



4: Exchange Rate Determination

Financial managers of MNCs that conduct international business must continuously monitor exchange rates because their cash flows are highly dependent on them. They need to understand what factors influence exchange rates so that they can anticipate how exchange rates may change in response to specific conditions. This chapter provides a foundation for understanding how exchange rates are determined.

The specific objectives of this chapter are to:

- explain how exchange rate movements are measured,
- explain how the equilibrium exchange rate is determined, and
- examine factors that affect the equilibrium exchange rate.

Measuring Exchange Rate Movements

HTTP://

<http://www.xe.com/ict/>
Real-time exchange rate quotations.

Exchange rate movements affect an MNC's value because they can affect the amount of cash inflows received from exporting or from a subsidiary and the amount of cash outflows needed to pay for imports. An exchange rate measures the value of one currency in units of another currency. As economic conditions change, exchange rates can change substantially. A decline in a currency's value is often referred to as **depreciation**. When the British pound depreciates against the U.S. dollar, this means that the U.S. dollar is strengthening relative to the pound. The increase in a currency value is often referred to as **appreciation**.

When a foreign currency's spot rates at two specific points in time are compared, the spot rate at the more recent date is denoted as S and the spot rate at the earlier date is denoted as S_{t-1} . The percentage change in the value of the foreign currency is computed as follows:

$$\text{Percent } \Delta \text{ in foreign currency value} = \frac{S - S_{t-1}}{S_{t-1}}$$

HTTP://

<http://www.federalreserve.gov/releases/>
Current and historic exchange rates.

A positive percentage change indicates that the foreign currency has appreciated, while a negative percentage change indicates that it has depreciated. The values of some currencies have changed as much as 5 percent over a 24-hour period.

On some days, most foreign currencies appreciate against the dollar, although by different degrees. On other days, most currencies depreciate against the dollar, but by different degrees. There are also days when some currencies appreciate while others depreciate against the dollar; the media describe this scenario by stating that "the dollar was *mixed* in trading."

E X A M P L E

Exchange rates for the Canadian dollar and the euro are shown in the second and fourth columns of Exhibit 4.1 for the months from January 1 to July 1. First, notice that the direction of the movement may persist for consecutive months in some cases or may not persist in other cases. The magnitude of the movement tends to vary every month, although the range of percentage movements over these months may be a reasonable indicator of the range of percentage movements in future months. A comparison of the movements in these two currencies suggests that they appear to move independently of each other.

HTTP://

<http://www.bis.org/statistics/eer/index.htm>
Information on how each currency's value has changed against a broad index of currencies.

The movements in the euro are typically larger (regardless of direction) than movements in the Canadian dollar. This means that from a U.S. perspective, the euro is a more volatile currency. The standard deviation of the exchange rate movements for each currency (shown at the bottom of the table) verify this point. The standard deviation should be applied to percentage movements (not the values) when comparing volatility among currencies. ■

Foreign exchange rate movements tend to be larger for longer time horizons. Thus, if yearly exchange rate data were assessed, the movements would be more volatile for each currency than what is shown here, but the euro's movements would still be more volatile. If daily exchange rate movements were assessed, the movements would be less volatile for each currency than what is shown here, but the euro's movements would still be more volatile. A review of daily exchange rate movements is important to an MNC that will need to obtain a foreign currency in a few days and wants to assess the possible degree of movement over that period. A review of annual exchange movements would be more appropriate for an MNC that conducts foreign trade every year and wants to assess the possible degree of movements on a yearly basis. Many MNCs review exchange rates based on short-term and long-term horizons because they expect to engage in international transactions in the near future and in the distant future.

Exchange Rate Equilibrium

Although it is easy to measure the percentage change in the value of a currency, it is more difficult to explain why the value changed or to forecast how it may change in the future. To achieve either of these objectives, the concept of an **equilibrium exchange rate** must be understood, as well as the factors that affect the equilibrium rate.

Before considering why an exchange rate changes, realize that an exchange rate at a given point in time represents the *price* of a currency. Like any other products sold

Exhibit 4.1 How Exchange Rate Movements and Volatility Are Measured

	Value of Canadian Dollar (C\$)	Monthly % Change in C\$	Value of Euro	Monthly % Change in Euro
Jan. 1	\$.70	—	\$1.18	—
Feb. 1	\$.71	+1.43%	\$1.16	-1.69%
March 1	\$.703	-0.99%	\$1.15	-0.86%
April 1	\$.697	-0.85%	\$1.12	-2.61%
May 1	\$.692	-0.72%	\$1.11	-0.89%
June 1	\$.695	+0.43%	\$1.14	+2.70%
July 1	\$.686	-1.29%	\$1.17	+2.63%
Standard deviation of monthly changes		1.04%		2.31%

in markets, the price of a currency is determined by the demand for that currency relative to supply. Thus, for each possible price of a British pound, there is a corresponding demand for pounds and a corresponding supply of pounds for sale. At any point in time, a currency should exhibit the price at which the demand for that currency is equal to supply, and this represents the equilibrium exchange rate. Of course, conditions can change over time, causing the supply or demand for a given currency to adjust, and thereby causing movement in the currency's price. This topic is more thoroughly discussed in this section.

Demand for a Currency

The British pound is used here to explain exchange rate equilibrium. The United Kingdom has not adopted the euro as its currency and continues to use the pound. Exhibit 4.2 shows a hypothetical number of pounds that would be demanded under various possibilities for the exchange rate. At any one point in time, there is only one exchange rate. The exhibit shows the quantity of pounds that would be demanded at various exchange rates at a specific point in time. The demand schedule is downward sloping because U.S. corporations will be encouraged to purchase more British goods when the pound is worth less, as it will take fewer dollars to obtain the desired amount of pounds.

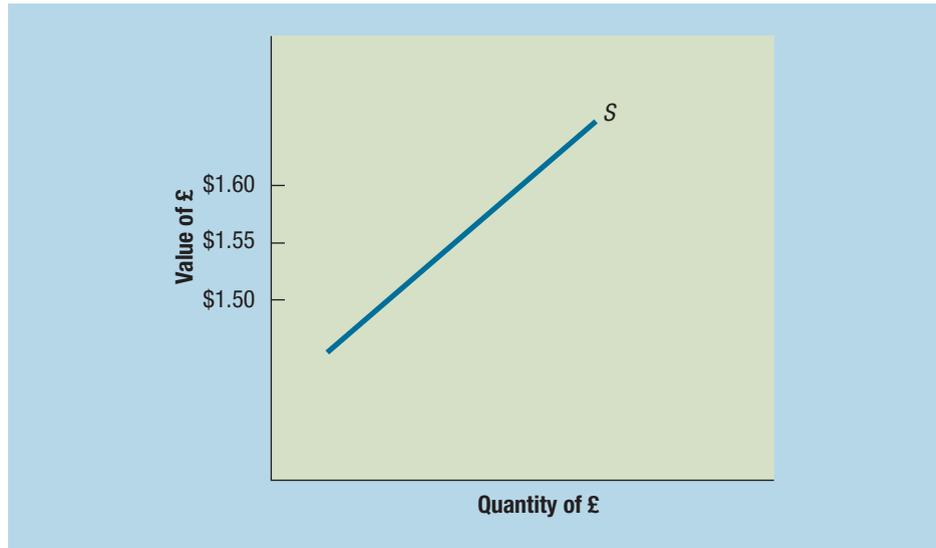
Supply of a Currency for Sale

Up to this point, only the U.S. demand for pounds has been considered, but the British demand for U.S. dollars must also be considered. This can be referred to as a British *supply of pounds for sale*, since pounds are supplied in the foreign exchange market in exchange for U.S. dollars.

