

CHAPTER 9

Managing Transaction Exposure and Economic Exposure

Opening Case 9: Avon's Actions to Protect Against Volatile Currencies

Avon Products, Inc. is a global manufacturer and marketer of beauty and related products. In 1996, the Asian market accounted for 16 percent of Avon's total revenues (\$4.8 billion). This case recounts how Avon minimized its currency exposure to the Asian financial crisis of 1997—8 through the use of three hedging techniques: the balance-sheet hedge, leads and lags, and forward contracts.

First, Avon produces and sells nearly all its own products in 10 Asian countries. This strategy, known as the balance-sheet hedge, has enabled Avon to maintain the same amount of exposed assets and exposed liabilities in Asian currencies. Avon suffered neither a gain nor a loss from the Asian crisis, because devaluations of the Asian currencies affected both the company's assets and liabilities equally.

Second, when the crisis began in Thailand in July 1997, Avon had its Asian unit remit its earnings weekly rather than monthly (leads) and had, moreover, delayed its dollar payments to some Asian suppliers (lags).

Third, just before other Asian countries allowed their currencies to depreciate, Avon sold about \$50 million worth of five Asian currencies forward against the dollar for periods of up to 15 months.

Source: Fred R. Bleakly, "How US Firm Copes with Asian Crisis: Avon Moves to Protect against Volatile Currencies," *The Wall Street Journal*, Dec. 26, 1997, pp. A2, A4.

Foreign-exchange risk is the risk of loss due to changes in the international exchange value of national currencies. For example, in 1999 Sony was the victim of a 40 percent increase in the yen against currencies of its major trading partners in 1999 (Landers 1999). In October 1999, Sony reported impressive accomplishments for the first half of that year: new products, product and distribution rationalization, and increased sales and profits across the board in local-currency terms. But the same report broke bad news in dollar terms: sales had dropped by 7.6 percent, operating income by 45 percent, and net income by 25 percent. These results underline the impact of the high yen on Japanese exporters such as Sony. In fact, these days many companies are at the mercy of foreign-exchange rates.

So long as we do not have a single world currency, some degree of exchange risk will exist, no matter what the system. Fluctuations in the value of currency had been quite frequently pronounced even under the fixed exchange rate system. A study by DeVries (1968), for example, shows that during the 20-year period from 1948 to 1968, 96 countries devalued their currencies by more than 40 percent, and 24 countries devalued their currencies by more than 75 percent. This problem has become more complicated in the past three decades, because most countries have permitted their currencies to float since 1973. Daily currency fluctuations and frequent currency crises have become a way of life since then. Daily currency fluctuations and the increasing integration of the world economy are two major reasons why multinational companies (MNCs) consider exchange rate risk as the most important among many risks.

This chapter has four major sections. The first section describes the basic nature of foreign-exchange exposure. The second section explains how transaction exposure can be measured and hedged. The third section explains how economic exposure can be measured and hedged. The fourth section covers the use of exchange risk management instruments by MNCs. In addition, this section explores the possibility that a hedge can be risky, by using the maturity mismatch in a German firm's oil futures hedge as an example.

● 9.1 The Basic Nature of Foreign-Exchange Exposures

Foreign-exchange exposure refers to the possibility that a firm will gain or lose because of changes in exchange rates. Every company faces exposure to foreign-exchange risk as soon as it chooses to maintain a physical presence in a foreign country. Likewise, a firm faces exposure to exchange risk when it chooses to finance its operations in foreign currencies. Both exchange risks are analyzed in the context of investing and financing decisions. In addition, foreign trade and loans may involve foreign-exchange risk. An important task of the international financial manager is to compare potential losses with the cost of avoiding these losses.

Three basic types of exchange exposure are translation exposure, transaction exposure, and economic exposure. Translation exposure is the accounting-based changes in consolidated financial statements caused by exchange rate changes. Transaction exposure occurs when exchange rates change between the time when an obligation is incurred and the time when it is settled, thereby affecting actual cash flows. Economic exposure reflects the change in the present value of the firm's future cash flows because of an unexpected change in exchange rates.

9.1.1 *Exposure management strategy*

Most large MNCs manage their foreign-exchange risk by using a pre-established exposure management strategy. For example, Merck uses the following five steps for currency exposure management: (1) projecting exchange rate volatility, (2) assessing the impact of the 5-year strategic plan, (3) deciding on hedging the exposure, (4) selecting the appropriate financial instruments, and (5) constructing a hedging program (for details, see Case Problem 6: Merck's Use of Currency Options). To protect assets adequately against risks from exchange rate fluctuations, MNCs must (1) forecast the degree of exposure, (2) develop a reporting system to monitor exposure and exchange rate movements, (3) assign responsibility for hedging exposure, and (4) select appropriate hedging tools.

FORECASTING THE DEGREE OF EXPOSURE To develop a viable hedging program, an MNC must forecast the degree of exposure in each major currency in which it operates. Approaches range from gut feelings to sophisticated economic models, each of which has had varying degrees of success. Whatever the approach, the MNC should estimate and use ranges within which it expects a currency to vary over the forecasting period. Some companies develop in-house capabilities to monitor exchange rates, using economists who also try to obtain a consensus of exchange rate movements from the banks with which they deal. Their concern is to forecast the direction, magnitude, and timing of an exchange rate change. Other companies contract out their forecasting needs.

DEVELOPING A REPORTING SYSTEM TO MONITOR EXPOSURE AND EXCHANGE RATE MOVEMENTS Once the MNC has decided how to forecast the degree of exposure, it should develop a reporting system that will assist in protecting it against risk. To achieve this goal, substantial participation from foreign operations must be combined with effective central control. Because exchange rates change frequently, MNCs should obtain input from those who are attuned to the foreign country's economy. Central control of exposure protects resources more efficiently than letting each subsidiary monitor its own exposure. The management of the MNC should devise a uniform reporting system for all of its subsidiaries. The report should identify the exposed accounts that it wants to monitor, the amount of exposure by currency of each account, and the different times under consideration.

ASSIGNING RESPONSIBILITY FOR HEDGING EXPOSURE It is important for management to decide at what level hedging strategies will be determined and implemented. Most MNCs today continue to centralize exchange exposure management, because it is impossible for regional or country managers to know how their foreign-exchange exposure relates to other affiliates. A three-country study of exchange risk management by Belk (2002) found that 66 percent of the sample companies highly centralized their exposure management, 19 percent lowly centralized their exposure management, and only 15 percent decentralized their exposure management. However, a centralized policy may miss opportunities to detect the possibility of currency fluctuations in certain regions or countries. Thus, some MNCs decentralize some exposure management decisions so that they can react quickly to a more rapidly changing international environment.

