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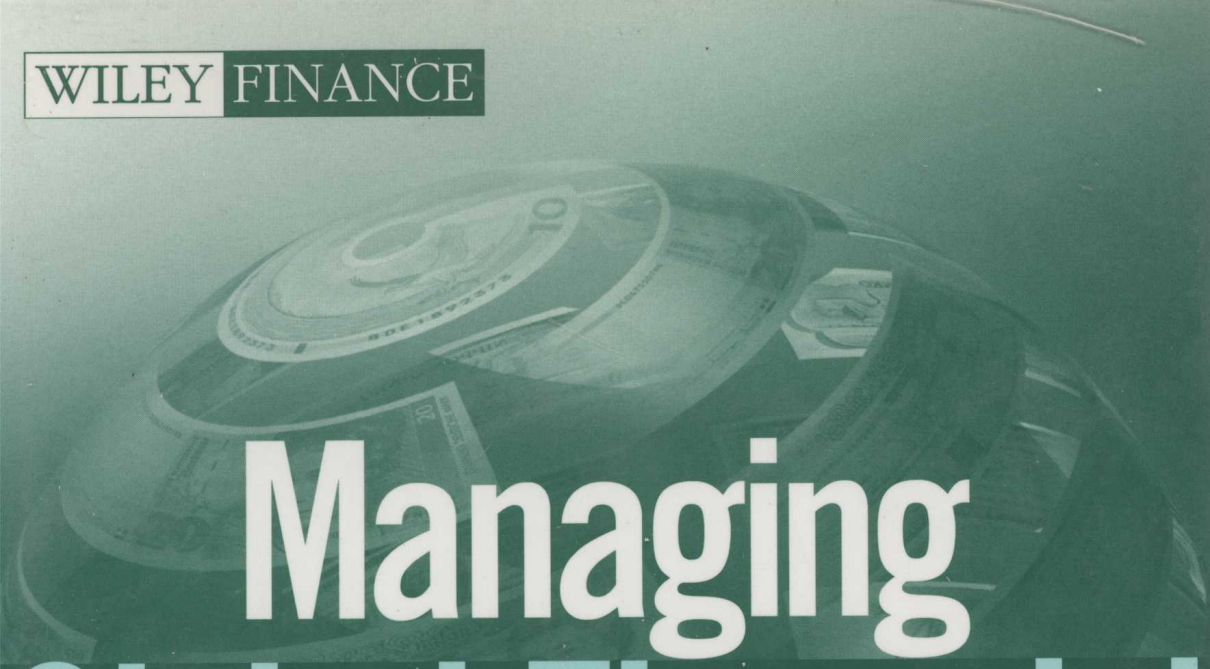

Managing Global Financial and Foreign Exchange Rate Risk

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To my wife and daughters

preface

Risk taking is the foundation of the capitalist economy as it is positively correlated to the reward for entrepreneurial behavior. Risk management in the twenty-first century integrates mathematical and physical science along with that of behavioral finance and economics. The end result is a mushrooming set of derivative products where price is contingent on the behavior of underlying assets, such as stocks, bonds, commodities, currencies, indices, and other exotic instruments. The market for derivatives plays an ever-increasing important role in transferring risk from risk-averse individuals and institutions to those who are willing to take it for a profit. Risk taking and risk management are balanced in the marketplace by regulatory oversight, as bank and financial services industry regulators continue to search for an optimum balance that protects the integrity of the banking system and provides regulatory capital relief while enhancing the return on capital to financial institutions.

This book is intended to provide readers who already have an understanding of the time value of money the opportunity to venture into the exciting and often mysterious world of global derivatives. In various derivative textbooks, the price-generating function of derivatives is expressed as a highly complex mathematical manipulation that is unintelligible to a broad audience. This endeavor is intended to bridge the gap between theory and practice by focusing on understanding various derivatives for managing exposure to foreign exchange, commodity price, interest rate, and credit and weather risks.

The objective is to present a coherent analysis of the various risks that a multinational firm faces in an integrated global market and to consider active risk management approaches for mitigating exposures to commodity price, foreign exchange, equity price, and interest rate changes within the context of value creation for its stakeholders. Numerous real-world examples are employed to illustrate how derivatives can be used to mitigate risks. To those whose work has been cited throughout this book, I am indebted for their contributions to the knowledge base that has revolutionized the practice of risk management. Wall Street's brightest minds continue to respond to changes in the regulatory landscape, changes in tax laws, and changes in business and financial risks with further innovations in derivatives and financial engineering.

