

10

Transaction Exposure

There are two times in a man's life when he should not speculate: when he can't afford it and when he can. —"Following the Equator, Pudd'nhead Wilson's New Calendar," Mark Twain.

LEARNING OBJECTIVES

- 10.1** Examine the three major foreign exchange exposures experienced by firms
- 10.2** Explore why firms hedge foreign exchange exposure
- 10.3** Detail how transaction exposure is defined and measured
- 10.4** Describe how one company may hedge its transaction exposures
- 10.5** Evaluate how foreign exchange risk management is conducted by actual firms today

Foreign exchange exposure is a measure of the potential for a firm's profitability, net cash flow, and market value to change because of a change in exchange rates. An important task of the financial manager is to measure foreign exchange exposure and to manage it so as to maximize the profitability, net cash flow, and market value of the firm. This chapter provides an in-depth discussion of *transaction exposure*, the exposure that generally receives the most attention by corporate financial management. The following chapters focus on *translation exposure* (Chapter 11) and *operating exposure* (Chapter 12). The chapter concludes with a Mini-Case, *China Noah Corporation*, examining what a Chinese firm's currency hedging practices.

10.1 Types of Foreign Exchange Exposure

What happens to a firm when foreign exchange rates change? There are two distinct categories of foreign exchange exposure for the firm, those that are based in accounting and those that arise from economic competitiveness. Accounting exposures, specifically described as *transaction exposure* and *translation exposure*, arise from contracts and accounts being denominated in foreign currency. The economic exposure, which we will describe as *operating exposure*, is the potential change in the value of the firm from its changing global competitiveness as determined by exchange rates. Exhibit 10.1 shows schematically the three main types of foreign exchange exposure: transaction, translation, and operating:

- **Transaction exposure**, the primary topic of this chapter, measures changes in the value of outstanding financial obligations incurred prior to a change in exchange rates but not due to be settled until after the exchange rates change. Thus, it deals with changes in cash flows that result from existing contractual obligations.
- **Translation exposure** is the potential for accounting-derived changes in owner's equity to occur because of the need to "translate" foreign currency financial statements of foreign

subsidiaries into a single reporting currency to prepare worldwide consolidated financial statements.

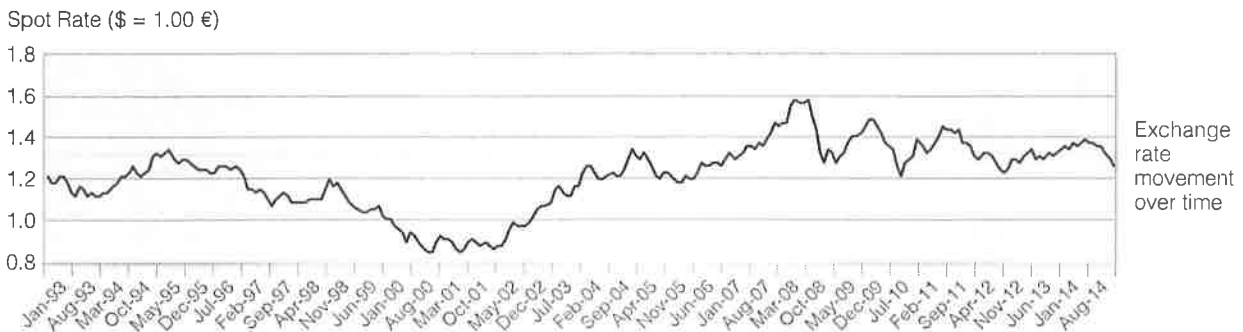
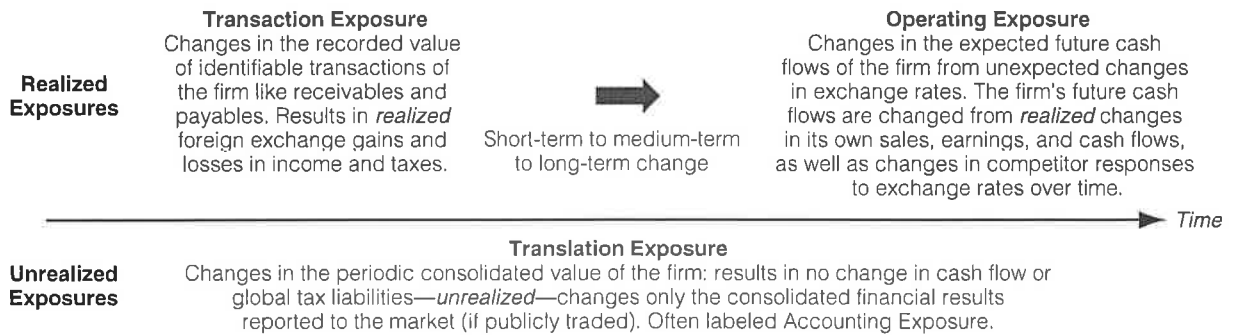
- **Operating exposure**—also called *economic exposure*, *competitive exposure*, or *strategic exposure*—measures the change in the present value of the firm resulting from any change in future operating cash flows of the firm caused by an unexpected change in exchange rates. The change in value depends on the effect of the exchange rate change on future sales volume, prices, and costs.

Transaction exposure and operating exposure both exist because of unexpected changes in future cash flows. However, while transaction exposure is concerned with future cash flows already contracted for, operating exposure focuses on expected (not yet contracted for) future cash flows that might change because a change in exchange rates alters its international competitiveness.

10.2 Why Hedge?

Multinational firms, as first described in Chapter 1, consist of a multitude of cash flows that are sensitive to changes in exchange rates, interest rates, and commodity prices. This chapter focuses on how the MNE’s outstanding obligations, many of which are contractual in nature, are altered by changes in exchange rates. We begin by exploring the question of whether exchange rate risk should or should not be managed.

EXHIBIT 10.1 The Foreign Exchange Exposures of the Firm



Hedging Defined

Many firms attempt to manage their foreign exchange exposure through *hedging*. Hedging requires a firm to take a position—an asset, a contract, or a derivative—the value of which will rise or fall in a manner that counters the fall or rise in value of an existing position—the exposure. Hedging protects the owner of the existing asset from loss. However, it also eliminates any gain from an increase in the value of the asset hedged. The question remains: What is to be gained by the firm from hedging?