SELECTING APPROPRIATE HEDGING TOOLS Once an MNC has identified its level of exposure and determined which exposure is critical, it can hedge its position by adopting operational techniques and financial instruments (see Global Finance in Action 9.1). **Operational techniques** are operational approaches to hedging exchange exposure that include diversification of a company's operations, the balance-sheet hedge, and exposure netting. **Financial instruments** are financial contracts to hedging exchange exposure that include currency forward and futures contracts, currency options, and swap agreements. This chapter and chapter 10 will discuss these and other hedging devices in detail.

Global Finance in Action 9.1

Coca Cola's Exposure Management

Coca Cola is a good example of how MNCs use operational techniques and financial instruments for their foreign-exchange exposure management. Because Coca Cola earns about 80 percent of its operating income from foreign operations, foreign-currency changes can have a major impact on reported earning. The company manages its currency exposures on a consolidated basis, which allows it to net exposures from different operations around the world and takes advantage of natural offsets – for example, cases in which Japanese yen receivables offset Japanese yen payables. It also uses financial contracts to further reduce its net exposure to currency fluctuations. Coca Cola enters into currency forward contracts and purchases currency options in several countries, most notably the euro and Japanese yen, to hedge firm sales commitments. It also buys currency options to hedge certain anticipated sales.

Source: J. D. Daniels, L. H. Radebaugh, and D. P. Sullivan, *International Business: Environments and Operations*, 10th edn, Upper Saddle River, NJ: Prentice Hall, 2004, p. 620.

9.1.2 Transaction exposure

Gains or losses may result from the settlement of transactions whose payment terms are stated in a foreign currency. **Transaction exposure** refers to the potential change in the value of outstanding obligations due to changes in the exchange rate between the inception of a contract and the settlement of the contract. Transactions that are subject to transaction exposure include credit purchases and credit sales whose prices are stated in foreign currencies, borrowed and loaned funds denominated in foreign currencies, and uncovered forward contracts.

Receipts and payments denominated in foreign currencies are considered to be exposed. If exposed receipts are greater than exposed payments, foreign-currency depreciations will cause exchange losses, and foreign-currency appreciations will cause exchange gains. On the other hand, if exposed receipts are smaller than exposed payments, foreign-currency depreciations will create exchange gains, and foreign-currency appreciations will create exchange losses.

Example 9.1

An American firm has sold machinery to a British firm through its UK subsidiary for £10,000, with terms of 180 days. The payments must be received in pounds. The spot rate for pounds is \$1.70 and the US seller expects to exchange £10,000 for \$17,000 when payment is received.

Transaction exposure arises because of the risk that the US exporter will receive something other than \$17,000 when the British pound receipts are exchanged for dollars. If the spot rate were to decline to \$1.40 180 days from today, the US exporter would receive only \$14,000, \$3,000 less than the expected \$17,000. However, if the spot rate were to rise to \$1.90 during the same period, the exporter would receive \$19,000, an increase of \$2,000 over the amount expected. If the US exporter had invoiced in dollars, the transaction exposure would have shifted to the British importer. Unlike translation gains and losses, transaction gains and losses have a direct impact on actual cash flows.

9.1.3 *Economic exposure*

Economic exposure, also called operating exposure, competitive exposure, or revenue exposure, measures the impact of an exchange rate change on the net present value of expected future cash flows from a foreign investment project. Future effects of changes in exchange rates occur under the general category of economic risk. An MNC may have established its subsidiary in a country with price stability, readily available funds, a favorable balance of payments, and low rates of taxation. These positive features may disappear over time if the economic situation of the country deteriorates. Eventually, the local currency will devalue or depreciate. The subsidiary is likely to face immediate operational problems if it has to pay for its imports in hard currencies or if it has borrowed from abroad. Exchange rate changes may also affect economic factors such as inflationary forces, price controls, the supply of loanable funds, and local labor availability.

Economic exposure is a broader and more subjective concept of exposure than either translation or transaction exposure, because it involves the potential effects of exchange rate changes on all facets of a firm's operations. Economic exposure is difficult to measure, but may be more significant than the others because it relates to the long-term profit performance and hence the value of the firm.

Example 9.2

For the coming year, a Malaysian subsidiary of an American firm is expected to earn 35 million ringgits after taxes, and its depreciation charge is estimated at 5 million ringgits. The exchange rate is expected to decrease from M\$4 per dollar at present to M\$5 per dollar for the next year.

The difference between the first-year cash flows with and without devaluation is computed as follows:

Profit after taxes	M\$35 million
Depreciation	+5 million
Cash flows from operation	M\$40 million
Predevaluation rate (M\$4 = \$1)	M\$40 million = \$10 million
Postdevaluation rate (M\$5 = \$1)	M\$40 million = -\$8 million
Potential exchange loss	\$2 million

The subsidiary's economic loss is a decline in Malaysian ringgit cash flows equal to \$2 million over the next 12 months. The translation loss or the transaction loss is a one-time loss, but the economic loss is an open-ended event. If the anticipated business activity were to stay the same for the next 5 years, cash flows would decrease by \$2 million per year for 5 years.

9.1.4 A comparison of the three exposures

The management of foreign-exchange risk based on translation exposure is basically static and historically oriented. By definition, translation exposure does not look to the future impact of an exchange rate change that has occurred or may occur. In addition, it does not involve actual cash flows. In contrast, both transaction and economic exposures look to the future impact of an exchange rate change that has occurred or may occur. These exposures also involve actual or potential cash flow changes.

Transaction risk and economic risk are the same in kind, but they differ in degree. For example, economic risk is essentially subjective, because it depends on estimated future cash flows for an arbitrary time horizon. Transaction risk, on the other hand, is essentially objective, because it depends on outstanding obligations that existed before changes in exchange rates but were settled after changes in exchange rates. Table 9.1 illustrates the major differences among these three exposures.

9.2 Transaction Exposure Management

An action that removes transaction risk is said to “cover” that risk. A cover involves the use of forward contracts, a combination of spot market and money market transactions, and other techniques to protect a foreign-exchange loss in the conversion from one currency to another. The term “conversion” relates to transaction exposure because the transaction exposure involves the actual conversion of exposed assets and liabilities from one currency to another. If MNCs decide to cover their transaction exposure, they may select from a variety of financial instruments and operational techniques. Operational techniques, such as exposure netting, leading and lagging, and price adjustments through transfer prices, will be discussed in chapter 10. This chapter will focus on the following four financial instruments.