A supply schedule of pounds for sale in the foreign exchange market can be developed in a manner similar to the demand schedule for pounds. Exhibit 4.3 shows the quantity of pounds for sale (supplied to the foreign exchange market in exchange for dollars) corresponding to each possible exchange rate at a given point in time. Notice from the supply schedule in Exhibit 4.3 that there is a positive relationship between the value of the British pound and the quantity of British pounds for sale (supplied), which can be explained as follows. When the pound is valued high, British consumers

Exhibit 4.2 Demand Schedule for British Pounds



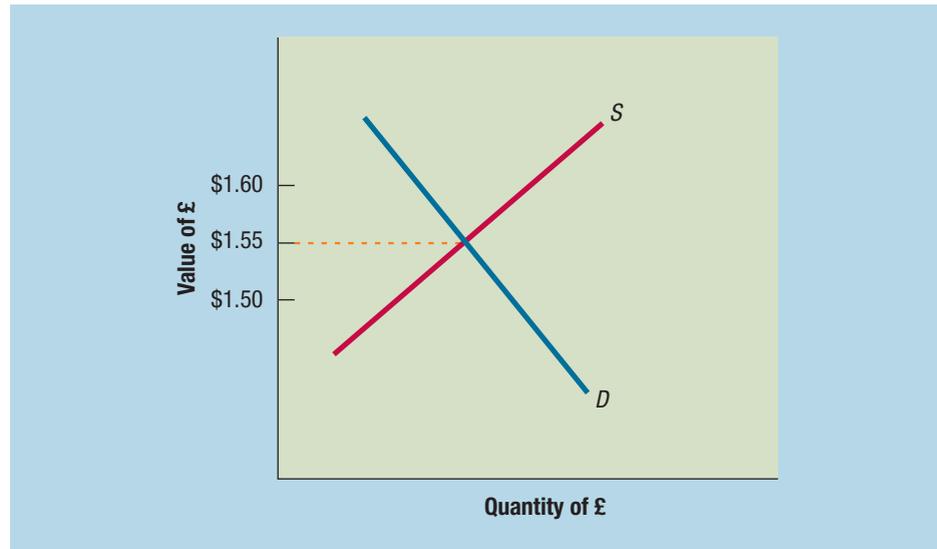
Exhibit 4.3 Supply Schedule of British Pounds for Sale

and firms are more likely to purchase U.S. goods. Thus, they supply a greater number of pounds to the market, to be exchanged for dollars. Conversely, when the pound is valued low, the supply of pounds for sale is smaller, reflecting less British desire to obtain U.S. goods.

Equilibrium

The demand and supply schedules for British pounds are combined in Exhibit 4.4. At an exchange rate of \$1.50, the quantity of pounds demanded would exceed the supply of pounds for sale. Consequently, the banks that provide foreign exchange services would experience a shortage of pounds at that exchange rate. At an exchange rate of \$1.60, the quantity of pounds demanded would be less than the supply of pounds for sale. Therefore, banks providing foreign exchange services would experience a surplus of pounds at that exchange rate. According to Exhibit 4.4, the equilibrium exchange rate is \$1.55 because this rate equates the quantity of pounds demanded with the supply of pounds for sale.

Impact of Liquidity. For all currencies, the equilibrium exchange rate is reached through transactions in the foreign exchange market, but for some currencies, the adjustment process is more volatile than for others. The liquidity of a currency affects the sensitivity of the exchange rate to specific transactions. If the currency's spot market is liquid, its exchange rate will not be highly sensitive to a single large purchase or sale of the currency. Therefore, the change in the equilibrium exchange rate will be relatively small. With many willing buyers and sellers of the currency, transactions can be easily accommodated. Conversely, if the currency's spot market is illiquid, its exchange rate may be highly sensitive to a single large purchase or sale transaction. There are not sufficient buyers or sellers to accommodate a large transaction, which means that the price of the currency must change to rebalance the supply and demand for the currency. Consequently, illiquid currencies tend to exhibit more volatile exchange rate movements, as the equilibrium prices of their currencies adjust to even minor changes in supply and demand conditions.

Exhibit 4.4 Equilibrium Exchange Rate Determination

Factors That Influence Exchange Rates

The equilibrium exchange rate will change over time as supply and demand schedules change. The factors that cause currency supply and demand schedules to change are discussed here by relating each factor's influence to the demand and supply schedules graphically displayed in Exhibit 4.4. The following equation summarizes the factors that can influence a currency's spot rate:

$$e = f(\Delta INF, \Delta INT, \Delta INC, \Delta GC, \Delta EXP)$$

where

e = percentage change in the spot rate

ΔINF = change in the differential between U.S. inflation and the foreign country's inflation

ΔINT = change in the differential between the U.S. interest rate and the foreign country's interest rate

ΔINC = change in the differential between the U.S. income level and the foreign country's income level

ΔGC = change in government controls

ΔEXP = change in expectations of future exchange rates

Relative Inflation Rates

Changes in relative inflation rates can affect international trade activity, which influences the demand for and supply of currencies and therefore influences exchange rates.

EXAMPLE Consider how the demand and supply schedules displayed in Exhibit 4.4 would be affected if U.S. inflation suddenly increased substantially while British inflation remained the same. (Assume that both British and U.S. firms sell goods that can serve as substitutes for each other.) The sudden jump in U.S. inflation should cause an increase in the U.S. demand for British goods and therefore also cause an increase in the U.S. demand for British pounds.

In addition, the jump in U.S. inflation should reduce the British desire for U.S. goods and therefore reduce the supply of pounds for sale. These market reactions are illustrated

in Exhibit 4.5. At the previous equilibrium exchange rate of \$1.55, there will be a shortage of pounds in the foreign exchange market. The increased U.S. demand for pounds and the reduced supply of pounds for sale place upward pressure on the value of the pound. According to Exhibit 4.5, the new equilibrium value is \$1.57. ■

If British inflation increased (rather than U.S. inflation), the opposite forces would occur.