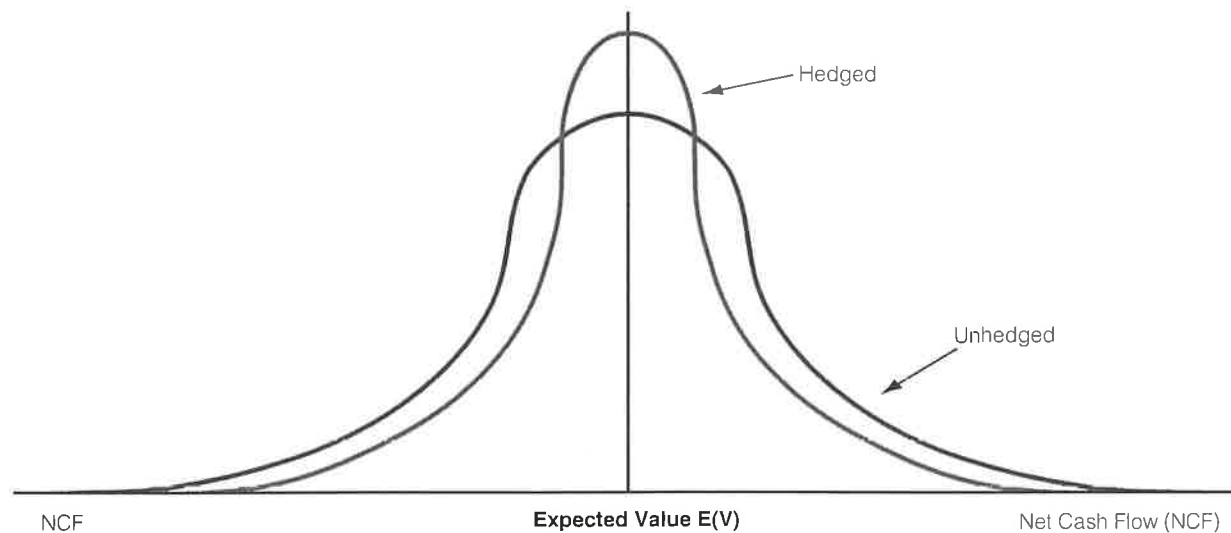
According to financial theory, the value of a firm is the net present value of all expected future cash flows. The fact that these cash flows are *expected* emphasizes that nothing about the future is certain. If the reporting currency value of many of these cash flows is altered by exchange rate changes, a firm that hedges its foreign exchange exposures reduces the variance in the value of its future expected cash flows. The *foreign exchange exposure* of the firm can then be defined as the variance in expected cash flows arising from unexpected changes in exchange rates.

Exhibit 10.2 illustrates the distribution of expected net cash flows of the individual firm. Hedging these cash flows narrows the distribution of the cash flows about the mean of the distribution. Currency hedging reduces risk. Reduction of risk is not, however, the same as adding value or return. The value of the firm depicted in Exhibit 10.2 would be increased only if hedging actually shifted the mean of the distribution to the right. In fact, if hedging is not “free,” meaning the firm must expend resources to hedge, then hedging will add value only if the rightward shift is sufficiently large to compensate for the cost of hedging.

The Pros and Cons of Hedging

Is a reduction in the variability of cash flows sufficient reason for currency risk management?

EXHIBIT 10.2 Hedging's Impact on the Expected Cash Flows of the Firm



Hedging reduces the variability of expected cash flows about the mean of the distribution. This reduction of distribution variance is a reduction of risk.

Pros. Proponents of hedging cite the following arguments:

- Reduction in risk of future cash flows improves the planning capability of the firm. If the firm can more accurately predict future cash flows, it may be able to undertake specific investments or activities that it might not otherwise consider.
- Reduction of risk in future cash flows reduces the likelihood that the firm's cash flows will fall below a level sufficient to make debt service payments required for continued operation. This minimum level of cash flows, often referred to as the point of *financial distress*, lies to the left of the center of the distribution of expected cash flows. Hedging reduces the likelihood that the firm's cash flows will fall to this level.
- Management has a comparative advantage over the individual shareholder in knowing the actual currency risk of the firm. Regardless of the level of disclosure provided by the firm to the public, management always possesses an advantage in the depth and breadth of knowledge concerning the real risks.
- Markets are usually in disequilibrium because of structural and institutional imperfections, as well as unexpected external shocks (such as an oil crisis or war). Management is in a better position than shareholders to recognize disequilibrium conditions and to take advantage of single opportunities to enhance firm's value through *selective hedging*—hedging only exceptional exposures or the occasional use of hedging when management has a definite expectation of the direction of exchange rates.

Cons. Opponents of hedging commonly make the following arguments:

- Shareholders are more capable of diversifying currency risk than is the management of the firm. If stockholders do not wish to accept the currency risk of any specific firm, they can diversify their portfolios to manage the risk in a way that satisfies their individual preferences and risk tolerance.
- Currency hedging does not increase the expected cash flows of the firm. Currency risk management does, however, consume firm resources and so reduces cash flow. The impact on value is a combination of the reduction of cash flow (which lowers value) and the reduction in variance (which increases value).
- Management often conducts hedging activities that benefit management at the expense of the shareholders. The field of finance called *agency theory* frequently argues that management is generally more risk-averse than are shareholders.
- Managers cannot outguess the market. If and when markets are in equilibrium with respect to parity conditions, the expected net present value of hedging should be zero.
- Management's motivation to reduce variability is sometimes for accounting reasons. Management may believe that it will be criticized more severely for incurring foreign exchange losses than for incurring even higher cash costs by hedging. Foreign exchange losses appear in the income statement as a highly visible separate line item or as a footnote, but the higher costs of protection through hedging are buried in operating or interest expenses.
- Efficient market theorists believe that investors can see through the "accounting veil" and therefore have already factored the foreign exchange effect into a firm's market valuation. Hedging would only add cost.

Every individual firm in the ends decides whether it wishes to hedge to manage its foreign exchange exposure. But as illustrated by *Global Finance in Practice 10.1*, this often results in even more questions and more doubts.

GLOBAL FINANCE IN PRACTICE 10.1

Hedging and the German Automobile Industry

The leading automakers in Germany have long been some of the world's biggest advocates of currency hedging. Companies like BMW, Mercedes, Porsche—and Porsche's owner Volkswagen—have aggressively hedged their foreign currency earnings for years in response to their structural exposure: while they manufacture in the eurozone, they increasingly rely on sales in dollar, yen, or other foreign (non-euro) currency markets.

How individual companies hedge, however, differs dramatically. Some companies, like BMW, state clearly that they “hedge to protect earnings,” but that they do not

speculate. Others, like Porsche and Volkswagen in the past, have sometimes generated more than 40% of their earnings from their “hedges.”

Hedges that earn money continue to pose difficulties for regulators, auditors, and investors worldwide. How a hedge is defined, and whether a hedge should only “cost” but not “profit,” has delayed the implementation of many new regulatory efforts in the United States and Europe in the post-2008 financial crisis era. If a publicly traded company—for example an automaker—can consistently earn profits from hedging, is its core competency automobile manufacturing and assembly, or hedging/speculating on exchange rate movements?

