quad [22.8]$$

This important relationship is called **uncovered interest parity (UIP)**, and it will play a key role in our international capital budgeting discussion that follows. With t periods, UIP becomes:

$$E(S_t) = S_0 \times [1 + (R_{FC} - R_{US})]^t \quad [22.9]$$

uncovered interest parity (UIP)

The condition stating that the expected percentage change in the exchange rate is equal to the difference in interest rates.

The International Fisher Effect Next, we compare PPP and UIP. Both of them have $E(S_1)$ on the left-hand side, so their right-hand sides must be equal. We thus have that:

$$S_0 \times [1 + (h_{FC} - h_{US})] = S_0 \times [1 + (R_{FC} - R_{US})]$$

$$h_{FC} - h_{US} = R_{FC} - R_{US}$$

This tells us that the difference in returns between the United States and a foreign country is just equal to the difference in inflation rates. Rearranging this slightly gives us the **international Fisher effect (IFE)**:

$$\text{IFE: } R_{US} - h_{US} = R_{FC} - h_{FC} \quad [22.10]$$

international Fisher effect (IFE)

The theory that real interest rates are equal across countries.

The IFE says that *real* rates are equal across countries.²

The conclusion that real returns are equal across countries is really basic economics. If real returns were higher in, say, Brazil than in the United States, money would flow out of U.S. financial markets and into Brazilian markets. Asset prices in Brazil would rise and their returns would fall. At the same time, asset prices in the United States would fall and their returns would rise. This process acts to equalize real returns.

Having said all this, we need to note a couple of things. First of all, we really haven't explicitly dealt with risk in our discussion. We might reach a different conclusion about real returns once we do, particularly if people in different countries have different tastes and attitudes toward risk. Second, there are many barriers to the movement of money and capital around the world. Real returns might be different in two different countries for long periods of time if money can't move freely between them.

Despite these problems, we expect that capital markets will become increasingly internationalized. As this occurs, any differences in real rates that do exist will probably diminish. The laws of economics have very little respect for national boundaries.

Concept Questions

22.4a What is covered interest arbitrage?

22.4b What is the international Fisher effect?

²Notice that our result here is in terms of the approximate real rate, $R - h$ (see Chapter 7), because we used approximations for PPP and IRP. For the exact result, see Problem 18 at the end of the chapter.

International Capital Budgeting

22.5

Kihlstrom Equipment, a U.S.-based international company, is evaluating an overseas investment. Kihlstrom's exports of drill bits have increased to such a degree that it is considering building a distribution center in France. The project will cost €2 million to launch. The cash flows are expected to be €0.9 million a year for the next three years.

The current spot exchange rate for euros is €0.5. Recall that this is euros per dollar, so a euro is worth $\$1/.5 = \2 . The risk-free rate in the United States is 5 percent, and the risk-free rate in "euroland" is 7 percent. Note that the exchange rate and the two interest rates are observed in financial markets, not estimated.³ Kihlstrom's required return on dollar investments of this sort is 10 percent.

Should Kihlstrom take this investment? As always, the answer depends on the NPV; but how do we calculate the net present value of this project in U.S. dollars? There are two basic methods:

1. *The home currency approach:* Convert all the euro cash flows into dollars, and then discount at 10 percent to find the NPV in dollars. Notice that for this approach, we have to come up with the future exchange rates to convert the future projected euro cash flows into dollars.
2. *The foreign currency approach:* Determine the required return on euro investments, and then discount the euro cash flows to find the NPV in euros. Then convert this euro NPV to a dollar NPV. This approach requires us to somehow convert the 10 percent dollar required return to the equivalent euro required return.

The difference between these two approaches is primarily a matter of when we convert from euros to dollars. In the first case, we convert before estimating the NPV. In the second case, we convert after estimating NPV.

It might appear that the second approach is superior because we have to come up with only one number, the euro discount rate. Furthermore, because the first approach requires us to forecast future exchange rates, it probably seems that there is greater room for error with this approach. As we illustrate next, however, based on our previous results, the two approaches are really the same.