This book is organized into 12 chapters. Chapter 1 provides an overview. Chapter 2 addresses the balance of payments (BP) equilibrium and managing exposures related to the disequilibrium in the various components of BP. Some

preliminary results for the U.S. balance of payments are presented and compared to recent evidence from the emerging market economies of Southeast Asia.

Chapter 3 outlines a simple and unified framework for the dynamic process of international rate parity relationships along with managing exposures induced due to changes in foreign exchange rates. Furthermore, the economic consequences of the partial and incomplete exchange rate pass-through provide interesting observations and challenges for U.S. multinational corporations. This chapter concludes with a framework for the macrodetermination of the exchange rate linking the real sector of the economy, where production takes place, with the financial markets and monetary policy formulation by the Federal Reserve Board, where financing is encouraged (discouraged).

Chapter 4 lays out the foundation of option pricing in a fairly simple context and its application for managing risk. Hedging foreign-denominated cash inflows and outflows using call and put options provides the reader with opportunities to challenge the conventional wisdom of hedging and not hedging. The question of whether to hedge or not to hedge explains the cost and benefits of hedging with options vis à vis hedging with forward or futures contract. The chapter concludes with an example of covered call, protective put, and zero collar and its implications for managers.

Chapter 5 outlines the principles of futures pricing and application for dividend-paying instruments such as stock index and currency futures. The pricing formulation prepares, in a relatively nontechnical way, the foundation for the understanding of the relatively complex derivatives instruments discussed throughout the book. Nondividend-paying futures such as gold, silver, and other commodity futures are priced in the context of cost of carry model.

Anticipatory hedging with various futures, such as stock index, currency, and commodities, is provided in the context of illustrative cases that permits readers to follow the peculiarities of the futures and forward contracts as well as highlighting their idiosyncrasies. The final section of the chapter presents some of the most recent evidence on the forward and futures prices.

Chapter 6 presents principles of pricing and application of interest rate futures, such as Treasury bills, notes, bonds, and Eurodollar futures, for managing exposure due to interest rate and price risk. The shape of the term structure of interest rates provides readers with various theories of the interest rates as the foundation of the interest-sensitive derivative instruments that has revolutionized the financial services industry in the last two decades. The price volatility of bonds such as duration and convexity provides readers with a clear and coherent analysis of these important factors in active bond portfolio management. The delivery process in the futures market illustrates the institutional aspects of the cheapest-to-deliver bonds in the Treasury notes and bonds market.

Arbitrage and risk transfer from hedgers to speculators in interest rate futures market in the context of easy-to-follow examples provide readers with an in-depth analysis of this important subject. Hedging with a duration-based approach illustrates the application of the various interest rates futures using long and short hedges for managing exposure to interest rate risk.

Chapter 7 lays out the foundation of the swaps. In the finance nomenclature, selling an asset and buying another asset simultaneously, and vice versa, is a swap. The markets for interest rate and currency swaps are some of the most innovative in the world. A new breed of swaps are introduced in the over-the-counter market in restructuring assets/liabilities, and mitigating and transferring risk. This chapter provides an extensive analysis of the valuation of the plain-vanilla interest rate and currency swaps and their application to interest rate risk management. Pricing and valuation of caps, floors, collars, and corridors along with their application is presented in a framework that can be easily understood by readers with a minimal background in the time value of money. Valuation and application of swaptions is highlighted with numerous examples and graphical illustrations. The swap risks and exposure associated with swaps can be substantial, as regulatory authorities have imposed capital reserve in protecting the soundness of the banking system in swaps transactions that used to be treated off balance sheet and footnoted in the past. Currency swaps are analyzed along the same lines as their interest rate counterpart in a plain-vanilla type and embedded with various options making them callable, cancelable, exchangeable, and so on.

Chapter 8 analyzes the effect of the unexpected change in exchange rates: on the single-period cash flows (transaction exposure), multiperiod cash flows (operating exposure), and accounting-induced changes in the consolidated balance sheet (accounting exposure). This chapter unifies the fundamentals of hedging transaction, economic (operating), and translation (accounting) exposures with various derivatives in a user-friendly framework. The chapter highlights managing transaction exposure for Lufthansa Airlines' acquisition of aircrafts from Boeing in 1985 by a cost-benefit analysis of various hedging instruments for mitigating airline exposure to foreign currency exchange rate risk. The chapter also reviews the current literature on the practice of U.S. multinational corporations in regard to their hedging activities on such firms as DuPont and Nike. Analysis of value at risk (VAR) for the exposures related to changes in commodity prices, interest rates, and market risk are illustrated with numerous easy-to-follow examples. The mandate of regulatory authorities in bank supervision requiring banks to hold capital reserve for risky assets have increased the importance of VAR analysis for financial and nonfinancial corporations.