EXAMPLE

Assume there is a sudden and substantial increase in British inflation while U.S. inflation is low. Based on this information, answer the following questions: (1) How is the demand schedule for pounds affected? (2) How is the supply schedule of pounds for sale affected? (3) Will the new equilibrium value of the pound increase, decrease, or remain unchanged? Based on the information given, the answers are (1) the demand schedule for pounds should shift inward, (2) the supply schedule of pounds for sale should shift outward, and (3) the new equilibrium value of the pound will decrease. Of course, the actual amount by which the pound's value will decrease depends on the magnitude of the shifts. There is not enough information to determine their exact magnitude. ■

In reality, the actual demand and supply schedules, and therefore the true equilibrium exchange rate, will reflect several factors simultaneously. The point of the preceding example is to demonstrate how to logically work through the mechanics of the effect that higher inflation in a country can have on an exchange rate. Each factor is assessed one at a time to determine its separate influence on exchange rates, holding all other factors constant. Then, all factors can be tied together to fully explain why an exchange rate moves the way it does.

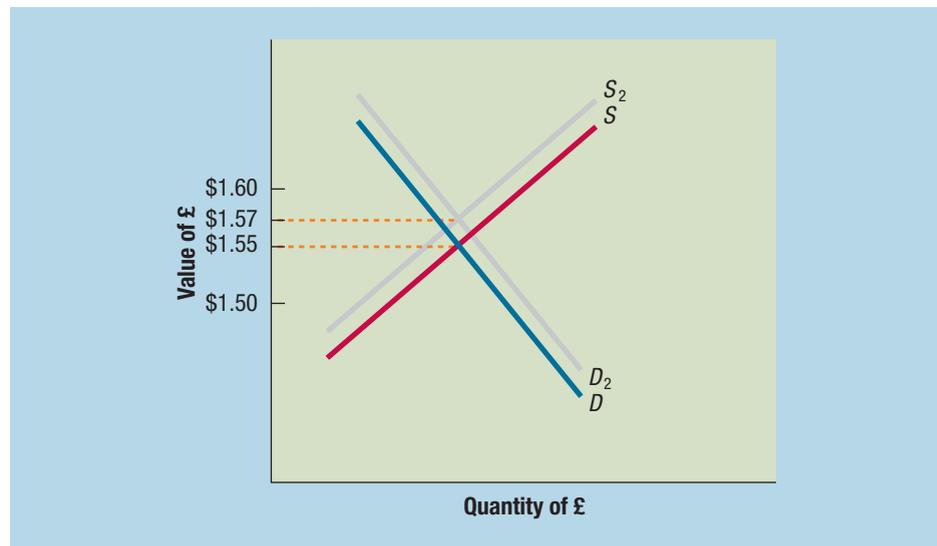
Relative Interest Rates

Changes in relative interest rates affect investment in foreign securities, which influences the demand for and supply of currencies and therefore influences exchange rates.

EXAMPLE

Assume that U.S. interest rates rise while British interest rates remain constant. In this case, U.S. investors will likely reduce their demand for pounds, since U.S. rates are now more attractive relative to British rates, and there is less desire for British bank deposits.

Exhibit 4.5 Impact of Rising U.S. Inflation on the Equilibrium Value of the British Pound



Because U.S. rates will now look more attractive to British investors with excess cash, the supply of pounds for sale by British investors should increase as they establish more bank deposits in the United States. Due to an inward shift in the demand for pounds and an outward shift in the supply of pounds for sale, the equilibrium exchange rate should decrease. This is graphically represented in Exhibit 4.6. If U.S. interest rates decreased relative to British interest rates, the opposite shifts would be expected. ■

HTTP://

<http://www.bloomberg.com>
Latest information from financial markets around the world.

In some cases, an exchange rate between two countries' currencies can be affected by changes in a third country's interest rate.

EXAMPLE

When the Canadian interest rate increases, it can become more attractive to British investors than the U.S. rate. This encourages British investors to purchase fewer dollar-denominated securities. Thus, the supply of pounds to be exchanged for dollars would be smaller than it would have been without the increase in Canadian interest rates, which places upward pressure on the value of the pound against the U.S. dollar. ■

In the 1999–2000 period, European interest rates were relatively low compared to U.S. interest rates. This interest rate differential encouraged European investors to invest money in dollar-denominated debt securities. This activity resulted in a large supply of euros in the foreign exchange market and put downward pressure on the euro. In the 2002–2003 period, U.S. interest rates were lower than European interest rates. Consequently, there was a large U.S. demand for euros to capitalize on the higher interest rates, which placed upward pressure on the euro.

HTTP://

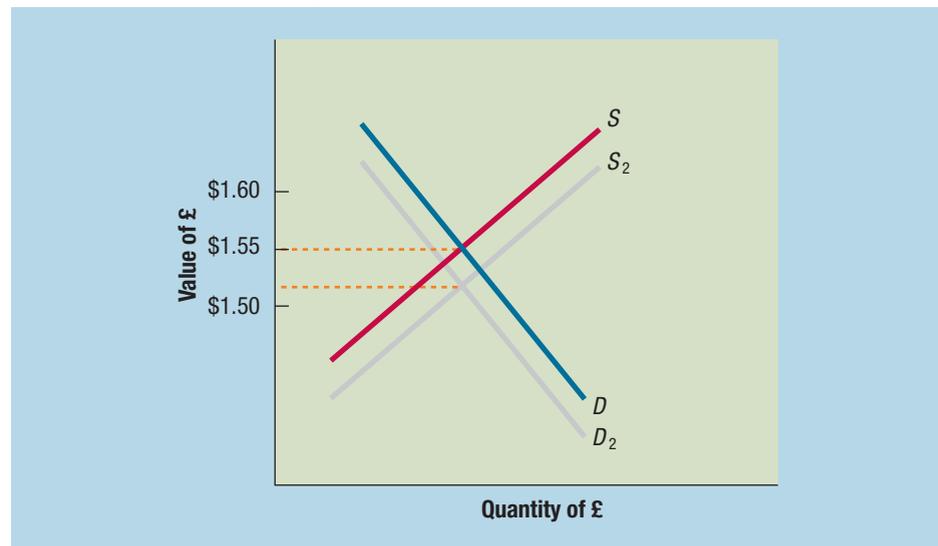
<http://research.stlouisfed.org/fred2>
Numerous economic and financial time series, e.g., on balance-of-payment statistics and interest rates.

Real Interest Rates. Although a relatively high interest rate may attract foreign inflows (to invest in securities offering high yields), the relatively high interest rate may reflect expectations of relatively high inflation. Because high inflation can place downward pressure on the local currency, some foreign investors may be discouraged from investing in securities denominated in that currency. For this reason, it is helpful to consider the **real interest rate**, which adjusts the nominal interest rate for inflation:

$$\text{Real interest rate} \cong \text{Nominal interest rate} - \text{Inflation rate}$$

This relationship is sometimes called the Fisher effect.