10.3 Transaction Exposure

Transaction exposure measures gains or losses that arise from the settlement of existing financial obligations whose terms are stated in a foreign currency. The types of transaction exposure experienced by a multinational firm arise from a variety of business activities:

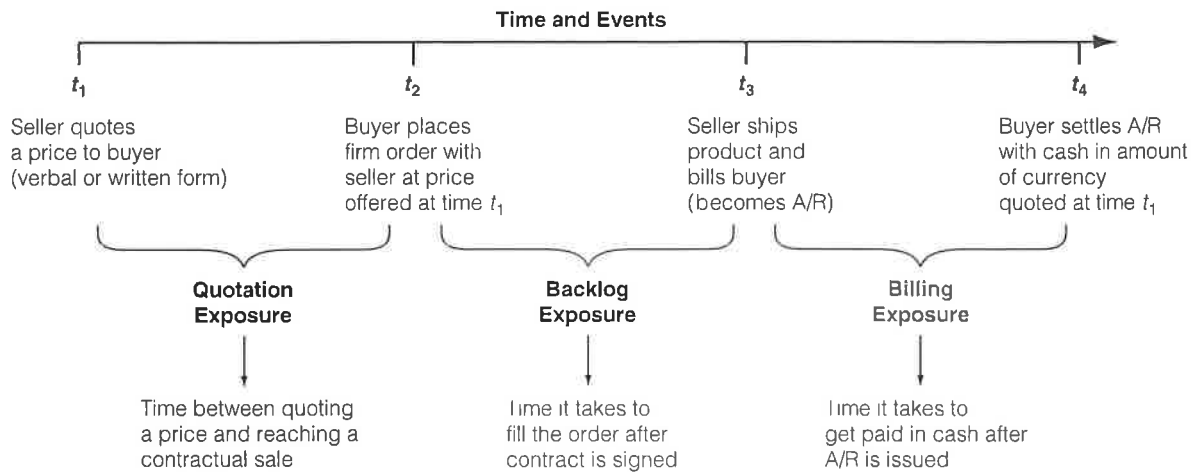
- Purchasing or selling goods or services when prices and settlement are stated in foreign currencies
- Borrowing or lending funds when repayment is to be made in a foreign currency
- Acquiring assets or incurring liabilities of any kind denominated in a foreign currency

Purchasing and Selling

The most common example of transaction exposure arises when a firm makes a sale and receives a promise of payment from the buyer (a *receivable*) or purchases an input and promises to pay in the future (a *payable*), and that transaction is denominated in a foreign currency. (Technically speaking, these types of sales or purchases are referred to as a *sale on open account* or a *purchase on open account*, because goods are shipped and delivered before payment is due.) Exhibit 10.3 demonstrates how a sale by a firm creates a receivable exposure, how that exposure evolves over its life span, and how it can be decomposed into its component exposures—*quotation*, *backlog*, and *billing*.

A transaction exposure is theoretically created at the first moment the seller quotes a price in foreign currency terms to a potential buyer, at time t_1 . The quote can be either verbal, as in a telephone quote, or as a written bid or a printed price list. This is *quotation exposure*. When the order is placed at time t_2 , the potential exposure created at the time of the quotation t_3 is converted into an actual exposure. This is called *backlog exposure* because the product has been contracted for but not yet shipped or delivered. Backlog exposure lasts until the goods are shipped and billed at t_3 , at which time it becomes *billing exposure*, which persists until payment is received by the seller at time t_4 .

Many firms, however, do not recognize the creation of the exposure as a transaction exposure until time t_3 . This is because many different business and contractual changes often occur during the quotation period—including contract cancellation—and the seller still has control over the product.

EXHIBIT 10.3 The Life Span of a Transaction Exposure

Suppose that Ganado Corporation, a U.S. firm, sells merchandise on open account to a Belgian buyer for €1,800,000, with payment to be made in 60 days. The spot exchange rate on the date of the sale is \$1.1200/€, and the seller expects to exchange the euros for €1,800,000 × \$1.12/€ = \$2,016,000 when payment is received. The \$2,016,000 is the value of the sale that is posted to the firm's books. Accounting practices stipulate that the foreign currency transaction be listed at the spot exchange rate in effect on the date of the transaction.

Transaction exposure arises because of the risk that Ganado will receive something other than the \$2,016,000 expected and booked. For example, if the euro weakens to \$1.1000/€ when payment is received, the U.S. seller will receive only €1,800,000 × \$1.1000/€ or \$1,980,000, some \$36,000 less than what was expected at the time of sale.

$$\begin{array}{rcl}
 \text{Transaction settlement: } & \text{€1,800,000} \times \$1.1000/\text{€} & = \$1,980,000 \\
 \text{Transaction booked: } & \text{€1,800,000} \times \$1.1200/\text{€} & = \underline{\$2,016,000} \\
 \text{Foreign exchange gain (loss) on sale} & & = (\$36,000)
 \end{array}$$

If the euro should strengthen to \$1.3000/€, however, Ganado receives \$2,340,000, an increase of \$324,000 over the amount expected. Thus, Ganado's exposure is the chance of either a loss or a gain on the resulting dollar settlement versus the amount at which the sale was booked.

This U.S. seller might have avoided transaction exposure by invoicing the Belgian buyer in dollars. Of course, if the U.S. firm attempted to sell only in dollars, it might not have obtained the sale in the first place. Even if the Belgian buyer agrees to pay in dollars, transaction exposure is not eliminated. Instead, the exposure is transferred to the Belgian buyer, whose dollar account payable has an unknown cost 60 days hence.

Borrowing and Lending

A second form of transaction exposure arises when funds are borrowed or loaned, and the amount involved is denominated in a foreign currency. For example, in 1994, PepsiCo's largest bottler outside of the United States was the Mexican company, Grupo Embotellador de Mexico (Gemex). In mid-December 1994, Gemex had U.S. dollar debt of \$264 million. At that

time, Mexico's new peso ("Ps") was traded at Ps3.45/\$, a pegged rate that had been maintained with minor variations since January 1, 1993, when the new currency unit had been created. On December 22, 1994, the peso was allowed to float because of economic and political events within Mexico, and in one day it sank to Ps4.65/\$. For most of the following January it traded in a range near Ps5.50/\$.

Dollar debt in mid-December 1994:	$\$264,000,000 \times \text{Ps}3.45/\$ =$	Ps910,800,000
Dollar debt in mid-January 1995:	$\$264,000,000 \times \text{Ps}5.50/\$ =$	Ps1,452,000,000
Dollar debt increase measured in Mexican pesos		<u>Ps541,200,000</u>

The number of pesos needed to repay the dollar debt increased by 59%! In U.S. dollar terms, the drop in the value of the peso meant that Gemex needed the peso-equivalent of an additional \$98,400,000 to repay its debt.

