Management and Control of Foreign Exchange Risk

Laurent L. Jacque

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PREFACE

Since I first published *Management of Foreign Exchange Risk* (Lexington Books, 1978), financial innovation—spurred, in part, by exploding volatility in currency prices—has revolutionized the theory and praxis of foreign exchange risk management. Old-fashioned forward contracts have surrendered market share to currency swaps and options as well as to their perpetually multiplying derivatives. Interestingly, forex derivatives now provide a low cost and highly efficient method of transferring risk from the firms that are exposed to risk but which would rather not be (i.e., risk-hedgers) to those which are not exposed but which—in exchange for a fee—would assume some exposure to risk (i.e., risk-bearers). Perhaps more importantly, foreign exchange risk management, which was once a fairly mechanical task confined to the international treasury function, is now permeating global strategic management. Indeed, since the demise of the Bretton Woods system of pegged exchange rates, the cost of forex hedging instruments has fallen so dramatically that firms can readily avail themselves of hedging products which can reduce unwanted risk, thereby potentially gaining a competitive advantage over rivals that do not. *Management and Control of Foreign Exchange Risk* has grown out of a fundamental revision of my earlier work published almost 20 years ago. In the process, my thinking about risk and its mathematics has greatly benefitted from my association with John Cozzolino and Charles Tapiero. This volume hopefully captures the excitement, complexity and sophistication of risk management as it pertains to foreign exchange while differentiating itself from its many competitors.

Acknowledgments

Over the years, consulting projects and discussions with many savvy executives have helped me challenge received wisdom in the area of foreign exchange risk management: for their insight this book is a better one. Most notably, I wish to thank several individuals: Y.D. Ahn (Daewoo), P. Alexander (Bunge y Born), G. Byker (Offshore Energy), A. Chintakananda (Stock Exchange of Thailand), C. Jotishkatira (Siam Commercial Bank), G. Ehrensperger (Garantia), J. Francis (Wharton Econometrics Forecasting Associates), V. Mareuse (Andre et Cie), D. Narayana (Norwest Bank), L. Polsky (Bankers Trust), J. D'Oliveira (Braesilinterpart), and J. Sroka (British Petroleum).

I am grateful to several authors for allowing me to reprint one of their case studies in this volume: Y.D. Ahn (Daewoo), E. Barrett (Thunderbird), W. Davidson (University of Southern California), I. Giddy (New York University), M. Moffet (Thunderbird), and A. Shapiro (University of Southern California).

Challenging questions and insightful comments from students and executives at the Wharton School (University of Pennsylvania), Carlson School (University of Minnesota), HEC School of Management (France), Chulalongkorn University (Thailand). and, since 1993, the Fletcher School of Law and Diplomacy (and sometimes Commerce) led me to make numerous revisions. I am also indebted to several students who selflessly read and edited numerous versions of the manuscript and wish to express my appreciation to Ph. Aquilino, Erin Conaton, Maria Lopez, C. Schmidt, and P. Vaaler Esq. Last but not least, the author is

indebted to J. Ari Day who never defaulted on a forward contract (whose floating—at times sinking—maturity raised interesting valuation questions) and who masterminded the entire production of this volume.

Yet, with so much help from so many, I am still searching for the ultimate hedge which would shield me from any remaining errors: but this is not escape, they are entirely mine!

L.L.J.
Winchester, Massachusetts
March 1996

INTRODUCTION

It is part of wise men to preserve themselves today for tomorrow, and risk all in one day.

Cervantes

The ever-increasing integration of the international economy coupled with the heightened volatility of foreign exchange rates has elevated managing currency risk from a tactical, functional assignment to a *cross-functional* and truly *strategic* management responsibility. Indeed, since the demise of the Bretton Woods system of quasi-fixed exchange rates in 1973, the international monetary system has experienced exploding exchange rate volatility coupled with periods of prolonged over or undershooting of currency values, which tends to wreak havoc with strategic plans laid on shifting sands. As one author notes allegorically,

> in this era of floating exchange rates, no business in the industrial world may consider itself insulated from currency risk. For if business is a war without bullets, then that war is increasingly fought on a floating battlefield. Imagine an army that struggles mightily to take a hill only to find that the hill, overnight, has turned into a valley, and the plain, out of which the enemy had been beaten, is now the high ground. Currency is such a battleground. Every company may be such an army.[1]