Exhibit 4.6 Impact of Rising U.S. Interest Rates on the Equilibrium Value of the British Pound



The real interest rate is commonly compared among countries to assess exchange rate movements because it combines nominal interest rates and inflation, both of which influence exchange rates. Other things held constant, there should be a high correlation between the real interest rate differential and the dollar's value.

Relative Income Levels

A third factor affecting exchange rates is relative income levels. Because income can affect the amount of imports demanded, it can affect exchange rates.

EXAMPLE

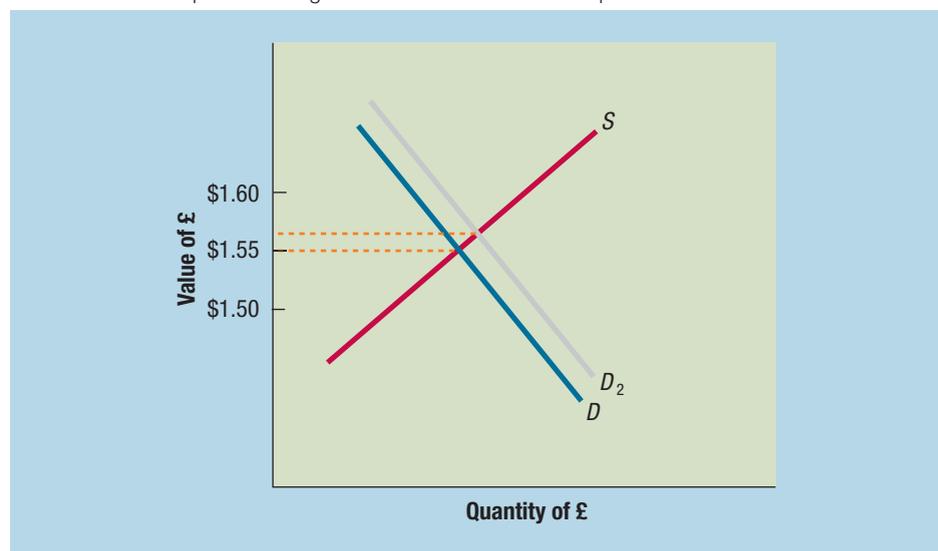
Assume that the U.S. income level rises substantially while the British income level remains unchanged. Consider the impact of this scenario on (1) the demand schedule for pounds, (2) the supply schedule of pounds for sale, and (3) the equilibrium exchange rate. First, the demand schedule for pounds will shift outward, reflecting the increase in U.S. income and therefore increased demand for British goods. Second, the supply schedule of pounds for sale is not expected to change. Therefore, the equilibrium exchange rate of the pound is expected to rise, as shown in Exhibit 4.7. ■

Changing income levels can also affect exchange rates indirectly through effects on interest rates. When this effect is considered, the impact may differ from the theory presented here, as will be explained shortly.

Government Controls

A fourth factor affecting exchange rates is government controls. The governments of foreign countries can influence the equilibrium exchange rate in many ways, including (1) imposing foreign exchange barriers, (2) imposing foreign trade barriers, (3) intervening (buying and selling currencies) in the foreign exchange markets, and (4) affecting macro variables such as inflation, interest rates, and income levels. Chapter 6 covers these activities in detail.

Exhibit 4.7 Impact of Rising U.S. Income Levels on the Equilibrium Value of the British Pound



E X A M P L E

Recall the example in which U.S. interest rates rose relative to British interest rates. The expected reaction was an increase in the British supply of pounds for sale to obtain more U.S. dollars (in order to capitalize on high U.S. money market yields). Yet, if the British government placed a heavy tax on interest income earned from foreign investments, this could discourage the exchange of pounds for dollars. ■

Expectations

A fifth factor affecting exchange rates is market expectations of future exchange rates. Like other financial markets, foreign exchange markets react to any news that may have a future effect. News of a potential surge in U.S. inflation may cause currency traders to sell dollars, anticipating a future decline in the dollar's value. This response places immediate downward pressure on the dollar.

Many institutional investors (such as commercial banks and insurance companies) take currency positions based on anticipated interest rate movements in various countries.

E X A M P L E

Investors may temporarily invest funds in Canada if they expect Canadian interest rates to increase. Such a rise may cause further capital flows into Canada, which could place upward pressure on the Canadian dollar's value. By taking a position based on expectations, investors can fully benefit from the rise in the Canadian dollar's value because they will have purchased Canadian dollars before the change occurred. Although the investors face an obvious risk here that their expectations may be wrong, the point is that expectations can influence exchange rates because they commonly motivate institutional investors to take foreign currency positions. ■

HTTP://

<http://www.ny.frb.org>
Links to information on economic conditions that affect foreign exchange rates and potential speculation in the foreign exchange market.

Impact of Signals on Currency Speculation. Day-to-day speculation on future exchange rate movements is commonly driven by signals of future interest rate movements, but it can also be driven by other factors. Signals of the future economic conditions that affect exchange rates can change quickly, so the speculative positions in currencies may adjust quickly, causing unclear patterns in exchange rates. It is not unusual for the dollar to strengthen substantially on a given day, only to weaken substantially on the next day. This can occur when speculators overreact to news on one day (causing the dollar to be overvalued), which results in a correction on the next day. Overreactions occur because speculators are commonly taking positions based on signals of future actions (rather than the confirmation of actions), and these signals may be misleading.

When speculators speculate on currencies in emerging markets, they can have a substantial impact on exchange rates. Those markets have a smaller amount of foreign exchange trading for other purposes (such as international trade) and therefore are less liquid than the larger markets.

E X A M P L E

The abrupt decline in the Russian ruble on some days during 1998 was partially attributed to speculative trading (although the decline might have occurred anyway over time). The decline in the ruble created a lack of confidence in other emerging markets as well and caused speculators to sell off other emerging market currencies, such as those of Poland and Venezuela. The market for the ruble is not very active, so a sudden shift in positions by speculators can have a substantial impact. ■

Interaction of Factors

Transactions within the foreign exchange markets facilitate either trade or financial flows. Trade-related foreign exchange transactions are generally less responsive to

news. Financial flow transactions are very responsive to news, however, because decisions to hold securities denominated in a particular currency are often dependent on anticipated changes in currency values. Sometimes trade-related factors and financial factors interact and simultaneously affect exchange rate movements.

EXAMPLE

An increase in income levels sometimes causes expectations of higher interest rates. So, even though a higher income level can result in more imports, it may also indirectly attract more financial inflows (assuming interest rates increase). Because the favorable financial flows may overwhelm the unfavorable trade flows, an increase in income levels is frequently expected to strengthen the local currency. ■

Exhibit 4.8 separates payment flows between countries into trade-related and finance-related flows and summarizes the factors that affect these flows. Over a particular period, some factors may place upward pressure on the value of a foreign currency while other factors place downward pressure on the currency's value.