Chapter 9 outlines the nonstandard debt derivatives developed in the over-the-counter market to transfer risk, to mitigate reinvestment rate risk, to transfer the prepayment risk from a class of bond to other classes, to mitigate price and exchange rate risks, to increase liquidity, to reduce agency costs, to reduce transaction costs, and to reduce tax burden circumventing regulatory restrictions. The nonstandard derivative products offer opportunities in the financial market to enhance the yield and reduce the risk if properly combined with other assets in the portfolio. Therefore, they demand an understanding of the underlying factors that determine their value. The reward is higher, as is the risk of the individual derivative product. It is imperative to fully understand the pricing mechanism before committing the capital. Pricing inverse floaters along with floaters and their application in an active bond portfolio management is illustrated at the outset.

Numerous examples explain using inverse floaters to create synthetic fixed rate. Mortgage and asset-backed derivative securities, as well as the price, yield, and prepayment risks, provide the idiosyncrasies of these instruments. The chapter also analyzes prepayment risks such as extension and contraction risks. The interest-only (IO) and principal-only (PO) securities derived synthetically from fixed rate instruments reveal an interesting phenomena regarding their price and yield relationship. This chapter concludes with the equity-linked debts and the implication for global diversification and liability management with such derivatives as caps, floors, collars, and swaptions.

Chapter 10 provides an overview of options on the interest rates, currencies, indices, and commodity futures products, such as options on spreads position on the Eurodollar futures, the Treasury futures, the currency futures and commodity futures. The currency options that began trading at the Philadelphia Exchange in 1982 to respond to the needs of multinational corporations for hedging currency exposure as well as to the needs of arbitrageurs and speculators to garner speculative profits (losses). Options in the interest rate products were introduced by the Chicago Mercantile Exchange in 1985. Various options positions for hedging and speculating are illustrated using real-life exposures. The options on futures are very similar to the options on equities and are priced accordingly using standard Black-Scholes options pricing formula. Spreads positions, such as bear spreads, bull spreads, butterfly spreads, box spreads, short straddle, long straddle, strips, and straps, are illustrated with numerous examples. The final section of the chapter discusses exotic options, variants of the ordinary options where the spot price, strike price, maturity, and/or volatility of the options are embedded with options. For example, the text discusses allowing the spot price to be determined by its behavior over the option period as opposed to one price at the expiration or exercise date (whichever comes first) or by making the spot price path-dependent, where the frequency of trading or number of days that options have for expiration to be used for establishing average spot price.

Chapter 11 discusses credit derivatives and default insurance, the new breed of on– and off–balance sheet financial instruments of the last five years that allow banks and other financial corporations to transfer or assume credit risk on a specific "reference" asset or portfolio of assets. The increased application of the derivatives has raised concerns about the default risk properties of these instruments. These concerns have been mitigated by the Bank for International Settlement, as it imposed a risk-based capital ratio in 1992, requiring banks to hold capital reserves to cover the unexpected losses on the current and future replacement cost of these instruments in the event of default. The number of credit derivatives is growing as new instruments are developed by financial engineers in response to changes in regulatory climate, taxes, increased volatility, and change in supply and demand condition. Credit derivatives enable the parties to reduce credit exposure without physically removing assets from the balance sheet. For example, loan sales and unwinding or assignment of loans require consent and notification of the counterparty. However, transactions on credit derivatives are confidential and do not require notification of the customer, thereby separating

the fiduciary relationship from risk management decisions. The credit derivatives discussed in this chapter, such as credit default swap, synthetic collateralized loan obligations, asset swaps, total return swaps, and credit-linked notes, allow efficient allocation of economic capital, resulting in diversification of risk and improved shareholder returns.

Chapter 12 reviews some of the recent exotic innovations in credit and weather derivatives. The regulatory changes in treatment of derivative transactions, whether booked in the bank balance sheet or in the bank trading desk, continue to have significant impact on the return on capital as the Bank for International Settlement searches for an optimum capital reserve requirement that protects the integrity of the banking system as well as providing sufficient regulatory and economic capital relief. The chapter starts with a discussion of highly leveraged transactions, such as credit spread forward, credit spread options, option on credit exposure, asset swap switch, and callable step-ups. These derivative products are designed to transfer risks synthetically in the capital markets. Numerous examples illustrate pricing and application of transfer and convertibility protection. A discussion of emerging market bonds and stripped Brady bonds follows. Finally, the chapter presents pricing and application of weather derivatives.

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