Indeed, managers who continue to ignore foreign exchange risk are a rapidly disappearing species! Simply put, foreign exchange risk management refers to the pro-active management of currency exposures deemed to affect the firm's cash flows and stock price. Thus, its purpose is to increase shareholder value by stabilizing the firm's earnings stream. This book is about foreign exchange risk management, its *theory* and *praxis* as understood from a financial, managerial, and strategic perspective. Accordingly, this book develops a risk-management framework and offers a rigorous set of operational guidelines within which forex risk can be (1) consistently hedged both across different risk situations and over time, (2) tightly integrated with other types of financial risk such as interest rate and commodity price risk, and (3) managed consistently with the firm's overall strategic plans so that the financial engineering dimensions of risk hedging are fully integrated with strategic management. (See box I.i for how a management scholar sees foreign exchange risk management—not necessarily this author's

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[1] Millman, Gregory J. *The Floating Battlefield: Corporate Strategies in the Currency Wars* (New York: AMACOM, 1990), pp. 3–4.

Box I.1 A Management Guru's View of Foreign Exchange Risk Management

1. **Exchange rates are inherently unstable and will remain so.** Fixed exchange rates are not from Genesis. It must be accepted that governments *mess with* exchange rates.
2. **Predicting currency rates is a foolish game.** Talk and emotions often move exchange rates in unpredictable directions. Imponderables such as these make it dangerous to engage in rate-dependent financial maneuvers. In other words, you had better hedge.
3. **Not to hedge is to speculate.** Exchange rates are a cost of production that financial executives must manage. A multinational corporation (MNC) with 60 percent foreign sales had better sell forward this year's expected earnings.
4. **MNCs must take advantage of global markets.** Most MNCs still finance largely in one country. This is an increasingly dubious luxury. Managers should protect earnings by financing capital in the same currency.
5. **Finance managers cannot blame corporate losses on market volatility.** The company's business is not finance but making widgets. In the next violent currency fluctuation—and it will occur during the business life of everyone working today—many managers will find that corporate profits are down, say, 40 percent owing to foreign exchange. This will not be accepted and the company will say, "You are paid to protect us from that."

Excerpted from: *Keynote Address*, Peter Drucker, Chief Financial Officers Conference, sponsored by Business International, San Francisco, 1990. Reprinted with permission.

view.) Thus, the new imperative for the international treasurer is to involve himself proactively with the strategic planning process so as to recognize early the impact of currency fluctuations on the firm's market share, profit margins, and ultimately valuation—a far cry from hedging yen-denominated account receivables, computing options' premia, or marking-to-market currency swaps. But first, we must define foreign exchange risk and make a case for managing it.

DEFINING FOREIGN EXCHANGE RISK MANAGEMENT AND ITS OBJECTIVES

Risk is at the core of economic activity. Indeed, a firm becomes exposed to various kinds of risk in its quest to create a *competitive advantage* and ultimately *value* for its shareholders. However, *business* risk should be clearly distinguished from financial risk (of which foreign exchange risk is a major component), which can be carefully hedged through appropriate market-traded instruments/techniques.

As a first approximation, foreign exchange risk can generally be defined as the additional variability experienced by a multinational corporation in its worldwide consolidated earnings due to *unexpected* currency fluctuations. By

way of illustration, consider the 1995 earnings performance reported by a large U.S. multinational corporation—call it Omega—under the following three mutually exclusive scenarios (illustrated in figure I.i).