Other Causes of Transaction Exposure

When a firm enters into a forward exchange contract, it is deliberately creating a transaction exposure. This risk is usually incurred to hedge an existing transaction exposure. For example, a U.S. firm might want to offset an existing obligation to purchase ¥100 million to pay for an import from Japan in 90 days. One way to offset this payment is to purchase ¥100 million in the forward market today for delivery in 90 days. In this manner any change in value of the Japanese yen relative to the dollar is neutralized. Thus, the potential transaction loss (or gain) on the account payable is offset by the transaction gain (or loss) on the forward contract. But regardless of whether the firm actually does make its yen payment in 90 days, the firm is obligated, by contract with its forward exchange contract provider (typically a bank), to settle the forward exchange contract. The contract is therefore itself a transaction exposure.

10.4 Transaction Exposure Management: The Case of Ganado

Foreign exchange transaction exposure can be managed by *contractual hedges* or *operating hedges*. *Contractual hedges*, also called *financial hedges*, employ forward, money, futures, and options markets. *Operating hedges* utilize operating cash flows—cash flows originating from the operating activities of the firm—and include risk-sharing agreements and payments strategies using leads and lags. *Financial hedges* utilize financing cash flows—cash flows originating from the financing activities of the firm—and include specific types of debt and foreign currency derivatives, such as swaps. Operating and financing hedges are described in greater detail in Chapter 12.

The term *natural hedge* refers to an offsetting operating cash flow, a payable arising from the conduct of business. A *financial hedge* refers to either an offsetting debt obligation (such as a loan) or some type of financial derivative such as an interest rate swap. Care should be taken to distinguish hedges in the same way finance distinguishes cash flows—operating from financing. The following case illustrates how contractual hedging techniques may be used to protect against transaction exposure.

Ganado's Transaction Exposure

Maria Gonzalez is the chief financial officer of Ganado. She has just concluded negotiations for the sale of a turbine generator to Regency, a British firm, for £1,000,000. This single sale is quite large in relation to Ganado's present business. Ganado has no other current foreign

customers, so the currency risk of this sale is of particular concern. The sale is made in March with payment due three months later in June. Exhibit 10.4 summarizes the financial and market information Maria has collected for the analysis of her currency exposure problem. The unknown—the transaction exposure—is the actual realized value of the receivable in U.S. dollars at the end of 90 days.

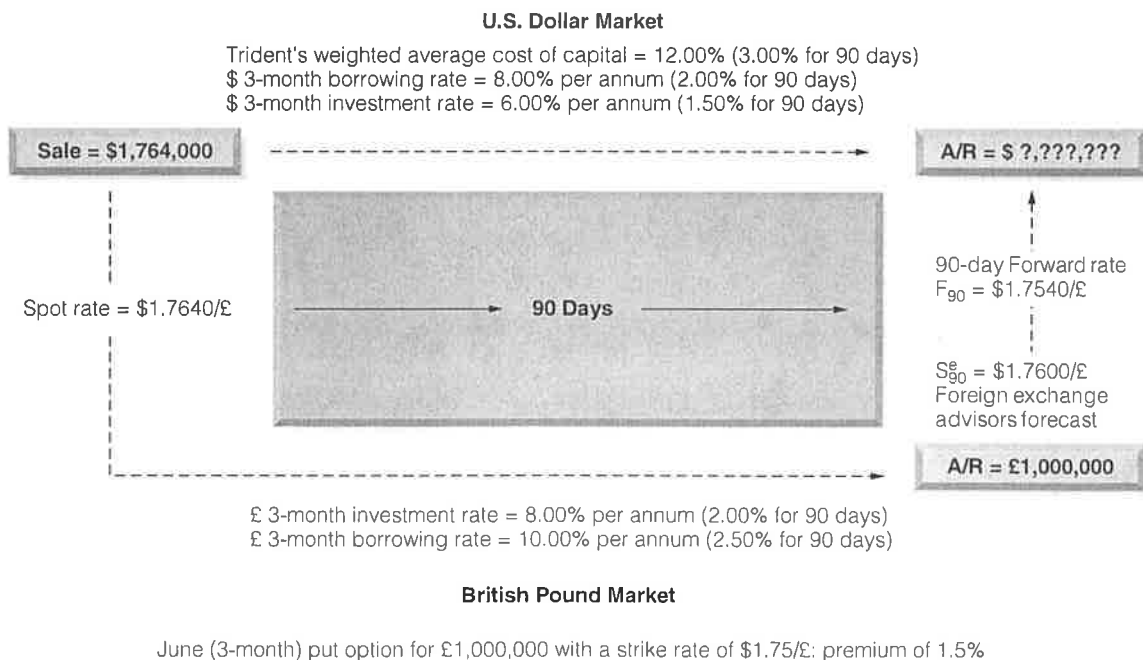
Ganado operates on relatively narrow margins. Although Maria and Ganado would be very happy if the pound appreciated versus the dollar, concerns center on the possibility that the pound will fall. Because this deal was deemed desirable both for financial and strategic reasons, Ganado priced and budgeted this contract with a very slim minimum acceptable margin at a sales price of \$1,700,000. The budget rate, the lowest acceptable dollar per pound exchange rate, was therefore established at \$1.70/£. Any exchange rate below this budget rate would result in Ganado realizing no profit on the deal.

Four alternatives are available to Ganado to manage this transaction exposure: (1) remain unhedged; (2) hedge in the forward market; (3) hedge in the money market; or (4) hedge in the options market.

Unhedged Position

Maria may decide to accept the transaction risk. If she believes the foreign exchange advisor, she expects to receive $£1,000,000 \times \$1.76 = \$1,760,000$ in three months. However, that amount is at risk. If the pound should fall to, say, \$1.65/£, she will receive only \$1,650,000. Exchange risk is not one sided, however; if the transaction is left uncovered and the pound strengthens even more than forecast, Ganado will receive considerably more than \$1,760,000.

EXHIBIT 10.4 Ganado's Transaction Exposure



The essence of an unhedged approach is as follows:



Forward Hedge

A *forward hedge* involves a forward (or futures) contract and a source of funds to fulfill that contract. The forward contract is entered into at the time the transaction exposure is created. In Ganado's case, that would be in March, when the sale to Regency was booked as an account receivable.

When a foreign currency denominated sale such as this is made, it is booked at the spot rate of exchange existing on the booking date. In this case, the spot rate on the date of sale was \$1.7640/£, so the receivable was booked as \$1,764,000. Funds to fulfill the forward contract will be available in June, when Regency pays £1,000,000 to Ganado. If funds to fulfill the forward contract are on hand or are due because of a business operation, the hedge is considered covered, perfect, or square, because no residual foreign exchange risk exists. Funds on hand or to be received are matched by funds to be paid.