EXAMPLE

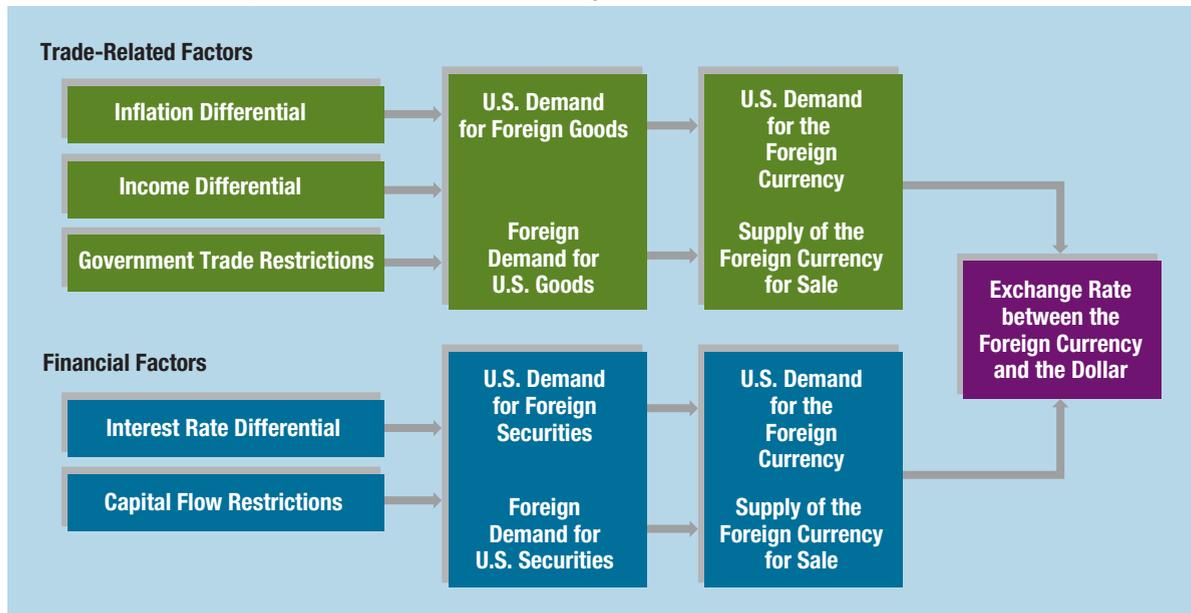
Assume the simultaneous existence of (1) a sudden increase in U.S. inflation and (2) a sudden increase in U.S. interest rates. If the British economy is relatively unchanged, the increase in U.S. inflation will place upward pressure on the pound's value while the increase in U.S. interest rates places downward pressure on the pound's value. ■

The sensitivity of an exchange rate to these factors is dependent on the volume of international transactions between the two countries. If the two countries engage in a large volume of international trade but a very small volume of international capital flows, the relative inflation rates will likely be more influential. If the two countries engage in a large volume of capital flows, however, interest rate fluctuations may be more influential.

EXAMPLE

Assume that Morgan Co., a U.S.-based MNC, commonly purchases supplies from Venezuela and Japan and therefore desires to forecast the direction of the Venezuelan

Exhibit 4.8 Summary of How Factors Can Affect Exchange Rates



bolivar and the Japanese yen. Morgan's financial analysts have developed the following one-year projections for economic conditions:

Factor	United States	Venezuela	Japan
Change in interest rates	-1%	-2%	-4%
Change in inflation	+2%	-3%	-6%

Assume that the United States and Venezuela conduct a large volume of international trade but engage in minimal capital flow transactions. Also assume that the United States and Japan conduct very little international trade but frequently engage in capital flow transactions. What should Morgan expect regarding the future value of the Venezuelan bolivar and the Japanese yen?

The bolivar should be influenced most by trade-related factors because of Venezuela's assumed heavy trade with the United States. The expected inflationary changes should place upward pressure on the value of the bolivar. Interest rates are expected to have little direct impact on the bolivar because of the assumed infrequent capital flow transactions between the United States and Venezuela.

The Japanese yen should be most influenced by interest rates because of Japan's assumed heavy capital flow transactions with the United States. The expected interest rate changes should place downward pressure on the yen. The inflationary changes are expected to have little direct impact on the yen because of the assumed infrequent trade between the two countries. ■

Capital flows have become larger over time and can easily overwhelm trade flows. For this reason, the relationship between the factors (such as inflation and income) that affect trade and exchange rates is not always as strong as one might expect.

An understanding of exchange rate equilibrium does not guarantee accurate forecasts of future exchange rates because that will depend in part on how the factors that affect exchange rates will change in the future. Even if analysts fully realize how factors influence exchange rates, they may not be able to predict how those factors will change.

Speculating on Anticipated Exchange Rates

Many commercial banks attempt to capitalize on their forecasts of anticipated exchange rate movements in the foreign exchange market, as illustrated in this example.

- Chicago Bank expects the exchange rate of the New Zealand dollar (NZ\$) to appreciate from its present level of \$.50 to \$.52 in 30 days.
- Chicago Bank is able to borrow \$20 million on a short-term basis from other banks.
- Present short-term interest rates (annualized) in the interbank market are as follows:

Currency	Lending Rate	Borrowing Rate
U.S. dollars	6.72%	7.20%
New Zealand dollars (NZ\$)	6.48%	6.96%

Because brokers sometimes serve as intermediaries between banks, the lending rate differs from the borrowing rate. Given this information, Chicago Bank could

1. Borrow \$20 million.
2. Convert the \$20 million to NZ\$40 million (computed as $\$20,000,000 / \$.50$).
3. Lend the New Zealand dollars at 6.48 percent annualized, which represents a .54 percent return over the 30-day period [computed as $6.48\% \times (30/360)$]. After 30 days, the bank will receive NZ\$40,216,000 [computed as $\text{NZ\$}40,000,000 \times (1 + .0054)$].
4. Use the proceeds from the New Zealand dollar loan repayment (on day 30) to repay the U.S. dollars borrowed. The annual interest on the U.S. dollars borrowed is 7.2 percent, or .6 percent over the 30-day period [computed as $7.2\% \times (30/360)$]. The total U.S. dollar amount necessary to repay the U.S. dollar loan is therefore \$20,120,000 [computed as $\$20,000,000 \times (1 + .006)$].

Assuming that the exchange rate on day 30 is \$.52 per New Zealand dollar as anticipated, the number of New Zealand dollars necessary to repay the U.S. dollar loan is NZ\$38,692,308 (computed as $\$20,120,000 / \$.52$ per New Zealand dollar). Given that the bank accumulated NZ\$40,216,000 from lending New Zealand dollars, it would earn a speculative profit of NZ\$1,523,692, which is the equivalent of \$792,320 (given a spot rate of \$.52 per New Zealand dollar on day 30). The bank would earn this speculative profit without using any funds from deposit accounts because the funds would have been borrowed through the interbank market.