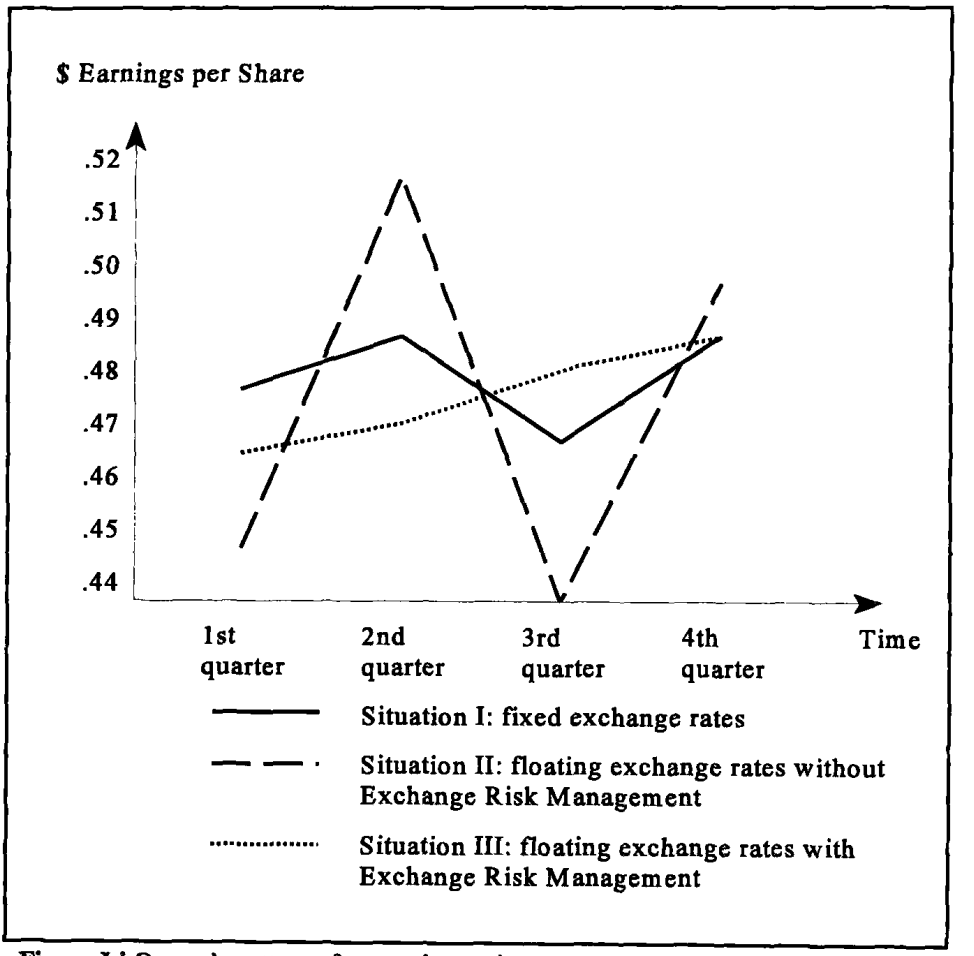

Figure I.i Omega's pattern of quarterly earnings

Under *situation I*, characterized by stable exchange rates throughout the 1995 accounting period, Omega reports small but steady increases in earnings per share. *Situation II* relaxes the assumption of fixed exchange rates—that is, fluctuating exchange rates prevail over the accounting horizon. Omega now exhibits an *erratic* pattern in quarterly earnings, with attendant exchange gains and losses. Finally, in *situation III*, Omega is assumed to be conservatively managing its foreign exchange risk exposure, thus reporting a somewhat lower but definitely more stable pattern of quarterly earnings. The considerable earnings variability has been virtually eliminated at a substantial cost, namely the cost of managing foreign exchange risk.

However, this focus on *accounting* values is increasingly challenged by a sounder emphasis on *economic* value derived from *free cash flows*. Exchange risk should then be redefined as the *variance* component in the firm's overall cash-flow due to exchange rate volatility. Foreign exchange risk management aims at reducing the volatility of a firm's pretax cash flow and, therefore, its riskiness (illustrated in figure I.ii by the lower variance of the probability distribution of the firm's value). Presumably by *stabilizing its cash flows*, hedging *reduces the firm's cost of capital* and enhances its ability to implement strategic plans now predicated on more dependable future cash flows.