METHOD 1: THE HOME CURRENCY APPROACH

To convert the project future cash flows into dollars, we will invoke the uncovered interest parity, or UIP, relation to come up with the projected exchange rates. Based on our earlier discussion, the expected exchange rate at time t , $E(S_t)$, is:

$$E(S_t) = S_0 \times [1 + (R_\epsilon - R_{US})]^t$$

where R_ϵ stands for the nominal risk-free rate in euroland. Because R_ϵ is 7 percent, R_{US} is 5 percent, and the current exchange rate (S_0) is €0.5:

$$\begin{aligned} E(S_t) &= .5 \times [1 + (.07 - .05)]^t \\ &= .5 \times 1.02^t \end{aligned}$$

³For example, the interest rates might be the short-term Eurodollar and euro deposit rates offered by large money center banks.

The projected exchange rates for the drill bit project are thus:

Year	Expected Exchange Rate
1	$€ .5 \times 1.02^1 = € .5100$
2	$€ .5 \times 1.02^2 = € .5202$
3	$€ .5 \times 1.02^3 = € .5306$

Using these exchange rates, along with the current exchange rate, we can convert all of the euro cash flows to dollars (note that all of the cash flows in this example are in millions):

Year	(1) Cash Flow in € mil	(2) Expected Exchange Rate	(3) Cash Flow in \$mil (1)/(2)
0	-€2.0	€ .5000	-\$4.00
1	.9	.5100	1.76
2	.9	.5202	1.73
3	.9	.5306	1.70

To finish off, we calculate the NPV in the ordinary way:

$$\begin{aligned} \text{NPV}_\$ &= -\$4 + \$1.76/1.10 + \$1.73/1.10^2 + \$1.70/1.10^3 \\ &= \$.3 \text{ million} \end{aligned}$$

So, the project appears to be profitable.

METHOD 2: THE FOREIGN CURRENCY APPROACH

Kihlstrom requires a nominal return of 10 percent on the dollar-denominated cash flows. We need to convert this to a rate suitable for euro-denominated cash flows. Based on the international Fisher effect, we know that the difference in the nominal rates is:

$$\begin{aligned} R_\epsilon - R_{US} &= h_\epsilon - h_{US} \\ &= 7\% - 5\% = 2\% \end{aligned}$$

The appropriate discount rate for estimating the euro cash flows from the drill bit project is approximately equal to 10 percent plus an extra 2 percent to compensate for the greater euro inflation rate.

If we calculate the NPV of the euro cash flows at this rate, we get:

$$\begin{aligned} \text{NPV}_\epsilon &= -€2 + € .9/1.12 + € .9/1.12^2 + € .9/1.12^3 \\ &= € .16 \text{ million} \end{aligned}$$

The NPV of this project is € .16 million. Taking this project makes us € .16 million richer today. What is this in dollars? Because the exchange rate today is € .5, the dollar NPV of the project is:

$$\text{NPV}_\$ = \text{NPV}_\epsilon / S_0 = € .16 / .5 = \$.3 \text{ million}$$

This is the same dollar NPV that we previously calculated.

The important thing to recognize from our example is that the two capital budgeting procedures are actually the same and will always give the same answer.⁴ In this second

⁴Actually, there will be a slight difference because we are using the approximate relationships. If we calculate the required return as $1.10 \times (1 + .02) - 1 = 12.2\%$, then we get exactly the same NPV. See Problem 18 for more detail.

approach, the fact that we are implicitly forecasting exchange rates is simply hidden. Even so, the foreign currency approach is computationally a little easier.

UNREMITTED CASH FLOWS

The previous example assumed that all aftertax cash flows from the foreign investment could be remitted to (paid out to) the parent firm. Actually, substantial differences can exist between the cash flows generated by a foreign project and the amount that can actually be remitted, or “repatriated,” to the parent firm.

A foreign subsidiary can remit funds to a parent in many forms, including the following:

1. Dividends.
2. Management fees for central services.
3. Royalties on the use of trade names and patents.

However cash flows are repatriated, international firms must pay special attention to remittances because there may be current and future controls on remittances. Many governments are sensitive to the charge of being exploited by foreign national firms. In such cases, governments are tempted to limit the ability of international firms to remit cash flows. Funds that cannot currently be remitted are sometimes said to be *blocked*.