Table 9.1 Major differences among three types of exposure

<i>Variables</i>	<i>Translation exposure</i>	<i>Transaction exposure</i>	<i>Economic exposure</i>
Contract	Specific	Specific	General
Duration	A point in time	Period of contract	Project life
Gains (losses)	Easy to compute	Intermediate to compute	Difficult to compute
Gains (losses) Measurement	Paper in nature Depends on accounting rules	Actual Depends on changes in actual spot rates	Actual Depends on changes in actual spot rates
Hedging	Easy	Intermediate	Difficult
Extent of exposure	Determined by accounting rules	Determined by the nature of the contract	Determined by product and market factors
Value	Book value of assets and liabilities	Contract value of assets and liabilities	Market value of assets
Management of exposure	By the Treasury Department	By the Treasury Department	By all departments

- 1 The forward market hedge.
- 2 The money market hedge.
- 3 The options market hedge.
- 4 Swap agreements.

9.2.1 *The forward market hedge*

A **forward-exchange market hedge** involves the exchange of one currency for another at a fixed rate on some future date to hedge transaction exposure. The purchase of a forward contract substitutes a known cost for the uncertain cost due to foreign-exchange risk caused by the possible devaluation of one currency in terms of another. Although the cost of a forward contract is usually smaller than the uncertain cost, the forward contract does not always assure the lowest cost due to foreign-exchange rate change. The forward contract simply fixes this cost in advance, thus eliminating the uncertainty caused by foreign-exchange rate changes. For example, an American company may have a euro import payable in 9 months. The American company can cover this risk by purchasing euros at a certain price for the same date forward as the payment maturity.

9.2.2 *The money market hedge*

A **money market hedge** involves a loan contract and a source of funds to carry out that contract in order to hedge transaction exposure. In this case, the contract represents a loan agreement. Assume that an American company has a British pound import payable in 90 days. To

hedge transaction exposure from this import payable, the American company may borrow in dollars (loan contract), convert the proceeds into British pounds, buy a 90-day British Treasury bill, and pay the import bill with the funds derived from the sale of the Treasury bill (source of funds). Of course, it can buy British pounds in the foreign-exchange spot market when the import bill becomes due, but this approach involves transaction risk.

A money market hedge is similar to a forward market hedge. The difference is that the cost of the money market hedge is determined by differential interest rates, while the cost of the forward market approach is determined by the forward premium or discount. If foreign-exchange markets and money markets are in equilibrium, the forward market approach and the money market approach incur the same cost.

9.2.3 *The options market hedge*

If a company has a foreign-currency receivable or a foreign-currency payable, the options market hedge can protect the company from exchange rate fluctuations. By buying a call option on the foreign currency, a US company can lock in a maximum dollar price for its foreign-currency accounts payable. By purchasing a put option on the foreign currency, the company can lock in a minimum dollar price for its foreign-currency accounts receivable.

Companies understand that hedging techniques such as the forward market hedge and the money market hedge can backfire or may even be costly when an accounts payable currency depreciates or an accounts receivable currency appreciates over the hedged period. Under these circumstances, an uncovered strategy might outperform the forward market hedge or the money market hedge. The ideal type of hedge should protect the company from adverse exchange rate movements but allow the company to benefit from favorable exchange rate movements. The options market hedge features these attributes.

To see how currency options provide such a flexible optional hedge against transaction exposure, assume that Boeing exports a DC 10 to British Airways and bills £10 million in 1 year. If Boeing purchases a put option on £10 million, this transaction provides Boeing with the right, but not the obligation, to sell up to £10 million at a fixed exchange rate, regardless of the future spot rate. With its pound receivable, Boeing would protect itself by exercising its put option if the pound were to weaken, but would benefit by letting its put option expire unexercised if the pound were to strengthen.

9.2.4 *The swap market hedge*

When exchange rates and interest rates fluctuate too widely, the risks of forward market and money market positions are so great that the forward market and the money market may not function properly. Currency options are available only for a selected number of currencies and are inflexible. In such cases, MNCs may use swap arrangements to protect the value of export sales, import orders, and outstanding loans denominated in foreign currencies.

The **swap market hedge** involves an exchange of cash flows in two different currencies between two companies. Swaps take many forms, but one type of swap — the currency swap — accommodates an MNC's needs to cover its transaction risk. In a currency swap, one company provides a certain principal in one currency to another company in exchange for an equivalent

amount in a different currency. For example, a Swiss company may be anxious to swap Swiss francs for US dollars. Similarly, a US company may be willing to exchange US dollars for Swiss francs. Given these needs, the two companies engage in a currency swap.

Example 9.3

To see how forward-exchange market, money market, options market, and swap market hedges may be utilized to protect against transaction exposure, assume that an American firm has sold an airplane to a Swiss firm for SFr100,000, with terms of 90 days. Let us further assume that the spot rate for francs is \$0.5233, the 90-day forward rate for francs is \$0.5335, the Swiss 90-day interest rate is 10 percent, and the US 90-day interest rate is 17.8 percent. The interest rates are in equilibrium with forward-exchange quotations, and this is confirmed by the following computation, using equation 5.8:

$$\begin{aligned} \frac{n\text{-day } F - S}{S} \times \frac{360}{90} &= \text{domestic rate} - \text{foreign rate} \\ \frac{\$0.5335 - \$0.5233}{\$0.5233} \times \frac{360}{90} &= 17.8\% - 10.0\% \\ 7.8\% &= 7.8\% \end{aligned}$$

The US company's bank believes that the spot rate in 90 days will rise to \$0.6000, which is higher than the implicit unbiased forecast of \$0.5335 that exists in the currency forward quotation. In addition, assume that put options with a 3-month settlement date have a strike price of \$0.5369 per franc and a premium of \$0.01 per franc. Finally, a swap dealer says that she will find a Swiss company that is willing to swap Swiss francs for US dollars at an exchange rate of \$0.5400 per franc.

Five alternatives are available to the US company: do not hedge (take the transaction risk), hedge in the forward market, hedge in the money market, hedge in the options market, or use swap agreements.