In some situations, funds to fulfill the forward exchange contract are not already available or due to be received later, but must be purchased in the spot market at some future date. Such a hedge is open or uncovered. It involves considerable risk because the hedger must take a chance on purchasing foreign exchange at an uncertain future spot rate in order to fulfill the forward contract. Purchase of such funds at a later date is referred to as covering.

Should Ganado wish to hedge its transaction exposure with a forward, it will sell £1,000,000 forward today at the 3-month forward rate of \$1.7540/£. This is a covered transaction in which the firm no longer has any foreign exchange risk. In three months the firm will receive £1,000,000 from the British buyer, deliver that sum to the bank against its forward sale, and receive \$1,754,000. This would be recorded on Ganado's income statement as a foreign exchange loss of \$10,000 (\$1,764,000 as booked, \$1,754,000 as settled).

The essence of a forward hedge is as follows:



If Maria's forecast of future rates was identical to that implicit in the forward quotation, that is, \$1.7540/£, then expected receipts would be the same whether or not the firm hedges. However, realized receipts under the unhedged alternative could vary considerably from the certain receipts when the transaction is hedged. Never underestimate the value of predictability of outcomes (and 90 nights of sound sleep). But many things may interrupt a sound night's sleep, as seen in *Global Finance in Practice 10.2*.

GLOBAL FINANCE IN PRACTICE 10.2

Currency Losses at Greenpeace

Foreign currency losses are not limited to multinational companies in search of profits in the global marketplace. In 2014 Greenpeace, the home of the Rainbow Warrior, announced that it had suffered a foreign exchange loss of €3.8 million on unauthorized trades. In a July 14, 2014, press release, Greenpeace explained and apologized that employees in their global finance unit had acted improperly

by purchasing forward contracts on the euro although the euro was appreciating versus a variety of currencies. The position had resulted in €3.8 million in currency losses.

Although it does sound as if the individual trader was not authorized to make the forward contract purchases (Greenpeace has not released any further detail), losses from the purchase of euros forward sounds more like losses related to hedging (an effort, perhaps, to protect the organization against a rising euro) rather than speculation.

Money Market Hedge (Balance Sheet Hedge)

Like a forward market hedge, a *money market hedge* (also commonly called a *balance sheet hedge*) also involves a contract and a source of funds to fulfill that contract. In this instance, the contract is a loan agreement. The firm seeking to construct a money market hedge borrows in one currency and exchanges the proceeds for another currency. Funds to fulfill the contract—that is, to repay the loan—are generated from business operations, in this case, the account receivable.

A money market hedge can cover a single transaction, such as Ganado's £1,000,000 receivable, or repeated transactions. Hedging repeated transactions is called *matching*. It requires the firm to match the expected foreign currency cash inflows and outflows by currency and maturity. For example, if Ganado had numerous sales denominated in pounds to British customers over a long period of time, then it would have somewhat predictable U.K. pound cash inflows. The appropriate money market hedge technique in that case would be to borrow U.K. pounds in an amount matching the typical size and maturity of expected pound inflows. Then, if the pound depreciated or appreciated, the foreign exchange effect on cash inflows in pounds would be offset by the effect on cash outflows in pounds from repaying the pound loan plus interest.

The structure of a money market hedge resembles that of a forward hedge. The difference is that the cost of the money market hedge is determined by different interest rates than the interest rates used in the formation of the forward rate. The difference in interest rates facing a private firm borrowing in two separate country markets may be different from the difference in risk-free government bill rates or eurocurrency interest rates in these same markets. In efficient markets interest rate parity should ensure that these costs are nearly the same, but not all markets are efficient at all times.

To hedge in the money market, Maria will borrow pounds in London at once, immediately convert the borrowed pounds into dollars, and repay the pound loan in three months with the proceeds from the sale of the generator. She will need to borrow just enough to repay both the principal and interest with the sale proceeds. The borrowing interest rate will be 10% per annum, or 2.5% for three months. Therefore, the amount to borrow now for repayment in three months is

$$\frac{\text{£}1,000,000}{1 + 0.025} = \text{£}975,610.$$

Maria would borrow £975,610 now, and in three months repay that amount plus £24,390 of interest with the account receivable. Ganado would exchange the £975,610 loan proceeds for dollars at the current spot exchange rate of \$1.7640/£, receiving \$1,720,976 at once.

The money market hedge, if selected by Ganado, creates a pound-denominated liability—the pound loan—to offset the pound-denominated asset—the account receivable. The money market hedge works as a hedge by matching assets and liabilities according to their currency of denomination. Using a simple T-account illustrating Ganado's balance sheet, the loan in British pounds is seen to offset the pound-denominated account receivable:

Assets		Liabilities and Net Worth	
Account receivable	£1,000,000	Bank loan (principal)	£975,610
		Interest payable	24,390
	£1,000,000		£1,000,000

The loan acts as a *balance sheet hedge* against the pound-denominated account receivable, and is based on a *money market loan* (90-day loan).

Forward and Money Market Hedges Compared

To compare the forward hedge with the money market hedge, one must analyze how Ganado's loan proceeds will be utilized for the next three months. Remember that the loan proceeds are received today, but the forward contract proceeds are received in three months. For comparison purposes, one must either calculate the future value of the loan proceeds or the present value of the forward contract proceeds. Since the primary uncertainty here is the dollar value in three months, we will use future value in this case.

As both the forward contract proceeds and the loan proceeds are relatively certain, it is possible to make a clear choice between the two alternatives based on the one that yields the higher dollar receipts. This result, in turn, depends on the assumed rate of investment or use of the loan proceeds.

At least three logical choices exist for an assumed investment rate for the loan proceeds for the next three months. First, if Ganado is cash rich, the loan proceeds might be invested in U.S. dollar money market instruments that yield 6% per annum. Second, Maria might simply use the pound loan proceeds to pay down dollar loans that currently cost Ganado 8% per annum. Third, Maria might invest the loan proceeds in the general operations of the firm, in which case the cost of capital of 12% per annum would be the appropriate rate. The field of finance generally uses the company's *cost of capital* (the *weighted average cost of capital* or WACC) to move capital forward and backward in time. We will therefore use the WACC of 12% (3% for the 90-day period here) to calculate the future value of proceeds under the money market hedge:

$$\$1,720,976 \times 1.03 = \$1,772,605$$

A break-even rate can now be calculated between the forward hedge and the money market hedge. Assume that r is the unknown 3-month investment rate (expressed as a decimal) that would equalize the proceeds from the forward and money market hedges. We have

$$\begin{aligned} (\text{Loan proceeds}) \times (1 + \text{rate}) &= (\text{forward proceeds}) \\ \$1,720,976 \times (1 + r) &= \$1,754,000 \\ r &= 0.0192 \end{aligned}$$

We now convert this 3-month (90 days) investment rate to an annual whole percentage equivalent, assuming a 360-day financial year, as follows:

$$0.0192 \times \frac{360}{90} \times 100 = 7.68\%$$

In other words, if Maria Gonzalez can invest the loan proceeds at a rate higher than 7.68% per annum, she would prefer the money market hedge. If she can only invest at a rate lower than 7.68%, she would prefer the forward hedge.