If, instead, Chicago Bank expects that the New Zealand dollar will depreciate, it can attempt to make a speculative profit by taking positions opposite to those just described. To illustrate, assume that the bank expects an exchange rate of \$.48 for the New Zealand dollar on day 30. It can borrow New Zealand dollars, convert them to U.S. dollars, and lend the U.S. dollars out. On day 30, it will close out these positions. Using the rates quoted in the previous example, and assuming the bank can borrow NZ\$40 million, the bank takes the following steps:

1. Borrow NZ\$40 million.
2. Convert the NZ\$40 million to \$20 million (computed as $\text{NZ\$}40,000,000 \times \$.50$).
3. Lend the U.S. dollars at 6.72 percent, which represents a .56 percent return over the 30-day period. After 30 days, the bank will receive \$20,112,000 [computed as $\$20,000,000 \times (1 + .0056)$].
4. Use the proceeds of the U.S. dollar loan repayment (on day 30) to repay the New Zealand dollars borrowed. The annual interest on the New Zealand dollars borrowed is 6.96 percent, or .58 percent over the 30-day period [computed as $6.96\% \times (30/360)$]. The total New Zealand dollar amount necessary to repay the loan is therefore NZ\$40,232,000 [computed as $\text{NZ\$}40,000,000 \times (1 + .0058)$].

HTTP://

<http://www.forex.com>
Individuals can open a foreign exchange trading account for a minimum of only \$250.

<http://www.fxcm.com>
Facilitates the trading of foreign currencies.

<http://www.hedgestreet.com>
Facilitates the trading of foreign currencies.

Assuming that the exchange rate on day 30 is \$.48 per New Zealand dollar as anticipated, the number of U.S. dollars necessary to repay the NZ\$ loan is \$19,311,360 (computed as $\text{NZ\$}40,232,000 \times \$.48$ per New Zealand dollar). Given that the bank accumulated \$20,112,000 from its U.S. dollar loan, it would earn a speculative profit of \$800,640 without using any of its own money (computed as $\$20,112,000 - \$19,311,360$).

Most money center banks continue to take some speculative positions in foreign currencies. In fact, some banks' currency trading profits have exceeded \$100 million per quarter lately.

The potential returns from foreign currency speculation are high for banks that have large borrowing capacity. Nevertheless, foreign exchange rates are very volatile, and a poor forecast could result in a large loss. One of the best-known bank failures, Franklin National Bank in 1974, was primarily attributed to massive speculative losses from foreign currency positions.

SUMMARY

- Exchange rate movements are commonly measured by the percentage change in their values over a specified period, such as a month or a year. MNCs closely monitor exchange rate movements over the period in which they have cash flows denominated in the foreign currencies of concern.
- The equilibrium exchange rate between two currencies at any point in time is based on the demand and supply conditions. Changes in the demand for a currency or the supply of a currency for sale will affect the equilibrium exchange rate.
- The key economic factors that can influence exchange rate movements through their effects on demand and supply conditions are relative inflation rates, interest rates, and income levels, as well as government controls. As these factors cause a change in international trade or financial flows, they affect the demand for a currency or the supply of currency for sale and therefore affect the equilibrium exchange rate.
- The two factors that are most closely monitored by foreign exchange market participants are relative inflation and interest rates:
 - If a foreign country experiences high inflation (relative to the United States), its exports to the United States should decrease (U.S. demand for its currency decreases), its imports should increase (supply of its currency to be exchanged for dollars increases), and there is downward pressure on its currency's equilibrium value.
 - If a foreign country experiences an increase in interest rates (relative to U.S. interest rates), the inflow of U.S. funds to purchase its securities should increase (U.S. demand for its currency increases), the outflow of its funds to purchase U.S. securities should decrease (supply of its currency to be exchanged for U.S. dollars decreases), and there is upward pressure on its currency's equilibrium value.
- All relevant factors must be considered simultaneously to assess the likely movement in a currency's value.

POINT COUNTER-POINT

How Can Persistently Weak Currencies Be Stabilized?

Point The currencies of some Latin American countries depreciate against the U.S. dollar on a consistent basis. The governments of these countries need to attract more capital flows by raising interest rates and making their currencies more attractive. They also need to insure bank deposits so that foreign investors who invest in large bank deposits do not need to worry about default risk. In addition, they could impose capital restrictions on local investors to prevent capital outflows.

Counter-Point Some Latin American countries have had high inflation, which encourages local firms and consumers to purchase products from the United

States instead. Thus, these countries could relieve the downward pressure on their local currencies by reducing inflation. To reduce inflation, a country may have to reduce economic growth temporarily. These countries should not raise their interest rates in order to attract foreign investment, because they will still not attract funds if investors fear that there will be large capital outflows upon the first threat of continued depreciation.

Who Is Correct? Use the Internet to learn more about this issue. Which argument do you support? Offer your own opinion on this issue.

SELF TEST

Answers are provided in Appendix A at the back of the text.

- Briefly describe how various economic factors can affect the equilibrium exchange rate of the Japanese yen's value with respect to that of the dollar.
- A recent shift in the interest rate differential between the United States and Country A had a large effect on the value of Currency A. However, the same shift in the interest rate differential between the United States and Country B had no effect on the value of Currency B. Explain why the effects may vary.
- Smart Banking Corp. can borrow \$5 million at 6 percent annualized. It can use the proceeds to invest in Canadian dollars at 9 percent annualized over a six-day period. The Canadian dollar is worth \$.95 and is expected to be worth \$.94 in six days. Based on this information, should Smart Banking Corp. borrow U.S. dollars and invest in Canadian dollars? What would be the gain or loss in U.S. dollars?