If the US company decides to accept the transaction risk, it would receive SFr100,000 in 90 days and sell them in the foreign-exchange market for dollars. If the bank's forecast is accurate, the US company would receive \$60,000 ($\$0.6000 \times \text{SFr}100,000$) in 90 days. However, that receipt is subject to foreign-exchange risk. If the franc were to decline to \$0.4000, the US company would receive only \$40,000, which is \$20,000 less than expected. The \$40,000 could in fact be insufficient to cover the manufacturing cost of the airplane. On the other hand, if the franc should increase in value even more than the bank's forecast, the US company would receive substantially more than \$60,000.

If the US company wishes to hedge its transaction exposure in the forward market, it would sell SFr100,000 in the forward market for \$53,350. This is known as a covered transaction, in which the US firm no longer has foreign-exchange risk. In 90 days, the US firm would receive SFr100,000 from the Swiss importer, deliver the proceeds to the bank against its forward sale, and receive \$53,350. It should be recognized that the certain \$53,350 is

less than the uncertain \$60,000 expected from the unhedged position, because the forward market quotation is not identical with the bank's forecast.

In addition to the forward market approach, the US company can also cover its transaction against foreign-exchange risk through the money market approach. The money market approach works as follows: (1) borrow SFr97,561 from a Swiss bank at 10 percent per annum (2.5 percent per quarter) in exchange for a promise to pay SFr100,000 ($\text{SFr}97,561 \times 1.025$); (2) receive \$51,054 ($\text{SFr}97,561 \times \0.5233) by exchanging the SFr97,561 for dollars at the current spot rate of \$0.5233; and (3) invest this sum in the US money market at 17.8 percent per annum (4.45 percent per quarter) and receive \$53,326 ($\$51,054 \times 1.0445$) at the end of 3 months. This sum should be equal to the sum received in the forward market hedge described earlier. The small difference between these two sums is due to a compounding error.

The US firm can cover its franc receivables with the put option. The US firm buys put options for a total premium of \$1,000 ($\text{SFr}100,000 \times \0.01), exercises its options in 90 days, and sells SFr100,000 at a strike price of \$0.5369 for \$53,690. Thus, the US firm would obtain a net amount of \$52,690 ($\$53,690 - \$1,000$) in exchange for SFr100,000 at the end of 3 months. If the spot rate of the Swiss franc should exceed \$0.5369 in 90 days, the US firm would let the option contract expire unexercised and convert the SFr100,000 at the prevailing spot rate.

Finally, the US firm can cover its transaction risk with currency swaps. The US firm is anxious to swap its SFr100,000 for US dollars. Through a swap dealer, it may be able to find a Swiss company that may be willing to exchange US dollars for SFr100,000. Given these needs, the two companies could arrange a currency swap that allows for an exchange of SFr100,000 for US dollars at a predetermined exchange rate of \$0.5400. In this way, the US company could lock in the number of US dollars at \$54,000 that it will receive in exchange for SFr100,000 in 90 days.

OPTIONS VERSUS FORWARD CONTRACTS A forward contract is often an imperfect hedging instrument, because it is a fixed agreement to buy or sell a foreign currency at a specified price in the future. However, in many practical situations, companies are not sure whether their hedged foreign-currency cash flows will materialize. Consider the situations in which: (1) an overseas deal may fall through; (2) a bid on a foreign-currency contract may be rejected; or (3) a foreign subsidiary's dividend payments may exceed the expected amount. In such cases, companies may not need the obligation, but the right, to buy or sell a foreign currency at a specified price in order to reduce their exchange rate risk. Giddy (1983) suggested that companies should use the following rules to choose between forward contracts and currency options for hedging purposes:

- 1 When the quantity of a foreign-currency cash outflow is known, buy the currency forward; when the quantity is unknown, buy a call option on the currency.
- 2 When the quantity of a foreign-currency cash inflow is known, sell the currency forward; when the quantity is unknown, buy a put option on the currency.
- 3 When the quantity of a foreign-currency flow is partially known and partially uncertain, use a forward contract to hedge the known portion and an option to hedge the maximum value of the uncertain remainder.

CROSS-HEDGING A **cross-hedge** is a technique designed to hedge exposure in one currency by the use of futures or other contracts on another currency that is correlated with the first currency. Frequently, futures or forward markets are not available for some currencies. In these situations, MNCs may be able to use a substitute or proxy for the underlying currency that is available. The idea behind cross-hedging is this. If MNCs cannot find a forward contract on a particular currency in which they have an exposure, they may wish to hedge their exposure through a forward contract on a related currency.

Assume the following four things: (1) a US company has accounts payable in Hong Kong dollars 90 days from now; (2) the Hong Kong dollar is expected to appreciate against the US dollar; (3) forward contracts or other hedging techniques are not available for the Hong Kong dollar; and (4) the British pound and the Hong Kong dollar tend to move in a similar direction against the US dollar. In this case, the US firm could effectively hedge this position by using the pound as a proxy forward. In other words, the US firm can eliminate its exchange risk by purchasing the British pound in the forward market.

9.2.5 *Swap agreements*

Swaps take many forms, but they can be divided into four general categories: currency swaps, credit swaps, interest rate swaps, and back-to-back loans.

CURRENCY SWAPS An agreement between two parties to exchange local currency for hard currency at a specified future date is called a **currency swap**. In other words, a company purchases the specified amount of local currency in the foreign-exchange market and simultaneously buys a forward contract to sell this amount of local currency for hard currency at a future date. The former transaction is a spot transaction, and the latter transaction is a forward transaction. Thus, the currency swap is a simultaneous spot and forward transaction. This arrangement allows the company to recover the foreign exchange at a predetermined exchange rate.

To see how a currency swap works, assume that a US parent company wants to lend British pounds to its British subsidiary and to avoid foreign-exchange risk. The parent company would buy pounds in the spot market and lend them to the subsidiary. At the same time, the parent firm would sell the same amount of pounds in exchange for dollars in the forward market for the period of the loan. The parent company would receive the loan repayment in terms of pounds from the subsidiary at maturity and exchange the pounds with the dollars to close the forward contract. Alternatively, the US parent could enter into a swap agreement with a foreign-exchange dealer whereby they trade dollars for pounds now and pounds for dollars at maturity.

CREDIT SWAPS This hedging device is similar to the foreign-currency swap. The **credit swap** arrangement is a simultaneous spot and forward loan transaction between a private company and a bank of a foreign country. Suppose that an American company deposits a given amount of dollars in the New York office of a Colombian bank. In return for this deposit, the bank lends a given amount of pesos to the company's subsidiary in Colombia. The same contract provides that the bank could return the initial amount of dollars to the company on a specified date, and that the subsidiary could return the original amount of pesos to the bank on the same day. By so doing, the American company recovers the original dollar amount of its deposit, and the Colombian bank obtains a free hard-currency loan in the United States.