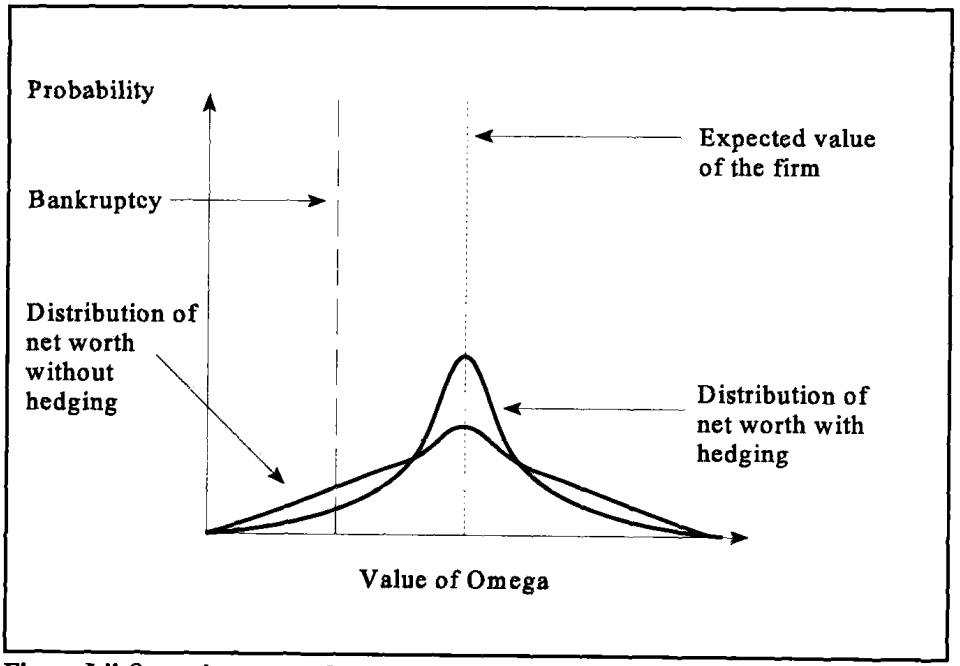

Figure I.ii Omega's pattern of quarterly earnings with and without hedging

THE CASE FOR FOREIGN EXCHANGE RISK MANAGEMENT

Hedging foreign exchange risk may, however, be suboptimal from the point of view of a shareholder who, by holding a scientifically diversified portfolio of securities, may be able to lay off this risk more cheaply. After all, shareholders could very well reduce the *earnings* volatility experienced by Omega (because of foreign exchange gains or losses) by holding part of their portfolio in the stocks of other multinational corporations that do business only in certain foreign countries or by simply investing in foreign stocks. Presumably, these countries should be selected on the basis of the imperfect or negative correlation in their currency movements with the currencies of the countries in which multinational

Omega is operating.[2] Srinivasulu and Dufey (1983) argue, however, that because individual investors face exchange controls, high transaction and information costs, the dead-weight cost of *financial distress*, and agency relationships, multinational corporations can better reduce the burden of such market imperfections and segmentation, since they are superiorly equipped to carry out currency diversification and to assume the responsibility of exchange risk management on behalf of their shareholders. For privately-held firms, whose owners (presumably risk-averse) may hold the bulk of their wealth in their corporate ventures, the case for foreign exchange risk management is even more compelling. Similarly, firms which are highly leveraged will pursue conservative hedging to avoid "surprises" which may push them into bankruptcy.

The benefits of hedging are confirmed by the widespread practice of multinational corporations that selectively manage foreign exchange risk because they presume its benefits outweigh its costs. (See appendix A.) That such costs are justified further presumes that corporate treasurers should be concerned—up to a point—with the smooth period-to-period earnings pattern so cherished by security analysts. A volatile earnings stream can affect a firm's stock price and, in turn, by depressing its price–earnings ratio, reduce its ability to raise funds at a reasonable cost, fend off hostile takeovers, or implement effectively a merger/acquisition strategy through a stock swap. Indeed, the readily established link between the variability of corporate earnings and the value of the firm justifies the allocation of (scarce) cash resources to hedging exchange risk.

RISK MANAGEMENT MODEL AND BOOK SYNOPSIS

Part I of this book lays the foundation of foreign exchange risk management by offering an in-depth discussion of the *valuation* of spot and forward foreign exchange rates, currency futures and options, swaps, and other forex derivative products. That the need for a comprehensive understanding of the macroeconomic theater within which foreign exchange risk management is played out should be readily apparent to the reader. First, foreign exchange risk