QUESTIONS AND APPLICATIONS

- Percentage Depreciation.** Assume the spot rate of the British pound is \$1.73. The expected spot rate one year from now is assumed to be \$1.66. What percentage depreciation does this reflect?
- Inflation Effects on Exchange Rates.** Assume that the U.S. inflation rate becomes high relative to Canadian inflation. Other things being equal, how should this affect the (a) U.S. demand for Canadian dollars, (b) supply of Canadian dollars for sale, and (c) equilibrium value of the Canadian dollar?
- Interest Rate Effects on Exchange Rates.** Assume U.S. interest rates fall relative to British interest rates. Other things being equal, how should this affect the (a) U.S. demand for British pounds, (b) supply of pounds for sale, and (c) equilibrium value of the pound?
- Income Effects on Exchange Rates.** Assume that the U.S. income level rises at a much higher rate than does the Canadian income level. Other things being equal, how should this affect the (a) U.S. demand for Canadian dollars, (b) supply of Canadian dollars for sale, and (c) equilibrium value of the Canadian dollar?
- Trade Restriction Effects on Exchange Rates.** Assume that the Japanese government relaxes its controls on imports by Japanese companies. Other things being equal, how should this affect the (a) U.S. demand for Japanese yen, (b) supply of yen for sale, and (c) equilibrium value of the yen?
- Effects of Real Interest Rates.** What is the expected relationship between the relative real interest rates of two countries and the exchange rate of their currencies?
- Speculative Effects on Exchange Rates.** Explain why a public forecast by a respected economist about future interest rates could affect the value of the dollar today. Why do some forecasts by well-respected economists have no impact on today's value of the dollar?
- Factors Affecting Exchange Rates.** What factors affect the future movements in the value of the euro against the dollar?
- Interaction of Exchange Rates.** Assume that there are substantial capital flows among Canada, the United States, and Japan. If interest rates in Canada decline to a level below the U.S. interest rate, and inflationary expectations remain unchanged, how could this affect the value of the Canadian dollar against the U.S. dollar? How might this decline in Canada's interest rates possibly affect the value of the Canadian dollar against the Japanese yen?
- Trade Deficit Effects on Exchange Rates.** Every month, the U.S. trade deficit figures are announced. Foreign exchange traders often react to this announcement and even attempt to forecast the figures before they are announced.
 - Why do you think the trade deficit announcement sometimes has such an impact on foreign exchange trading?
 - In some periods, foreign exchange traders do not respond to a trade deficit announcement, even when the announced deficit is very large. Offer an explanation for such a lack of response.
- Comovements of Exchange Rates.** Explain why the value of the British pound against the dollar will

not always move in tandem with the value of the euro against the dollar.

12. **Factors Affecting Exchange Rates.** In the 1990s, Russia was attempting to import more goods but had little to offer other countries in terms of potential exports. In addition, Russia's inflation rate was high. Explain the type of pressure that these factors placed on the Russian currency.
13. **National Income Effects.** Analysts commonly attribute the appreciation of a currency to expectations that economic conditions will strengthen. Yet, this chapter suggests that when other factors are held constant, increased national income could increase imports and cause the local currency to weaken. In reality, other factors are not constant. What other factor is likely to be affected by increased economic growth and could place upward pressure on the value of the local currency?
14. **Factors Affecting Exchange Rates.** If the Asian countries experience a decline in economic growth (and experience a decline in inflation and interest rates as a result), how will their currency values (relative to the U.S. dollar) be affected?
15. **Impact of Crises.** Why do you think most crises in countries (such as the Asian crisis) cause the local currency to weaken abruptly? Is it because of trade or capital flows?
16. **Impact of September 11.** The terrorist attacks on the United States on September 11, 2001, were expected to weaken U.S. economic conditions and reduce U.S. interest rates. How do you think the weaker U.S. economic conditions would have affected trade flows? How would this have affected the value of the dollar (holding other factors constant)? How do you think the lower U.S. interest rates would have affected the value of the U.S. dollar (holding other factors constant)?

Advanced Questions

17. **Measuring Effects on Exchange Rates.** Tarheel Co. plans to determine how changes in U.S. and Mexican real interest rates will affect the value of the U.S. dollar. (See Appendix C.)
 - a. Describe a regression model that could be used to achieve this purpose. Also explain the expected sign of the regression coefficient.
 - b. If Tarheel Co. thinks that the existence of a quota in particular historical periods may have affected exchange rates, how might this be accounted for in the regression model?
18. **Factors Affecting Exchange Rates.** Mexico tends to have much higher inflation than the United States and also much higher interest rates than the United

States. Inflation and interest rates are much more volatile in Mexico than in industrialized countries. The value of the Mexican peso is typically more volatile than the currencies of industrialized countries from a U.S. perspective; it has typically depreciated from one year to the next, but the degree of depreciation has varied substantially. The bid/ask spread tends to be wider for the peso than for currencies of industrialized countries.

- a. Identify the most obvious economic reason for the persistent depreciation of the peso.
 - b. High interest rates are commonly expected to strengthen a country's currency because they can encourage foreign investment in securities in that country, which results in the exchange of other currencies for that currency. Yet, the peso's value has declined against the dollar over most years even though Mexican interest rates are typically much higher than U.S. interest rates. Thus, it appears that the high Mexican interest rates do not attract substantial U.S. investment in Mexico's securities. Why do you think U.S. investors do not try to capitalize on the high interest rates in Mexico?
 - c. Why do you think the bid/ask spread is higher for pesos than for currencies of industrialized countries? How does this affect a U.S. firm that does substantial business in Mexico?
19. **Aggregate Effects on Exchange Rates.** Assume that the United States invests heavily in government and corporate securities of Country K. In addition, residents of Country K invest heavily in the United States. Approximately \$10 billion worth of investment transactions occur between these two countries each year. The total dollar value of trade transactions per year is about \$8 million. This information is expected to also hold in the future.

Because your firm exports goods to Country K, your job as international cash manager requires you to forecast the value of Country K's currency (the "krank") with respect to the dollar. Explain how each of the following conditions will affect the value of the krank, holding other things equal. Then, aggregate all of these impacts to develop an overall forecast of the krank's movement against the dollar.

 - a. U.S. inflation has suddenly increased substantially, while Country K's inflation remains low.
 - b. U.S. interest rates have increased substantially, while Country K's interest rates remain low. Investors of both countries are attracted to high interest rates.
 - c. The U.S. income level increased substantially, while Country K's income level has remained unchanged.

- d. The United States is expected to impose a small tariff on goods imported from Country K.
- e. Combine all expected impacts to develop an overall forecast.

20. **Speculation.** Blue Demon Bank expects that the Mexican peso will depreciate against the dollar from its spot rate of \$.15 to \$.14 in 10 days. The following interbank lending and borrowing rates exist:

Currency	Lending Rate	Borrowing Rate
U.S. dollar	8.0%	8.3%
Mexican peso	8.5%	8.7%

Assume that Blue Demon Bank has a borrowing capacity of either \$10 million or 70 million pesos in the interbank market, depending on which currency it wants to borrow.

- a. How could Blue Demon Bank attempt to capitalize on its expectations without using deposited funds? Estimate the profits that could be generated from this strategy.
 - b. Assume all the preceding information with this exception: Blue Demon Bank expects the peso to appreciate from its present spot rate of \$.15 to \$.17 in 30 days. How could it attempt to capitalize on its expectations without using deposited funds? Estimate the profits that could be generated from this strategy.
21. **Speculation.** Diamond Bank expects that the Singapore dollar will depreciate against the U.S. dollar from its spot rate of \$.43 to \$.42 in 60 days. The following interbank lending and borrowing rates exist:

Currency	Lending Rate	Borrowing Rate
U.S. dollar	7.0%	7.2%
Singapore dollar	22.0%	24.0%

Diamond Bank considers borrowing 10 million Singapore dollars in the interbank market and investing the funds in U.S. dollars for 60 days. Estimate the profits (or losses) that could be earned from this strategy. Should Diamond Bank pursue this strategy?