Example 9.4

A subsidiary in Israel requires the Israel shekel equivalent of \$1 million at the current exchange rate of NIS4 per dollar, or NIS4 million. To obtain NIS4 million for the subsidiary in Israel, the parent must open a \$1 million credit in favor of an Israeli bank. The Israeli bank charges the parent 10 percent per annum on the NIS4 million made available to the subsidiary and pays no interest on the \$1 million that the parent has deposited in favor of the bank. The parent's opportunity cost on the \$1 million deposit is 20 percent.

The total cost of this swap consists of the parent's opportunity cost and the interest charge on the local currency loan. The opportunity cost at 20 percent on the \$1 million is \$200,000 and the 10 percent interest on the NIS4 million (NIS400,000) is \$100,000 at the prevailing rate of NIS4 per dollar. Thus, the total swap cost is \$300,000 on a loan equivalent of \$1 million, or 30 percent. This example suggests that a direct loan costs the parent 20 percent while the credit swap costs it 30 percent. The parent cannot choose between these two alternatives solely on the basis of comparative costs, because the direct loan is unhedged while the credit swap is hedged. The meaningful comparison of the two lending alternatives requires the parent to explicitly consider foreign-exchange fluctuations. The direct loan is 10 percent cheaper only if the exchange rate stays the same.

If the MNC is unable to predict future exchange rate changes with a fair degree of accuracy, it may attempt to identify the future exchange rate that equates the cost of the credit swap with the cost of the direct loan; that is, the exchange rate at which the MNC would be indifferent between the two financing alternatives. Assume that this exchange rate is denoted by y . The cost of the direct loan from the parent consists of $200,000y$, which equals the Israeli shekel cost equivalent of the direct loan (\$1 million \times 20 percent) plus $(1,000,000y - 4,000,000)$, which equals the potential foreign-exchange loss from the repayment of the loan principal (\$1 million). The cost of the credit swap consists of $200,000y$, which equals the Israeli shekel cost equivalent of the \$1 million deposited in favor of the Israeli bank plus 400,000, which equals the interest paid on the NIS4 million loan extended by the Israeli bank at 10 percent per annum. Because the cost of the direct loan and the cost of the credit swap are the same at the exchange rate of y , we obtain:

$$\frac{\text{direct loan cost}}{200,000y + (1,000,000y - 4,000,000)} = \frac{\text{credit swap cost}}{200,000y + 400,000}$$

$$y = 4.4$$

If the MNC company believes that the foreign-exchange rate will not deteriorate to the equilibrium exchange rate of NIS4.4 per dollar, it should choose the unhedged alternative, which will be less costly. It should select the hedged alternative whenever its subjective assessment indicates that there is a significant chance for the foreign-exchange rate to deteriorate beyond NIS4.4 per dollar.

INTEREST RATE SWAPS This device can be used to alter the exposure of a portfolio of assets or liabilities to interest rate movements. An **interest rate swap** is a technique whereby companies exchange cash flows of a floating rate for cash flows of a fixed rate, or exchange cash flows of a fixed rate for cash flows of a floating rate. Interest rate swaps are actively used when companies have costs of debt that are fixed but revenues that vary with the level of interest rates.

Take the example of a French company that borrowed \$100 million from the Bank of America a year ago at 9.5 percent. The long-term interest rate in the USA has started to fall and the French company believes that it will continue to fall. To take advantage of this drop in interest rates, the French company decides to enter an interest rate swap in dollars. It swaps \$100 million with a fixed rate of 9.5 percent for \$100 million with a floating rate equal to a 6-month SDR rate. In effect, the French company is now protected against a downward movement in interest rates. Conversely, a reverse swap is arranged if the French company believes that the US interest rate will increase.

BACK-TO-BACK LOANS Back-to-back loans, or parallel loans, are arranged by two parent companies in two different countries. Suppose that a US parent has a subsidiary in Japan and that a Japanese parent has a subsidiary in the USA. Let us further assume that each parent wants to lend to its subsidiary in the subsidiary's currency. These loans can be arranged without using the foreign-exchange market. The US parent lends the agreed amount in dollars to the American subsidiary of the Japanese parent. In return for this loan, the Japanese parent lends the same amount of money in yen to the Japanese subsidiary of the American parent. Parallel loan agreements involve the same amount of loan and the same loan maturity. Of course, each loan is repaid in the subsidiary's currency. The parallel loan arrangement avoids foreign-exchange risk because each loan is made and repaid in one currency.

There are a number of variations on this basic swap scheme. A variation may involve blocked funds. Assume that General Motors (GM) and IBM have their subsidiaries in Colombia. The Colombian subsidiary of GM has idle pesos but cannot remit to the USA because of Colombian restrictions on the remittance of funds. On the other hand, the Colombian subsidiary of IBM needs peso loans for expansion. In this case, in Colombia the GM subsidiary lends pesos to the IBM subsidiary; while in the USA, IBM lends dollars to GM.

● 9.3 Economic Exposure Management

Companies can easily hedge translation and transaction exposures, because these risks are based on projected foreign-currency cash flows. However, it is very difficult, if not impossible, for companies to hedge economic exposure for several reasons. The scope of economic exposure is broad, because it can change a company's competitiveness across many markets and products. A company always faces economic risks from competition. When based in foreign currencies, the risks are long term, hard to quantify, and cannot be dealt with solely through financial hedging techniques.

As a result, international financial managers should assess economic exposure comprehensively. Their analysis should account for how variations in exchange rates influence: (1) a company's sales prospects in foreign markets (the product market); (2) the costs of labor and other inputs to be used in overseas production (the factor market); and (3) the home-currency value of finan-

cial assets and liabilities denominated in foreign currencies (the capital market). Consequently, those techniques used to eliminate translation and transaction risks — forwards, money markets, options, swaps, leads and lags of intersubsidiary accounts, and transfer pricing adjustments — are not feasible for hedging economic exposure.

Economic exposure management is designed to neutralize the impact of unexpected exchange rate changes on net cash flows. Diversified operations and financing can reduce economic exposure. They permit the MNC to react to those opportunities that disequilibrium conditions in the foreign-exchange, capital, and product markets present. Moreover, diversification strategies do not require that management predict disequilibrium conditions. Still, they require that it recognize them when they occur. In other words, the primary technique to minimize economic risk is strategic management in choosing product markets, pricing policies, promotion, and investment and financing alternatives.