The essence of a money market hedge is as follows:



The money market hedge therefore results in cash received up-front (at the start of the period), which can then be carried forward in time for comparison with the other hedging alternatives.

Options Market Hedge

Maria Gonzalez could also cover her £1,000,000 exposure by purchasing a put option. This technique—an *option hedge*—allows her to speculate on the upside potential for appreciation of the pound while limiting downside risk to a known amount. Maria could purchase from her bank a 3-month put option on £1,000,000 at an at-the-money (ATM) strike price of \$1.75/£ with a premium cost of 1.50%. The total cost of the option is calculated as follows:

$$\begin{array}{rcccccc} \text{Size of option} & \times & \text{premium} & \times & \text{spot rate} & = & \text{total cost of option} \\ \text{£1,000,000} & \times & 0.015 & \times & \$1.7640 & = & \$26,460 \end{array}$$

Because we are using future value to compare the various hedging alternatives, it is necessary to project the premium cost of the option forward three months. We will use the cost of capital of 12% per annum or 3% per quarter. Therefore the premium cost of the put option as of June would be $\$26,460 \times 1.03 = \$27,254$. This is equal to \$0.0273 per pound ($\$27,254 \div \text{£1,000,000}$).

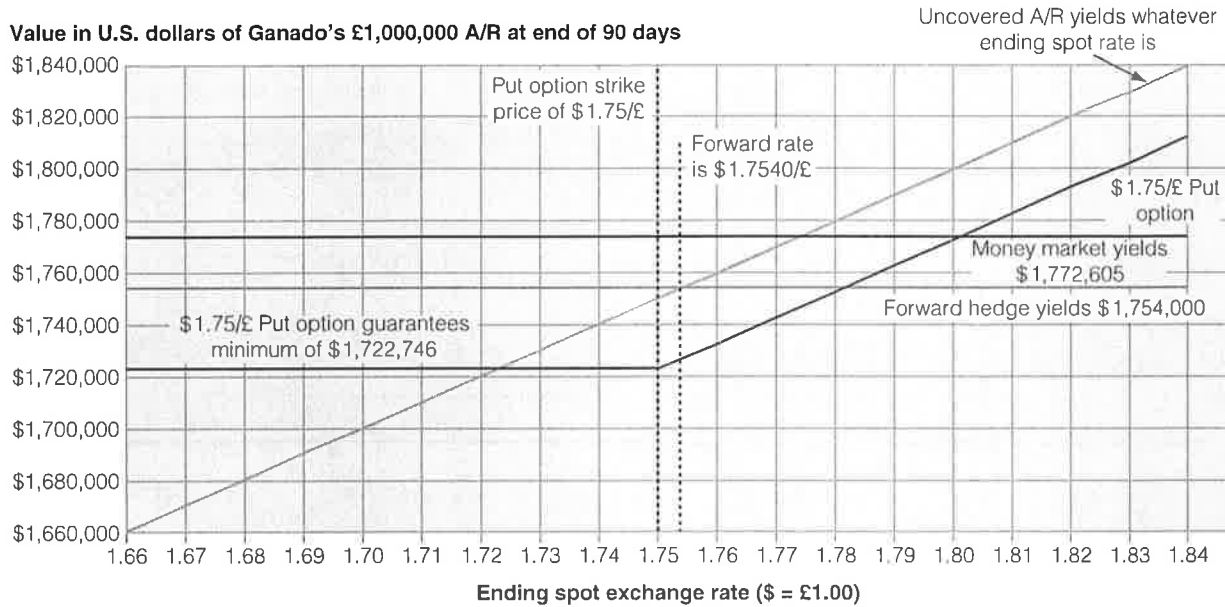
When the £1,000,000 is received in June, the value in dollars depends on the spot rate at that time. The upside potential is unlimited, the same as in the unhedged alternative. At any exchange rate above \$1.75/£, Ganado would allow its option to expire unexercised and would exchange the pounds for dollars at the spot rate. If the expected rate of \$1.76/£ materializes, Ganado would exchange the £1,000,000 in the spot market for \$1,760,000. Net proceeds would be \$1,760,000 minus the \$27,254 cost of the option, or \$1,732,746.

In contrast to the unhedged alternative, downside risk is limited with an option. If the pound depreciates below \$1.75/£, Maria would exercise her option to sell (*put*) £1,000,000 at \$1.75/£, receiving \$1,750,000 gross, but \$1,722,746 net of the \$27,254 cost of the option. Although this downside result is worse than the downside of either the forward or money market hedges, the upside potential is unlimited.

The essence of the at-the-money (ATM) put option market hedge is as follows:



EXHIBIT 10.5 Ganado's A/R Transaction Exposure Hedging Alternatives



We can calculate a trading range for the pound that defines the break-even points for the option compared with the other strategies. The upper bound of the range is determined by comparison with the forward rate. The pound must appreciate enough above the \$1.7540 forward rate to cover the \$0.0273/£ cost of the option. Therefore, the break-even upside spot price of the pound must be $1.7540 + 0.0273 = 1.7813$. If the spot pound appreciates above \$1.7813, proceeds under the option strategy will be greater than under the forward hedge. If the spot pound ends up below \$1.7813, the forward hedge would have been superior in retrospect.

The lower bound of the range is determined by the unhedged strategy. If the spot price falls below \$1.75/£, Maria will exercise her put and sell the proceeds at \$1.75/£. The net proceeds will be \$1.75/£ less than the \$0.0273 cost of the option, or \$1.7227/£. If the spot rate falls below \$1.7227/£, the net proceeds from exercising the option will be greater than the net proceeds from selling the unhedged pounds in the spot market. At any spot rate above \$1.7227/£, the spot proceeds from remaining unhedged will be greater.

Foreign currency options have a variety of hedging uses. A put option is useful to construction firms and exporters when they must submit a fixed price bid in a foreign currency without knowing until some later date whether their bid is successful. Similarly, a call option is useful to hedge a bid for a foreign firm if a potential future foreign currency payment may be required. In either case, if the bid is rejected, the loss is limited to the cost of the option.