22. **Relative Importance of Factors Affecting Exchange Rate Risk.** Assume that the level of capital flows between the United States and the country of Krendo is negligible (close to zero) and will continue to be negligible. There is a substantial

amount of trade between the United States and the country of Krendo and no capital flows. How will high inflation and high interest rates affect the value of the kren (Krendo’s currency)? Explain.

23. **Assessing the Euro’s Potential Movements.** You reside in the United States and are planning to make a one-year investment in Germany during the next year. Since the investment is denominated in euros, you want to forecast how the euro’s value may change against the dollar over the one-year period. You expect that Germany will experience an inflation rate of 1 percent during the next year, while all other European countries will experience an inflation rate of 8 percent over the next year. You expect that the United States will experience an annual inflation rate of 2 percent during the next year. You believe that the primary factor that affects any exchange rate is the inflation rate. Based on the information provided in this question, will the euro appreciate, depreciate, or stay at about the same level against the dollar over the next year? Explain.
24. **Weighing Factors That Affect Exchange Rates.** Assume that the level of capital flows between the United States and the country of Zeus is negligible (close to zero) and will continue to be negligible. There is a substantial amount of trade between the United States and the country of Zeus. The main import by the United States is basic clothing purchased by U.S. retail stores from Zeus, while the main import by Zeus is special computer chips that are only made in the United States and are needed by many manufacturers in Zeus. Suddenly, the U.S. government decides to impose a 20 percent tax on the clothing imports. The Zeus government immediately retaliates by imposing a 20 percent tax on the computer chip imports. Second, the Zeus government immediately imposes a 60 percent tax on any interest income that would be earned by Zeus investors if they buy U.S. securities. Third, the Zeus central bank raises its local interest rates so that they are now higher than interest rates in the United States. Do you think the currency of Zeus (called the zee) will appreciate or depreciate against the dollar as a result of all the government actions described above? Explain.

Discussion in the Boardroom

This exercise can be found in Appendix E at the back of this textbook.

Running Your Own MNC

This exercise can be found on the Xtra! website at <http://maduraxtra.swlearning.com>.

BLADES, INC. CASE

Assessment of Future Exchange Rate Movements

As the chief financial officer of Blades, Inc., Ben Holt is pleased that his current system of exporting “Speedos” to Thailand seems to be working well. Blades’ primary customer in Thailand, a retailer called Entertainment Products, has committed itself to purchasing a fixed number of Speedos annually for the next 3 years at a fixed price denominated in baht, Thailand’s currency. Furthermore, Blades is using a Thai supplier for some of the components needed to manufacture Speedos. Nevertheless, Holt is concerned about recent developments in Asia. Foreign investors from various countries had invested heavily in Thailand to take advantage of the high interest rates there. As a result of the weak economy in Thailand, however, many foreign investors have lost confidence in Thailand and have withdrawn their funds.

Ben Holt has two major concerns regarding these developments. First, he is wondering how these changes in Thailand’s economy could affect the value of the Thai baht and, consequently, Blades. More specifically, he is wondering whether the effects on the Thai baht may affect Blades even though its primary Thai customer is committed to Blades over the next 3 years.

Second, Holt believes that Blades may be able to speculate on the anticipated movement of the baht, but he is uncertain about the procedure needed to accomplish this. To facilitate Holt’s understanding of exchange rate speculation, he has asked you, Blades’ financial analyst, to provide him with detailed illustrations of two scenarios. In the first, the baht would move from a current level of \$.022 to \$.020 within the next 30 days. Under the second scenario, the baht would move from its current level to \$.025 within the next 30 days.

Based on Holt’s needs, he has provided you with the following list of questions to be answered:

- How are percentage changes in a currency’s value measured? Illustrate your answer numerically by assuming a change in the Thai baht’s value from a value of \$.022 to \$.026.
- What are the basic factors that determine the value of a currency? In equilibrium, what is the relationship between these factors?
- How might the relatively high levels of inflation and interest rates in Thailand affect the baht’s value? (Assume a constant level of U.S. inflation and interest rates.)
- How do you think the loss of confidence in the Thai baht, evidenced by the withdrawal of funds from Thailand, will affect the baht’s value? Would Blades be affected by the change in value, given the primary Thai customer’s commitment?
- Assume that Thailand’s central bank wishes to prevent a withdrawal of funds from its country in order to prevent further changes in the currency’s value. How could it accomplish this objective using interest rates?
- Construct a spreadsheet illustrating the steps Blades’ treasurer would need to follow in order to speculate on expected movements in the baht’s value over the next 30 days. Also show the speculative profit (in dollars) resulting from each scenario. Use both of Ben Holt’s examples to illustrate possible speculation. Assume that Blades can borrow either \$10 million or the baht equivalent of this amount. Furthermore, assume that the following short-term interest rates (annualized) are available to Blades:

Currency	Lending Rate	Borrowing Rate
Dollars	8.10%	8.20%
Thai baht	14.80%	15.40%

SMALL BUSINESS DILEMMA

Assessment by the Sports Exports Company of Factors That Affect the British Pound’s Value

Because the Sports Exports Company (a U.S. firm) receives payments in British pounds every month and converts those pounds into dollars, it needs to closely

monitor the value of the British pound in the future. Jim Logan, owner of the Sports Exports Company, expects that inflation will rise substantially in the

United Kingdom, while inflation in the United States will remain low. He also expects that the interest rates in both countries will rise by about the same amount.

1. Given Jim's expectations, forecast whether the pound will appreciate or depreciate against the dollar over time.

2. Given Jim's expectations, will the Sports Exports Company be favorably or unfavorably affected by the future changes in the value of the pound?

INTERNET/EXCEL EXERCISES

The website of the Federal Reserve Board of Governors provides exchange rate trends of various currencies. Its address is <http://www.federalreserve.gov/releases/>.

1. Click on the section "Foreign Exchange Rates" monthly. Use this Web page to determine how exchange rates of various currencies have changed in recent months. Note that most of these currencies (except the British pound) are quoted in units per dollar. In general, have most currencies strengthened or weakened against the dollar over the last 3 months? Offer one or more reasons to explain the recent general movements in currency values against the dollar.
2. Does it appear that the Asian currencies move in the same direction relative to the dollar? Does it appear that the Latin American currencies move in the same direction against the dollar? Explain.

3. Go to <http://www.oanda.com/convert/fxhistory>. Obtain the direct exchange rate (\$ per currency unit) of the Canadian dollar for the beginning of each of the last 12 months. Insert this information in a column on an electronic spreadsheet. (See Appendix C for help on conducting analyses with Excel.) Repeat the process to obtain the direct exchange rate of the euro. Compute the percentage change in the value of the Canadian dollar and the euro each month. Determine the standard deviation of the movements (percentage changes) in the Canadian dollar and in the euro. Compare the standard deviation of the euro's movements to the standard deviation of the Canadian dollar's movements. Which currency is more volatile?