When managing economic exposure, MNCs resort to maneuvers across functional areas of operations. The functional areas of business operations for MNCs are production, marketing, and finance. Production and marketing are clearly critical because they determine a company's existence — its ability to produce products and to sell them at a profit. But finance is an integral part of total management and cuts across functional boundaries.

Economic exposure management depends on the assumption that disequilibrium conditions exist in national markets for factors of production, products, and financial assets. For example, consider the cases in which there are temporary deviations from purchasing power parity and the international Fisher effect. Companies could observe changes in comparative costs, profit margins, and sales volume in one country compared to another.

9.3.1 *Diversified production*

Several production strategies can deal with economic exposure when disequilibrium conditions exist: (1) plant location, (2) input mix, (3) product sourcing, and (4) productivity increase.

First, companies with manufacturing facilities in many countries can quickly lengthen their production runs in one country and shorten them in another in line with the changing currency costs of production. Second, well-managed companies can substitute their input mix between domestic and imported inputs, depending on the relative prices of inputs and the degree of possible substitution. Third, well-diversified companies can make shifts in sourcing raw materials, components, and products in accordance with currency value fluctuations. Fourth, companies assaulted by wide swings in currency values can improve productivity by closing inefficient plants, automating production processes, and negotiating concessions from unions.

9.3.2 *Diversified marketing*

Marketing programs are normally adjusted only after changes in exchange rates. Yet marketing initiatives under conditions of exchange rate changes can obtain competitive leverage by means of: (1) product strategy, (2) pricing strategy, (3) promotional options, and (4) market selection.

First, product differentiation, diversification, and deletions reduce the impact of exchange rate fluctuations on worldwide corporate earnings. Second, prices may be adjusted to cope with the consequences of currency-value changes. A pricing strategy is affected by a variety of factors such

as market share, profit margin, competition, and price elasticity. Third, the size of promotional budgets for advertising, personal selling, and merchandising could be adjusted to reflect changes in currency values. For example, a devaluation of the Japanese yen may well be the time to increase a US company's advertising budget in Japan. Fourth, a worldwide distribution system enables companies to neutralize the impact of unexpected exchange rate changes on overall company revenues.

9.3.3 *Diversified financing*

On the financial side, additional tools to protect against economic risk are the currency denomination of long-term debt, the place of issue, the maturity structure, the capital structure, and leasing versus buying. For example, LSI Logic, a manufacturer of custom-made microchips based in California, uses four financial instruments: (1) equity markets in London and other European markets; (2) Japanese equity through institutional investors such as Nomura Securities; (3) local Japanese credit markets through its joint venture partners; and (4) Eurobond issues through Swiss and US securities firms.

Diversified financing sources allow a company to improve its overall financial performance because interest rate differentials do not always equal expected changes in exchange rates. In addition to taking advantage of unexpected differentials in diversified markets, companies reduce economic risk by matching the mix of currencies in loan portfolios or operating expenses to the mix of currencies in expected revenues.

9.3.4 *A summary of economic exposure management*

Purely domestic companies do not have as many options for reacting to international disequilibrium conditions as MNCs. International diversification neutralizes the impact of unexpected exchange rate changes on corporate cash flows. Exchange rate changes under conditions of disequilibrium are likely to increase competitiveness in some markets and to reduce it in others. However, at least one serious constraint may limit the feasibility of a diversification strategy: companies with worldwide production systems may have to relinquish large economies of scale. However, these companies could still diversify sales functions and financing sources.

● 9.4 **Currency Exposure Management Practices**

9.4.1 *The relative importance of different exchange exposures*

Table 9.2 shows the relative importance of different exchange exposures from two perspectives: the amount of attention given to each exposure and hedging preference for each exposure. A survey of 125 US MNCs by Malindretos and Tsanacas (1995) revealed that transaction exposure was the overwhelming choice of chief financial officers (CFOs) in terms of the attention that it must receive, with 64 percent ranking it as the most important one. Twenty-six percent of these CFOs picked economic exposure as their number one choice, while only 13 percent considered translation exposure as their most important exposure. A survey of large US MNCs

Table 9.2 The relative importance of different exchange exposures

<i>Type of exposure</i>	<i>Most important exposure</i>	<i>Hedging preference</i>
Translation exposure	13%	26%
Transaction exposure	64%	65%
Economic exposure	26%	39%

Sources: J. Malindretos and D. Tsanacas, "Hedging Preferences and Foreign Exchange Exposure Management," *Multinational Business Review*, Fall 1995, pp. 56–66; and D. M. Perkins, "Treasury Accounting Must Work Together to Fashion Foreign Exchange Hedging Strategy," *Corporate Cashflow*, Jan. 1993, pp. 34–6.

by Business International and Arthur Andersen & Co. found that 65 percent of the sample companies hedged their transaction exposure, while only 26 percent hedged their translation exposure. Apparently, not many executives of MNCs think that they should hedge paper gains and losses for translation exposure and potential exchange gains and losses from future operations (economic exposure). In addition, these executives do not pay too much attention to these two types of exposure, because they believe that these exposures are not as important as transaction exposure.

9.4.2 *The use of hedging techniques by MNCs*

Burston-Marsteller, a consulting firm in currency risk management, conducted a survey of 110 chief financial officers at a November 1997 CFO forum in Manila, Philippines. Figure 9.1 shows that these CFOs consider foreign-exchange risk (38 percent) as the most important one among the many risks that they face. The next most frequently cited risks are interest rate risk (32 percent) and political risk (10 percent). Other risks (20 percent) consist of credit risk at 9 percent, liquidity risk at 7 percent, and inflation risk at 4 percent.

Figure 9.1 also shows that the traditional forward contract was the most commonly used instrument to manage foreign-exchange risks. Of all respondents, 42 percent used the forward contract as the primary hedging instrument. Four other hedging techniques discussed in part II of this book – currency swaps, interest rate swaps, currency options, and futures – were almost equally used by these respondents. Another recent survey by Jesswein et al. (1995) also found that the forward contract is the most popular hedging instrument. In addition, their other findings confirm most of the Burston-Marsteller survey results.