Hedging Alternatives Compared

Exhibit 10.5 shows the value of Ganado's £1,000,000 account receivable over a range of possible ending spot exchange rates and hedging alternatives. This exhibit makes it clear that the firm's view of likely exchange rate changes aids in the hedging choice as follows:

- If the exchange rate is expected to move against Ganado, to the left of \$1.76/£, the money market hedge is clearly the preferred alternative with a guaranteed value of \$1,772,605.
- If the exchange rate is expected to move in Ganado's favor, to the right of \$1.76/£, then the preferred alternative is less clear-cut, lying between remaining unhedged, the money market hedge, or the put option.

Remaining unhedged is most likely an unacceptable choice. If Maria's expectations regarding the future spot rate prove to be wrong, and the spot rate falls below \$1.70/£, she will not reach her budget rate. The put option offers a unique alternative. If the exchange rate moves in Ganado's favor, the put option offers nearly the same upside potential as the unhedged alternative except for the up-front costs. If, however, the exchange rate moves against Ganado, the put option limits the downside risk to \$1,722,746.

So how should Maria Gonzalez choose among the alternative hedging strategies? She must select on the basis of two decision criteria: (1) the risk tolerance of Ganado, as expressed in its stated policies; and (2) her own view, or expectation of the direction (and distance) the exchange rate will move over the coming 90-day period.

Ganado's *risk tolerance* is a combination of management's philosophy toward transaction exposure and the specific goals of treasury activities. Many firms believe that currency risk is simply a part of doing business internationally, and therefore, begin their analysis from an unhedged baseline. Other firms, however, view currency risk as unacceptable, and either begin their analysis from a full forward contract cover baseline, or simply mandate that all transaction exposures be fully covered by forward contracts regardless of the value of other hedging alternatives. The treasury in most firms operates as a *cost* or *service center* for the firm. On the other hand, if the treasury operates as a *profit center*, it might tolerate taking more risk.

The final choice between hedges—if Maria Gonzalez does expect the pound to appreciate—combines the firm's risk tolerance, its view, and its confidence in its view. Transaction exposure management with contractual hedges requires managerial judgment. *Global Finance in Practice 10.3* describes how hedging choices may also be influenced by profitability concerns and forward premiums.

Hedging an Account Payable

The management of an account payable, where the firm would be required to make a foreign currency payment at a future date, is similar but not identical to the management of an account receivable. If Ganado had a £1,000,000 account payable due in 90 days, the hedging choices would include the following.

Remain Unhedged. Ganado could wait 90 days, exchange dollars for pounds at that time, and make its payment. If Ganado expects the spot rate in 90 days to be \$1.7600/£, the payment would be expected to cost \$1,760,000. This amount is, however, uncertain; the spot exchange rate in 90 days could be very different from that expected.

Forward Market Hedge. Ganado could buy £1,000,000 forward, locking in a rate of \$1.7540/£, and a total dollar cost of \$1,754,000. This is \$6,000 less than the expected cost of remaining unhedged, and therefore clearly preferable to the first alternative.

Money Market Hedge. The money market hedge is distinctly different for a payable as opposed to a receivable. To implement a money market hedge in this case, Ganado would exchange U.S. dollars spot and invest them for 90 days in a pound-denominated interest-bearing account. The principal and interest in British pounds at the end of the 90-day period would be used to pay the £1,000,000 account payable.

GLOBAL FINANCE IN PRACTICE 10.3

Forward Rates and the Cost of Hedging

Some multinational firms measure the cost of hedging as the "total cash flow expenses of the hedge" as a percentage of the initial booked foreign currency transaction. They define the "total cash flow expense of the hedge" as any cash expenses for purchase (e.g., option premium paid up-front, including the time value of money) plus any difference in the final cash flow settlement versus the booked transaction.

If a firm were using forwards, there is no up-front cost, so the total cash flow expense is simply the difference between the forward settlement and the booked transaction (using this definition of hedging expense). This is the forward premium. But the size of the forward premium has sometimes motivated firms to avoid using forward contracts.

Assume a U.S.-based firm has a GBP1 million one-year receivable. The current spot rate is USD1.6000 = GBP1.00. If U.S. dollar and British pound interest rates were 2.00%

and 4.00%, respectively, the forward rate would be USD1.5692. This is a forward premium of -1.923% (the pound is selling forward at a 1.923% discount versus the dollar), and in this firm's view, the cost of hedging the transaction is then 1.923%.

However, if British pound interest rates were significantly higher, say 8.00%, then the one year forward rate would be USD1.5111, a forward premium of -5.556%. Some multinationals see using a forward in this case, in which more than 5.5% of the transaction's settlement is "lost" to hedging as too expensive. The definition of "too expensive" must be based on the philosophy of the individual firm, its risk tolerance for currency risk, and the profitability of the business and industry itself. Fundamentals of financial theory, however, would argue that the two cases are not truly different. Yet, in global business today, depending on how pricing is conducted, a loss of 5.56% on the sale settlement could destroy much of the net margin on the sale.

In order to assure that the principal and interest exactly equal the £1,000,000 due in 90 days, Ganado would discount the £1,000,000 by the pound investment interest rate of 8% for 90 days in order to determine the pounds needed today:

$$\frac{£1,000,000}{1 + \left(.08 \times \frac{90}{360} \right)} = £980,392.16.$$

This £980,392.16 needed today would require \$1,729,411.77 at the current spot rate of \$1.7640/£:

$$£980,392.16 \times \$1.7640/£ = \$1,729,411.77.$$

Finally, in order to compare the money market hedge outcome with the other hedging alternatives, the \$1,729,411.77 cost today must be carried forward 90 days to the same future date as the other hedge choices. If the current dollar cost is carried forward at Ganado's WACC of 12%, the total cost of the money market hedge is \$1,781,294.12. This is higher than the forward hedge and therefore unattractive.

$$\$1,729,411.77 \times \left[1 + \left(.12 \times \frac{90}{360} \right) \right] = \$1,781,294.12.$$

Option Hedge. Ganado could cover its £1,000,000 account payable by purchasing a call option on £1,000,000. A June call option on British pounds with a near at-the-money strike price of \$1.75/£ would cost 1.5% (premium) or

$$£1,000,000 \times 0.015 \times \$1.7640/£ = \$26,460.$$

This premium, regardless of whether the call option is exercised or not, will be paid up-front. Its value, carried forward 90 days at the WACC of 12%, would raise its end of period cost to \$27,254.