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[2] Modern capital market theory, which defines foreign exchange risk as the *systematic* or *diversifiable* risk associated with a foreign currency denominated revenue (or cost) stream, argues that under certain assumptions of market efficiency, foreign exchange risk management is totally superfluous. In this somewhat hypothetical world, multinational corporation treasurers abdicate the initiative of foreign exchange risk management whose responsibility is fully transferred to the shareholders, who, in turn, will manage the unsystematic portion of exchange risk through efficient portfolio diversification. How to diversify exchange risk effectively at the investor level remains an unanswered question because existing international asset pricing models require satisfaction of a strict set of conditions that are far removed from the multicurrency institutional environment facing international investors (Adler and Dumas, 1984).

originates from the volatile spot exchange rate relationship linking different currencies. Chapter 1 provides an analytical overview of systems of exchange rate determination. Depending on the nature and the degree of central banks' intervention in their foreign exchange market, exchange rates are classified as either *floating, stabilized,* or *controlled.* Second, forward contracts are a major instrument of protection against foreign exchange risk. Chapter 2 discusses the determination of forward exchange rates as resulting from the interplay of market participants, namely, *interest rate arbitragers, traders, hedgers, and speculators.* Chapter 3 introduces in some details the gamut of forex products that have appeared in the last 25 years, namely, currency futures, options, swaps, and derivatives.

Our discussion of foreign exchange risk management then proceeds in the context of the risk management model outlined in figure I.iii. Steps 1 and 2, the preliminary steps of defining the firm's attitudes toward risk and establishing objectives which are congruent with the firm's risk aversion, are indeed treacherous as they require systematic introspection on the part of the firm's senior managers as well as consistency in dealing with different types of risk whether it is exchange risk, interest rate risk, commodity price risk, or general liability risk.

Part II provides a framework for generating foreign exchange rate forecasts. Chapter 4 explores the perplexing issue of forecasting *floating* exchange rates: *market-based* forecasts are contrasted with *model-based* forecasts as an attempt is made to answer the ever-elusive question: "*Can we beat the forex market?*" The somewhat different problem of forecasting *pegged yet adjustable* exchange rates is tackled in chapter 5, where a four-step forecasting framework, based upon the estimation of macroeconomic indicators, is introduced. Our pessimistic conclusion with respect to forecasters' ability to generate reliable forecasts is the very foundation for foreign exchange risk management: to the extent that we cannot forecast exchange rates with great accuracy, it becomes imperative to manage exposure to foreign exchange risk, which requires the firm to take inventory of its exposure to currency risk (step 4).

Assessment of a multinational corporation's exposure to foreign exchange risk is discussed in part III. Chapter 6 offers an accounting answer that distinguishes between transaction and translation exposures. *Transaction exposure* results from foreign currency-denominated contracts, with a well-defined maturity, that generally materialize imports, exports, or international financing transactions. By contrast, *translation exposures* stems from a multinational corporation's practice of consolidating foreign subsidiaries' financial statements with those of their parents. Although widely used, this accounting concept of exposure to foreign exchange risk is, by definition, misleading, since it fails to incorporate the longer-term impact of exchange rate changes on the economic valuation of the multinational corporation. In chapter 7, we sketch the link between the firm's value and exchange rates by tracing the impact of the inflation/devaluation cycle upon the profitability of the subsidiary of an oligopolistic multinational corporation. It is shown that such a subsidiary's