9.4.3 *A maturity mismatch in MGRM's oil futures hedge*

Metallgesellschaft (MG) is Germany's 14th largest industrial company, with interests in engineering, metals, and mining. In early 1994, the US subsidiary of the company, MGRM, reported the world's largest derivative-related losses — \$1.3 billion from its positions in energy futures and swaps. This incident brought MG to the brink of bankruptcy. After dismissing the company's chief executive officer and several other senior managers, MG's board of supervisors was forced to negotiate a \$1.9 billion rescue package with the company's 120 creditor banks. Many analysts

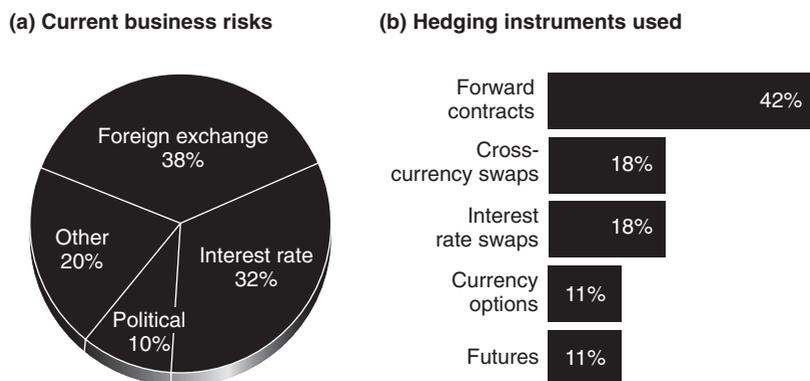


Figure 9.1 Survey results of 110 chief financial officers

Source: *The Wall Street Journal*, Nov. 19, 1997, p. A18; reprinted by kind permission.

remain puzzled over how a company could lose over \$1 billion by hedging. This debacle has sparked a lively debate on the drawbacks of the company's hedging strategy and on the lessons to be learned from the incident.

In 1992, MGRM began to implement an aggressive marketing program in which it offered long-term customers firm price guarantees for up to 10 years on gasoline, heating oil, and diesel fuel. These long-term price guarantees included: (1) firm-fixed contracts that guaranteed a set price over the life of the contract; (2) firm-flexible contracts with prices that fluctuated with spot oil prices; and (3) guaranteed margin contracts that pegged the price of refined oil products to prices paid by local competitors. Through these contracts, MGRM had assumed most of the oil price risk of its customers.

To hedge the risk of these delivery obligations, MGRM bought a combination of short-dated oil swaps and futures contracts as part of a strategy known as a "stack-and-roll" hedge. In its simplest form, a stack-and-roll hedge involves repeated purchases of a stack of near-term futures contracts to hedge a long-term exposure. In other words, the long (buy) position was rolled over each month into the next month's contract. MGRM used a one-to-one hedging strategy in which long-term obligations were hedged dollar-for-dollar with positions in near-term oil futures contracts.

As discussed in chapter 6, market gains or losses from fluctuations in the price of futures contracts are debited or credited on a daily basis to protect market participants against the possibility of contract default. Had oil prices risen, the accompanying gain in the value of MGRM's futures contracts would have produced positive cash flows; this gain in turn would have offset losses arising from its commitments to deliver oil at below-market prices. However, short-term cash drains must be incurred to meet margin calls when futures prices fall. Margin calls are a broker's request for additional money to restore the margin account to a certain minimum level. As it happened, oil prices fell sharply in 1993.

Significantly lower oil prices in 1993 caused MGRM to incur huge unrealized losses and subsequent margin calls on its derivative positions. After several consecutive months of falling oil prices during the latter part of 1993, MGRM's German parent liquidated its hedge and realized losses in excess of \$1 billion. The mismatch between the long-term delivery obligations of oil

and the short-term long position in oil futures created chaos for MGRM. In other words, fluctuations in the price of short-dated futures contracts resulted in widely fluctuating short-term cash flow needs that did not match the maturity of MGRM's long-term contracts.

SUMMARY

This chapter has discussed two foreign-exchange exposures and their management. Every single company faces an exposure to gain or loss from changes in exchange rates, because globalization is totally reshaping the way we live and do business. Transaction exposure refers to possible gains or losses that may result from the settlement of transactions whose payment terms are stated in a foreign currency. Economic exposure measures the total impact of exchange rate changes on a firm's profitability.

In essence, a hedge or a cover is a type of insurance that provides security against the risk of loss from a change in exchange rates. When devaluation seems likely, the MNC must determine whether it has any unwanted net exposure to foreign-exchange risk. When the company finds that it has an unwanted net exposure to exchange risk, it can use a variety of operational techniques and financial instruments to reduce this net exposure. These include the forward market hedge, the money market hedge, the options market hedge, swaps, and others. These financial instruments are primarily used to minimize transaction exposures. Economic exposure can be managed by balancing the sensitivity of revenues and expenses of changes to exchange rates through diversification and strategic planning.

Questions

- 1 Explain the conditions under which items and/or transactions are exposed to foreign-exchange risks.
- 2 This chapter has discussed transaction exposure and economic exposure. Briefly explain each of these two types of exposure.
- 3 How should appreciation of a company's home currency affect its cash inflows? How should depreciation of a company's home currency affect its cash inflows?
- 4 What should management do to protect assets adequately against risks from exchange rate fluctuations?
- 5 What are the two major types of hedging tools?
- 6 Which exposure is more difficult to manage: transaction exposure or economic exposure?
- 7 How could a US company hedge net payables in Japanese yen in terms of forward and options contracts?
- 8 How could a US company hedge net receivables in Japanese yen in terms of forward and options contracts?

- 9 Are there any special situations in which options contracts are better than forward contracts or vice versa?
- 10 What are the major problems of economic exposure management?
- 11 What is the basic purpose of economic exposure management?
- 12 How do most companies deal with their economic exposure?

Problems

- 1 A US company negotiated a forward contract to buy 100,000 British pounds in 90 days. The company was supposed to use the £100,000 to buy British supplies. The 90-day forward rate was \$1.40 per pound. On the day the pounds were delivered in accordance with the forward contract, the spot rate of the pound was \$1.44. What was the real cost of hedging the pound payables in this example?
- 2 Boeing sells an airplane to Korean Airlines for 840 million won with terms of 1 year. Boeing will receive its payment in Korean won. The spot rate for the Korean currency is 700 won per dollar and Boeing expects to exchange 840 million won for \$1.2 million (840 million ÷ 700) when payment is received.
 - (a) If the spot rate for won rises to 600 won per dollar 1 year from today, what is the potential transaction gain or loss?
 - (b) If the spot rate for won declines to 1,000 won per dollar at maturity, what is the potential transaction gain or loss?
- 3 For the coming year, a Singapore subsidiary of an American company is expected to earn an after-tax profit of S\$25 million and its depreciation charge is estimated at S\$5 million. The exchange rate is expected to rise from S\$2.00 per dollar to S\$1.5 per dollar for the next year.
 - (a) What is the potential economic gain or loss?
 - (b) If the anticipated business activity were to stay the same for the next 3 years, what would be the total economic gain or loss for 3 years?
- 4 A US company purchased several boxes of watches from a Swiss company for SFr300,000. This payment must be made in Swiss francs 90 days from today. The following quotations and expectations exist:

90-day US interest rate	4.00%
90-day Swiss interest rate	3.00%
90-day forward rate for francs	\$0.400
Spot rate for francs	\$0.404

Would the company be better off using the forward market hedge or the money market hedge?