If the spot rate in 90 days is less than \$1.75/£, the option would be allowed to expire and the £1,000,000 for the payable would be purchased on the spot market. The total cost of the

call option hedge, if the option is not exercised, is theoretically smaller than any other alternative (with the exception of remaining unhedged, because the option premium is still paid and lost). If the spot rate in 90 days exceeds \$1.75/£, the call option would be exercised. The total cost of the call option hedge, if exercised, is as follows:

Exercise call option ($\text{£}1,000,000 \times \$1.75/\text{£}$)	\$1,750,000
Call option premium (carried forward 90 days)	<u>27,254</u>
Total maximum expense of call option hedge	\$1,777,254

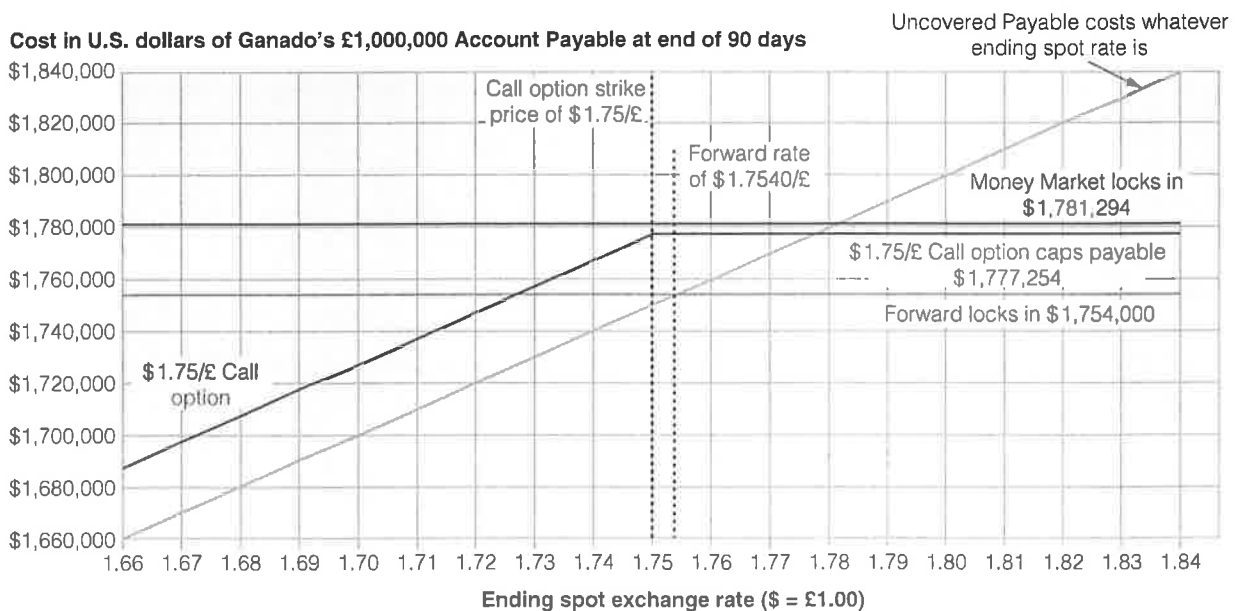
Strategy Choice. The four hedging methods of managing a £1,000,000 account payable for Ganado are summarized in Exhibit 10.6. The costs of the forward hedge and money market hedge are certain. The cost using the call option hedge is calculated as a maximum, and the cost of remaining unhedged is highly uncertain.

As with Ganado’s account receivable, the final hedging choice depends on Maria’s exchange rate expectations and her willingness to bear risk. The forward hedge provides the lowest cost of making the account payable payment; that is certain. If the dollar strengthens against the pound, ending up at a spot rate less than \$1.75/£, the call option could potentially be the lowest cost hedge. Given an expected spot rate of \$1.76/£, however, the forward hedge appears to be the preferred alternative.

10.5 Risk Management in Practice

There are as many different approaches to exposure management as there are firms. A variety of surveys of corporate risk management practices in recent years in the United States, the United Kingdom, Finland, Australia, and Germany, indicate no real consensus exists regarding the best approach. The following is our attempt to summarize survey findings on which goals,

EXHIBIT 10.6 Ganado’s A/P Transaction Exposure Hedging Alternatives



which exposures, and which contractual hedges, combined with our own personal experiences working with companies.

Which Goals?

The treasury function of most private firms, the group typically responsible for transaction exposure management, is usually considered a cost center. It is not expected to add profit to the firm's bottom line (which is not the same thing as saying it is not expected to add value to the firm). Currency risk managers are expected to err on the conservative side when managing the firm's money.

Which Exposures?

Transaction exposures exist before they are actually booked as foreign currency-denominated receivables and payables. However, many firms do not allow the hedging of quotation exposure or backlog exposure as a matter of policy. The reasoning is straightforward: until the transaction exists on the accounting books of the firm, the probability of the exposure actually occurring is considered to be less than 100%. Conservative hedging policies dictate that contractual hedges be placed only on existing exposures.

Which Contractual Hedges?

As might be expected, transaction exposure management programs are generally divided along an "option-line," those that use options and those that do not. Firms that do not use currency options rely almost exclusively on forward contracts and money market hedges. *Global Finance in Practice 10.4* demonstrates how market condition may change a firm's hedging choices.

Many MNEs have established rather rigid transaction exposure risk management policies, which mandate proportional hedging. These policies generally require the use of forward contract hedges on a percentage (e.g., 50, 60, or 70%) of existing transaction exposures. As the maturity of the exposures lengthens, the required forward-cover percentage decreases.

GLOBAL FINANCE IN PRACTICE 10.4

The Credit Crisis and Option Volatilities in 2009

The global credit crisis had a number of lasting impacts on corporate foreign exchange hedging practices in late 2008 and early 2009. Currency volatilities rose to some of the highest levels seen in years and stayed there. This caused option premiums to rise so dramatically that many companies became much more selective in their use of currency options for risk management.

The dollar-euro volatility was a prime example. As recently as July 2007, the implied volatility for this most widely traded currency cross was below 7% for maturities from one week to three years. By October 31, 2008, the 1-month implied volatility had reached 29%. Although this was seemingly the peak, 1-month implied volatilities were still over 20% on January 30, 2009.

This makes options very expensive. For example, the premium on a 1-month call option on the euro with a strike

rate forward-at-the-money was \$0.0096/€ in the summer of 2008, before the financial crisis, when dollar-euro volatility was 7%. By the end of January 2009, dollar-euro volatility had risen to 20%, driving that same option premium to \$0.0286/€. For a notional principal of €1 million, that is an increase in price from \$9,600 to \$28,600. That will put a hole in any treasury department's budget.

An increasing number of firms, however, are actively hedging not only backlog exposures, but also selectively hedging quotation and anticipated exposures. Anticipated exposures are transactions for which there are—at present—no contracts or agreements between parties, but are anticipated on the basis of historical trends and continuing business relationships. Although this may appear to be overly speculative on the part of these firms, it may be that hedging expected foreign-currency payables and receivables for future periods is the most conservative approach to protect the firm's future operating revenues.