Concept Questions

22.5a What financial complications arise in international capital budgeting? Describe two procedures for estimating NPV in the case of an international project.

22.5b What are blocked funds?

Exchange Rate Risk

Exchange rate risk is the natural consequence of international operations in a world where relative currency values move up and down. Managing exchange rate risk is an important part of international finance. As we discuss next, there are three different types of exchange rate risk, or exposure: short-run exposure, long-run exposure, and translation exposure. Chapter 23 contains a more detailed discussion of the issues raised in this section.

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 8.4 euros per case, and the exchange rate is currently €1.50, so it takes 1.50 euros to buy \$1.

At the current exchange rate, your cost in dollars of filling the order is $€8.4/1.5 = \$5.60$ per case, so your pretax profit on the order is $10,000 \times (\$6 - 5.60) = \$4,000$. 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.

22.6

exchange rate risk

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

For example, if the rate goes to €1.6, your cost is $\text{€}8.4/1.6 = \$5.25$ per case. Your profit goes to \$7,500. If the exchange rate goes to, say, €1.4, then your cost is $\text{€}8.4/1.4 = \$6$, and your profit is zero.

The short-run exposure in our example can be reduced or eliminated in several ways. The most obvious way is by entering into a forward exchange agreement to lock in an exchange rate. For example, suppose the 60-day forward rate is €1.58. What will be your profit if you hedge? What profit should you expect if you don't?

If you hedge, you lock in an exchange rate of €1.58. Your cost in dollars will thus be $\text{€}8.4/1.58 = \$5.32$ per case, so your profit will be $10,000 \times (\$6 - 5.32) = \$6,800$. If you don't hedge, then, assuming that the forward rate is an unbiased predictor (in other words, assuming the UFR condition holds), you should expect that the exchange rate will actually be €1.58 in 60 days. You should expect to make \$6,800.

Alternatively, if this strategy is not feasible, you could simply borrow the dollars today, convert them into euros, and invest the euros for 60 days to earn some interest. Based on IRP, this amounts to entering into a forward contract.

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.

The impact of changes in exchange rate levels can be substantial. For example, during 2005, the U.S. dollar continued to weaken against other currencies. This meant domestic manufacturers took home more for each dollar's worth of sales they made, which can lead to big profit swings. For example, during 2005, Pepsico estimated that it gained about \$251 million due to currency swings. The dramatic effect of exchange rate movements on profitability is also shown by the analysis done by Iluka Resources, Ltd., an Australian mining company, which stated that a one-cent movement in the Australian dollar–U.S. dollar exchange rate would change its net income by \$5 million.

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. Probably the best examples of this type of hedging are the so-called transplant auto manufacturers such as BMW, Honda, Mercedes, and Toyota, which now build a substantial portion of the cars they sell in the United States, thereby obtaining some degree of immunization against exchange rate movements.

For example, BMW produces 160,000 cars in South Carolina and exports about 100,000 of them. The costs of manufacturing the cars are paid mostly in dollars; when BMW exports the cars to Europe, it receives euros. When the dollar weakens, these vehicles become more profitable for BMW. At the same time, BMW exports about 217,000 cars to the United States each year. The costs of manufacturing these imported cars are mostly in euros, so they become less profitable when the dollar weakens. Taken together, these gains and losses tend to offset each other and provide BMW with a natural hedge.

Similarly, a firm can reduce its long-run exchange rate 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 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 as follows:

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 purely because the Lilliputian inflation rate is much higher than the U.S. inflation rate.

Because 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 a purely accounting phenomenon; but, even so, such fluctuations are disliked by some financial managers.

The current approach to handling translation gains and losses is based on rules set out in the Financial Accounting Standards Board (FASB) *Statement of Financial Accounting Standards No. 52* (FASB 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).” The amounts involved can be substantial, at least from an accounting standpoint. For example, IBM’s Jan 1, 2005, fiscal year-end balance sheet shows a deduction from equity in the amount of \$1.153 billion for translation adjustments related to assets and liabilities of non-U.S. subsidiaries. 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 in many different subsidiaries. A change in some exchange rate will likely 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 their overall positions in a foreign currency. For this reason, management of exchange rate risk is probably best handled on a centralized basis.