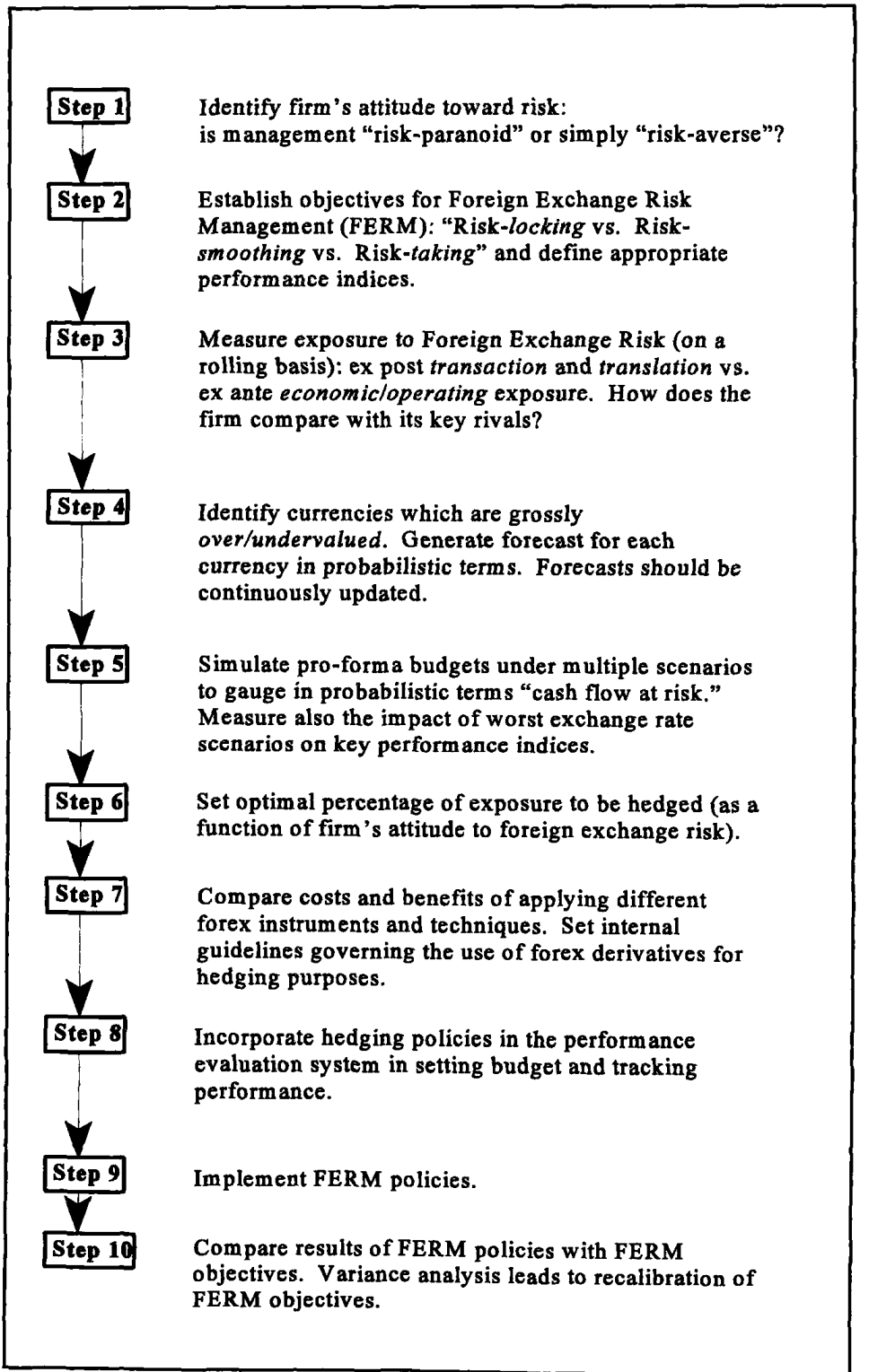

Figure I.iii Foreign Exchange Risk Management (FERM) model

economic exposure to foreign exchange risk primarily depends on (1) the *destination of its output*, that is, export market vs. domestic market, as well as the origin of its inputs, that is, imported vs. domestically sourced inputs, and (2) the *relative* response to the inflation/devaluation cycle by its key competitors (steps 3 and 5).

How to eliminate or, as a second-best option, mitigate cash-flow losses that may result from transaction exposure to foreign exchange risk is discussed in part IV. Specifically, chapter 8 provides operational guidelines designed for coping with exchange risk entailed by commercial transactions inclusive of international *bids/tenders*. The cases of short- vs. medium- or long-term contracts denominated in both convertible and inconvertible currencies are examined separately. The use of currency options and swaps is systematically introduced. An analytical framework for quantifying the cost of eliminating foreign exchange risk stemming from international financing is introduced next in chapter 9. Specifically, long-term international financing incorporates exchange gains or losses in the effective cost of long-term debt financing. The use of such artificial currency units such as Special Drawing Rights or European Currency Units in denominating long-term debt is explored as a technique for dampening exchange losses that corporate borrowers may experience in sourcing funds from foreign capital markets. Throughout part IV, decision rules are formulated algebraically to enable the decision maker to simulate, under alternative future spot exchange rates (break-even analysis), the relative cost of covering vs. not covering against exchange risk (steps 5, 6, and 7).