- 5 For the coming year, a British subsidiary of an American company is expected to incur an after-tax loss of £50 million and its depreciation charge is estimated at £10 million. The exchange rate is expected to rise from \$1.5 per pound to \$1.7 per pound for the next year. What is the potential economic gain or loss?
- 6 A US company has bought a number of TV sets from a Japanese company for ¥100,000. This payment must be made in Japanese yen 180 days from today. The following quotations and expectations exist:

Present spot rate	\$0.0050
180-day forward rate	\$0.0051
Japanese interest rate	7.00%
US interest rate	11.00%
Highest expected spot rate 180 days hence	\$0.0052
Lowest expected spot rate 180 days hence	\$0.0046

The US company does not have any idle dollar balances at present, but it expects to have adequate cash in 180 days. Identify the alternatives available for making payment.

- 7 An American firm has just sold merchandise to a British customer for £100,000, with payment in British pounds 3 months from now. The US company has purchased from its bank a 3-month put option on £100,000 at a strike price of \$1.6660 per pound and a premium cost of \$0.01 per pound. On the day the option matures, the spot exchange rate is \$1.7100 per pound. Should the US company exercise the option at that time or sell British pounds in the spot market?
- 8 Assume that a subsidiary in New Zealand needs NZ\$500,000 and that a credit swap has been proven the least costly hedged alternative. Further assume that the best unhedged alternative is the direct loan from the parent and that the cost of the direct loan is 20 percent. The current exchange rate is \$0.5000 per New Zealand dollar. To obtain NZ\$500,000 for the subsidiary in New Zealand, the parent must open a \$250,000 credit ($\$0.5000 \times \text{NZ\$}500,000$) in favor of a New Zealand bank. The New Zealand bank charges 10 percent per year on the NZ\$500,000 made available to the subsidiary and pays no interest on the \$250,000 deposit that the parent has deposited in the bank.
- What is the exchange rate that would make the direct loan and the credit swap equally attractive?
 - If most market analysts predict that the exchange rate will be NZ\$2 per dollar in 180 days, which alternative would you recommend?
 - If most market analysts predict that the exchange rate will be NZ\$3 per dollar in 180 days, which alternative would you recommend?
 - If the New Zealand bank should pay 5 percent interest on the \$250,000 credit, what is the exchange rate that would make the direct loan and the credit swap equally attractive?

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Case Problem 9: Western Mining's Economic Exposure Management

Western Mining Company (WMC) is an Australia-based minerals producer with business interests in 19 countries. It is the world's third largest nickel producer, owns 40 percent of the world's largest alumina producer (Alcoa World Alumina and Chemicals), and is a major producer of copper, uranium, gold, fertilizer, and talc. WMC builds its business on large, low-cost, and long-life assets that are globally competitive.

Most commodities produced by Australian mining companies, including WMC, are exported and priced in US dollars. Thus, these companies would suffer significantly and their Australian dollar revenue would drop if the Australian dollar appreciated sharply against the US dollar. Given such an exposure, the conventional wisdom held that borrowing in US dollars would provide a "natural" hedge against their dollar revenue stream. When forward markets began to develop in the mid-1970s, Australian mining companies often hedged up to 100 percent of forecasted revenues with a combination of debt servicing and forward contracts — often for periods up to 10 years. In the early and mid-1980s, the Australian dollar declined sharply against the US dollar, and the "natural" hedge proved not to be a hedge at all, but rather an uncovered short position in the US dollar. As expected, the decline in the Australian dollar

increased the cost of serving US dollar debt. And those companies that had also sold forward their expected dollar revenue stream also suffered further foreign-exchange losses as these contracts matured. The positive effect of the stronger US dollar on dollar-denominated revenues was offset by a prolonged slump in mineral commodity prices.

Although WMC also experienced some currency losses, it fared better than many of its competitors for two reasons. First, it had relied more on the equity markets to finance capital expenditures. Second, it had not participated in new major projects in the early 1980s. In 1984, however, the company contemplated investment in a new copper, uranium, and gold mine, with capital costs expected to be about \$750 million. Under arrangements with a joint venture partner, the company planned to finance its share of the mine solely with debt, thereby increasing its total debt by a magnitude of two or three times.

When confronted with the need to decide the currency denomination of the debt, WMC concluded that taking a short position in US dollars, whether by borrowing or selling forwards, would not stabilize the volatility of its home-country operating profits. Consequently, WMC decided to borrow in a basket of currencies that included Australian dollars, US dollars, Japanese yen, British pounds, and deutsche marks. The company also decided to discontinue its practice of selling forward US dollar revenues, except when actual sales had been made.

Case Questions

- 1 Evaluate the pros and cons of various exchange-hedging instruments and techniques.
- 2 What are the different types of foreign-exchange risk that WMC will encounter?
- 3 Explain why borrowings in US dollars and forward sales of US dollar revenues by Australian mining companies in the 1980s had backfired.
- 4 Explain why WMC decided to borrow in a basket of currencies rather than exclusively in US dollars or Australian dollars.
- 5 What are two possible ways to hedge economic exposure?
- 6 Explain why WMC decided not to hedge its economic exposure (i.e., future US-dollar revenues).
- 7 The websites for various multinational companies disclose exchange rate hedging activities and their exchange gains or losses. (Hint: see footnotes of annual reports.) On the basis of the website of WMC, www.wmc.com.au, or the website of IBM, www.ibm.com, describe the management of foreign-exchange risk for either company.

Sources: N. Abuaf, "The Nature and Management of Foreign Exchange Risk," *Journal of Applied Corporate Finance*, Fall 1986, pp. 39–44; P. J. Maloney, "Managing Currency Exposure: The Case of Western Mining," *Journal of Applied Corporate Finance*, Winter 1990, pp. 29–34; WMC's *Annual Reports*, various issues; and www.wmc.com.au.