Concept Questions

22.6a What are the different types of exchange rate risk?

22.6b How can a firm hedge short-run exchange rate risk? Long-run exchange rate risk?

22.7 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 refers to changes in value that arise as a consequence of political actions. This is not a problem faced exclusively 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 operate in these riskier countries, the extra political risk may lead the firms to require higher returns on overseas investments to compensate for the possibility that funds may 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



A great site for evaluating the political risk of a country is www.cia.gov/cia/publications/factbook.

country in question, reduces the possible loss because the company can refuse to pay the debt in the event of unfavorable political activities. Based on our discussion in this section, 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

22.7a What is political risk?

22.7b What are some ways of hedging political risk?

Summary and Conclusions

22.8

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 many different financial market regulations and tax systems. This chapter is intended to be a concise introduction to some of the financial issues that come up in international investing.

Our coverage has been necessarily brief. The main topics we discussed are the following:

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, PPP.
 - b. Interest rate parity, IRP.
 - c. Unbiased forward rates, UFR.

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.

The unbiased forward rates condition indicates that the current forward rate is a good predictor of the future spot exchange rate.

4. *International capital budgeting:* We showed that the basic foreign exchange relationships imply two other conditions:
 - a. Uncovered interest parity.
 - b. The international Fisher effect.

By invoking these two conditions, we learned how to estimate NPVs in foreign currencies and how to convert foreign currencies into dollars to estimate NPV in the usual way.

5. *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

- 22.1 Relative Purchasing Power Parity** The inflation rate in the United States is projected at 3 percent per year for the next several years. The New Zealand inflation rate is projected to be 5 percent during that time. The exchange rate is currently NZ\$ 1.66. Based on relative PPP, what is the expected exchange rate in two years?
- 22.2 Covered Interest Arbitrage** The spot and 360-day forward rates on the Swiss franc are SF 2.1 and SF 1.9, respectively. The risk-free interest rate in the United States is 6 percent, and the risk-free rate in Switzerland is 4 percent. Is there an arbitrage opportunity here? How would you exploit it?

ANSWERS TO CHAPTER REVIEW AND SELF-TEST PROBLEMS

- 22.1** Based on relative PPP, the expected exchange rate in two years, $E(S_2)$, is:

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

where h_{NZ} is the New Zealand inflation rate. The current exchange rate is NZ\$ 1.66, so the expected exchange rate is:

$$\begin{aligned} E(S_2) &= \text{NZ\$ } 1.66 \times [1 + (.05 - .03)]^2 \\ &= \text{NZ\$ } 1.66 \times 1.02^2 \\ &= \text{NZ\$ } 1.73 \end{aligned}$$

- 22.2** Based on interest rate parity, the forward rate should be (approximately):

$$\begin{aligned} F_1 &= S_0 \times [1 + (R_{FC} - R_{US})] \\ &= 2.1 \times [1 + (.04 - .06)] \\ &= 2.06 \end{aligned}$$

Because the forward rate is actually SF 1.9, there is an arbitrage opportunity.

To exploit the arbitrage opportunity, you first note that dollars are selling for SF 1.9 each in the forward market. Based on IRP, this is too cheap because they should be selling for SF 2.06. So you want to arrange to buy dollars with Swiss francs in the forward market. To do this, you can:

- Today:** Borrow, say, \$1 million for 360 days. Convert it to SF 2.1 million in the spot market, and buy a forward contract at SF 1.9 to convert it back to dollars in 360 days. Invest the SF 2.1 million at 4 percent.
- In one year:** Your investment has grown to SF 2.1 million \times 1.04 = SF 2.184 million. Convert this to dollars at the rate of SF 1.9 = \$1. You will have SF 2.184 million / 1.9 = \$1,149,474. Pay off your loan with 6 percent interest at a cost of \$1 million \times 1.06 = \$1,060,000 and pocket the difference of \$89,474.