Exchange rate devaluation may severely disrupt the steadiness of multinational corporations' foreign income streams. Even though no cash-flow losses are involved, consolidated accounting income may exhibit erratic trends that will in turn affect the corporation's overall risk profile as perceived by its shareholders and the investment community at large. Chapter 10 shows how the accounting income of multinational corporations' foreign operations can be smoothed by combining a strategy of selective hedging through the forward market with adequate manipulation of translation exposures through local borrowing or leading/lagging intracorporate payments (steps 7 and 9). The last chapter explores how currency risk can distort the performance-evaluation process of foreign subsidiaries by their parents. It constructs a *value-based contingent budgeting* model that builds on the economic exposure model introduced in chapter 7 and aligns shareholder value creation with exchange-rate-dependent operating decisions (steps 8 and 10).

Throughout the text more technical sections which can be omitted without loss of continuity are indicated by opening □ and closing ■ symbols. Each chapter is followed by *case studies* based on real-life situations and is supplemented by a set of problems; answers to selected problems appear at the end of the book. Detailed solutions to both case studies and problem sets are provided in a separate *instructor's manual*, which also includes a master set of transparencies for each chapter. It is available upon request from the publisher.

APPENDIX A: FOREIGN EXCHANGE RISK MANAGEMENT: WHAT DO FIRMS DO?[3]

- Accounting considerations remain the single most important factor influencing the practice for foreign exchange exposure management today.
- Current accounting rules discourage corporations from implementing some of the hedging strategies including hedging forecasted transactions two to three years in the future with derivatives with hedge accounting treatment.
- Because of current Financial Accounting Standards Board (FASB) hedge accounting rules and requirements to mark to market hedging instruments that do not qualify for hedge treatment, most companies appear to use the accounting model as the basis for measuring their exposure to exchange gains and losses. Accordingly, they focus mainly on the elements of translation, transaction, and commitment exposure that fall within the accounting model or generally accepted accounting principles (GAAP).
- While operating within the accounting model in daily exposure management, most companies understand that the accounting model does not capture the economic and competitive impacts that exchange gains and losses have on their companies.
- Most companies have created policies for foreign exchange exposure management, but they do not always take into account the development of derivatives.
- Senior management is becoming aware of the complexity of exposures and the need to understand how they are managed, due to recent incidents involving the use of derivatives. In leading companies, treasury departments are working with management to define business and financial risks, to decide which of those risks the company is in the business of taking and which it wants to hedge, to decide where on the risk spectrum the company wants to be, to design hedging programs to fit the company's risk tolerance, and to define benchmarks to measure and control the hedging program.
- Treasury departments are acting in a more consultive capacity, supporting business units that assume profit and loss responsibility for foreign exchange exposure and hedging decisions. In the past, treasury departments have operated independently and sometimes had more of a profit center orientation.
- In some larger companies, business units enter into hedging transactions with an internal treasury unit. In turn, treasury hedges externally for the company as a whole. In those companies, it is common for business units to use a budget or benchmark rate to hedge the U.S. dollar equivalent of their foreign currency earnings for performance measurement purposes and to use relatively

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[3] Abridged from Davis, Henry A., and Militello, Frederick C., Jr. "Foreign Exchange Risk Management: A Survey of Corporate Practices," *Financial Executives Research Report* 2, No. 1 (January 1995), pp. 1–3.

conservative hedging strategies designed to make or slightly beat the benchmark rate.

• The two most widely used financial hedging tools are forward exchange contracts and over-the-counter options. Forward exchange contracts are used for hedging booked transaction exposures, while options are used extensively for committed off balance sheet transactions. Few companies are active in the futures market.

• In the past ten years, the corporate practice of foreign exchange exposure management has become more systematic and less driven by day-to-day currency movements. The development of relatively inexpensive computer power has spurred the development of increasingly complex derivative financial instruments, technical currency rate trend analysis, and systems that help corporations identify exposures, simulate alternative exposure scenarios and hedging strategies, execute hedging transactions, and manage portfolios of hedging instruments.

• Foreign exchange, interest rate, and commodity risk management are becoming integrated because the hedging instruments are similar and the same personnel in the company have expertise in using them.

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