CONCEPTS REVIEW AND CRITICAL THINKING QUESTIONS

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?
2. **Purchasing Power Parity** Suppose the rate of inflation in Mexico 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 Mexican peso versus dollar exchange rate? What relationship are you relying on in answering?
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?
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.
5. **Exchange Rates** Are exchange rate changes necessarily good or bad for a particular company?
6. **International Risks** At one point, Duracell International confirmed 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?
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?
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 euroland 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, 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 while other market participants were unable to do so, you could successfully speculate in spot currency markets.
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 U.S. government announce that they are comfortable with a rising euro 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 reals and inject them into the economy in an effort to reduce the country's unemployment rate.
10. **International Capital Market Relationships** We discussed five international capital market relationships: relative PPP, IRP, UFR, UIP, and the international Fisher effect. Which of these would you expect to hold most closely? Which do you think would be most likely to be violated?

QUESTIONS AND PROBLEMS



BASIC

(Questions 1–13)

1. **Using Exchange Rates** Take a look back at Figure 22.1 to answer the following questions:
 - a. If you have \$100, how many euros can you get?
 - b. How much is one euro worth?
 - c. If you have 5 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 Mexican pesos 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 22.1 to answer the following questions:
 - a. Which would you rather have, \$100 or £100? Why?
 - b. Which would you rather have, 100 Swiss francs (SF) or £100? Why?
 - c. What is the cross-rate for Swiss francs in terms of British pounds? For British pounds in terms of Swiss francs?
3. **Forward Exchange Rates** Use the information in Figure 22.1 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 Canadian dollars 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\$1.15 and the six-month forward rate is Can\$1.19.
 - 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\$2.50? 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 $¥118 = \$1$, and the British pound exchange rate is $£1 = \$1.81$. 
- a. What is the cross-rate in terms of yen per pound?
- b. Suppose the cross-rate is $¥204 = £1$. Is there an arbitrage opportunity here? If there is, explain how to take advantage of the mispricing.
6. **Interest Rate Parity** Use Figure 22.1 to answer the following questions: Suppose interest rate parity holds, and the current six-month risk-free rate in the United States is 2.5 percent. What must the six-month risk-free rate be in Great Britain? 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 .48 percent per month. The interest rate in Great Britain is .57 percent per month. The spot exchange rate is $£.54$, and the three-month forward rate is $£.53$. 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 Polish zloty is $Z 3.18$. The expected exchange rate in three years is $Z 3.27$. What is the difference in the annual inflation rates for the United States and Poland 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 22.1. You have just placed an order for 30,000 motherboards at a cost to you of 204.7 Singapore dollars each. You will pay for the shipment when it arrives in 90 days. You can sell the motherboards for \$140 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?
10. **Exchange Rates and Arbitrage** Suppose the spot and six-month forward rates on the Norwegian krone are Kr 6.18 and Kr 6.30, respectively. The annual risk-free rate in the United States is 5 percent, and the annual risk-free rate in Norway is 8 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. **The International Fisher Effect** You observe that the inflation rate in the United States is 3.7 percent per year and that T-bills currently yield 4.3 percent annually. What do you estimate the inflation rate to be in:
- a. Australia, if short-term Australian government securities yield 5 percent per year?
- b. Canada, if short-term Canadian government securities yield 7 percent per year?
- c. Taiwan, if short-term Taiwanese government securities yield 10 percent per year?
12. **Spot versus Forward Rates** Suppose the spot and three-month forward rates for the yen are $¥120.43$ and $¥122.68$, 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?

INTERMEDIATE

(Questions 14–16)

13. Expected Spot Rates Suppose the spot exchange rate for the Hungarian forint is HUF 221.53. The inflation rate in the United States will be 4.9 percent per year. It will be 8.6 percent 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?

14. Capital Budgeting Lakonishok Equipment has an investment opportunity in Europe. The project costs €12 million and is expected to produce cash flows of €2.7 million in year 1, €3.5 million in year 2, and €3.3 million in year 3. The current spot exchange rate is \$1.22/€; the current risk-free rate in the United States is 4.8 percent, compared to that in Europe of 4.1 percent. The appropriate discount rate for the project is estimated to be 13 percent, the U.S. cost of capital for the company. In addition, the subsidiary can be sold at the end of three years for an estimated €7.4 million. What is the NPV of the project?



15. Capital Budgeting You are evaluating a proposed expansion of an existing subsidiary located in Switzerland. The cost of the expansion would be SF 27.0 million. The cash flows from the project would be SF 7.5 million per year for the next five years. The dollar required return is 13 percent per year, and the current exchange rate is SF 1.26. The going rate on Eurodollars is 8 percent per year. It is 7 percent per year on Euroswiss.

- What do you project will happen to exchange rates over the next four years?
- Based on your answer in (a), convert the projected franc flows into dollar flows and calculate the NPV.
- What is the required return on franc flows? Based on your answer, calculate the NPV in francs and then convert to dollars.

16. Translation Exposure Betancourt International has operations in Arrakis. The balance sheet for this division in Arrakeen solaris shows assets of 15,000 solaris, debt in the amount of 6,000 solaris, and equity of 9,000 solaris.

- If the current exchange ratio is 1.20 solaris per dollar, what does the balance sheet look like in dollars?
- Assume that one year from now the balance sheet in solaris is exactly the same as at the beginning of the year. If the exchange rate is 1.40 solaris per dollar, what does the balance sheet look like in dollars now?
- Rework part (b) assuming the exchange rate is 1.15 solaris per dollar.

CHALLENGE

(Questions 17–18)

17. Translation Exposure In the previous problem, assume the equity increases by 1,100 solaris due to retained earnings. If the exchange rate at the end of the year is 1.24 solaris per dollar, what does the balance sheet look like?

18. Using the Exact International Fisher Effect From our discussion of the Fisher effect in Chapter 7, we know that the actual relationship between a nominal rate, R , a real rate, r , and an inflation rate, h , can be written as:

$$1 + r = (1 + R)/(1 + h)$$

This is the *domestic* Fisher effect.

- What is the nonapproximate form of the international Fisher effect?
- Based on your answer in (a), what is the exact form for UIP? (*Hint*: Recall the exact form of IRP and use UFR.)
- What is the exact form for relative PPP? (*Hint*: Combine your previous two answers.)
- Recalculate the NPV for the Kihlstrom drill bit project (discussed in Section 22.5) using the exact forms for UIP and the international Fisher effect. Verify that you get precisely the same answer either way.

WEB EXERCISES



- 22.1 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. 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?
- 22.2 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?
- 22.3 Interest Rate Parity** Go to the *Financial Times* site at www.ft.com, and find the current exchange rate between the U.S. dollar and the euro. Next, 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?

MINICASE

S&S Air Goes International

Mark Sexton and Todd Story, the owners of S&S Air, have been in discussions with a light aircraft dealer in Monaco about selling the company's planes in Europe. Jarek Jachowicz, the dealer, wants to add S&S Air to his current retail line. Jarek has told Mark and Todd that he feels the retail sales will be approximately €5 million per month. All sales will be made in euros, and Jarek will retain 5 percent of retail sales as a commission, which will be paid in euros. Because the planes will be customized to order, the first sales will take place in one month. Jarek will pay S&S Air for the order 90 days after it is filled. This payment schedule will continue for the length of the contract between the two companies.

Mark and Todd are confident the company can handle the extra volume with its existing facilities, but they are unsure about the potential financial risks of selling their planes in Europe. In their discussion with Jarek, they found that the current exchange rate is \$1.20/€. At the current exchange rate, the company would spend 70 percent of the sales on production costs. This number does not reflect the sales commission paid to Jarek.

Mark and Todd have decided to ask Chris Guthrie, the company's financial analyst, to prepare an analysis of the proposed international sales. Specifically, they ask Chris to answer the following questions:

1. What are the pros and cons of the international sales? What additional risks will the company face?
2. What happens to the company's profits if the dollar strengthens? What if the dollar weakens?
3. Ignoring taxes, what are S&S Air's projected gains or losses from this proposed arrangement at the current exchange rate of \$1.20/€? What happens to profits if the exchange rate changes to \$1.30/€? At what exchange rate will the company break even?
4. How could the company hedge its exchange rate risk? What are the implications for this approach?
5. Taking all factors into account, should the company pursue the international sales further? Why or why not?