

Business Culinary Architecture  
Computer General Interest  
Children Life Sciences Biography  
Accounting Finance Mathematics  
History Self-Improvement Health  
Engineering Graphic Design  
Applied Sciences Psychology  
Interior Design Biology Chemistry

# WILEY BOOK

WILEY

JOSSEY-BASS

PFEIFFER

J.K.LASSER

CAPSTONE

WILEY-LISS

WILEY-VCH

WILEY-INTERSCIENCE

**Additional Praise for**

***The Risk Management Process***

“Risk management is much more than guessing how much an investment can lose. Culp has collected the best thinking on the many dimensions of risk management and presents it in an accessible and thoughtful way. This is valuable reading for corporate treasurers, fund managers, and investors alike.”

Todd E. Petzel  
President and Chief Investment Officer  
Commonfund Asset Management Company

“Culp offers corporate treasurers a number of insights into risk. They can now use explanations in the book to educate nonfinancial executives, from the board level on down, as to what the risks are and how to manage them. His book will elevate discussions far beyond the notion that risk management is simply ‘hedging with derivatives.’ I only wish this valuable book had been on my shelf while I was treasurer at McDonald’s Corporation. I would have drawn from its pages many times.”

Carleton D. Pearl  
President and CEO  
System Capital Corp.  
(a finance company for the McDonald’s System)



# The Risk Management **process**

*Business Strategy and Tactics*

CHRISTOPHER L. CULP



John Wiley & Sons, Inc.

New York • Chichester • Weinheim • Brisbane • Singapore • Toronto

Founded in 1807, John Wiley & Sons is the oldest independent publishing company in the United States. With offices in North America, Europe, Australia and Asia, Wiley is globally committed to developing and marketing print and electronic products and services for our customers' professional and personal knowledge and understanding.

The Wiley Finance series contains books written specifically for finance and investment professionals as well as sophisticated individual investors and their financial advisors. Book topics range from portfolio management to e-commerce, risk management, financial engineering, valuation and financial instrument analysis, as well as much more.

For a list of available titles, please visit our Web site at [www.WileyFinance.com](http://www.WileyFinance.com).

Copyright © 2001 by Christopher L. Culp. All rights reserved.

Published by John Wiley & Sons, Inc.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4744. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012, (212) 850-6011, fax (212) 850-6008, E-Mail: [PERMREQ@WILEY.COM](mailto:PERMREQ@WILEY.COM).

This publication is designed to provide accurate and authoritative information in regard to the subject matter covered. It is sold with the understanding that the publisher is not engaged in rendering professional services. If professional advice or other expert assistance is required, the services of a competent professional person should be sought.

This title is also available in print as ISBN 0-471-40554-X.

For more information about Wiley products, visit our web site at [www.Wiley.com](http://www.Wiley.com).

# acknowledgments

**M**y views of risk management have been heavily shaped by my teachers, my colleagues, my friends, and my clients. I have learned much from many—too many to thank here—and so shall adopt the customary academic approach and thank only those by name who commented on this manuscript or whose coauthored work with me appears in some excerpted form within. In that regard, I am grateful to John Cochrane, Chad Coffman, George Constantinides, Kevin Dages, Ken French, Dean Furbush, Steve Hanke, J.B. Heaton, Barb Kavanagh (who deserves special recognition for having helped edit the entire manuscript—brave soul), Laura Kline, Alastair Laurie-Walker, Robert Mackay, Bob MacLavery, Stuart McCrary, Ron Mensink, Andrea Neves, Mike Onak, Paul Palmer, Todd Petzel, José Scheinkman, Fred Smith, and my Autumn 2000 MBA class at the University of Chicago's Graduate School of Business. Most of the thoughts in this book that you find interesting or original probably belong to these folks, but any remaining errors definitely belong entirely to me.

Special thanks to Bill Falloon at Wiley who shepherded me through my first book project a year ago and was the instigator and faithful editor again of this one. Bill's capabilities as an editor are surpassed only by his knowledge of risk management and his patience for missed deadlines.

At a more personal level, thanks to all in my life who have tolerated what this book has done to my schedule, my personality, my temper, and my ability to honor my outside commitments. Hopefully Mr. Hyde will go back to his closet now that this is done, but for their patience in tolerating my dark and somber disposition and total unreliability these last months, special thanks to all my coworkers at CP Risk Management and Chicago Partners, the Executive Committee of the Governing Members of the Chicago Symphony Orchestra, and my friends and family—especially my parents, Lindalu and Johnny.

Finally, I would like to posthumously thank Professor Merton Miller, who embodied a truly unique combination of tireless energy, intellectual curiosity, creativity, natural intelligence, and insight. Through his unending efforts, Miller became one of the few people whose lasting impact will be felt in both academia and industry. His fingerprints will remain on both the

theory and practice of finance, as well as the worthy fight against excessive government intervention in economic regulation.

In addition to his own substantial contributions to corporate finance, Miller also enriched the theory and practice of finance by cultivating the talents of many other innovators of modern financial theory, including Eugene Fama—Miller's first PhD student at the University of Chicago Graduate School of Business and his coauthor on *The Theory of Finance*—and Myron Scholes. Even after officially retiring from the university, Mert continued to teach a symposium for graduate students, supervise dissertations, travel the world delivering speeches, wrestle with heavy-handed financial regulators and the often-archaic laws that empower them, and serve on the boards of the CBOT, the CME, Dimensional Fund Advisors, and several other noteworthy groups.

I had the genuine privilege of working with Mert for the nearly 10 years I spent writing my doctor's thesis, as well as a few years thereafter. Several of those years we spent collaborating on various articles ranging from currency boards in Indonesia to overregulation of financial markets and value at risk. Not a small part of our joint efforts were spent embroiled in the controversy over Metallgesellschaft AG's so-called "derivatives disaster" in 1993. The fruits of our labors in that regard appeared in 1999 in the book we co-edited entitled *Corporate Hedging in Theory and Practice: Lessons from Metallgesellschaft* (London: Risk Books).

In addition to owing Professor Miller much of what I am professionally, I also felt—as did most all of his students—that he was much more than just an advisor. He was a mentor, devoted teacher, innovator, champion of free markets, faithful friend, and father figure—to many of us. Above all, Merton Miller was a gentleman and scholar of the highest order, endowed with prodigious grace and wit, as well as insatiable intellectual curiosity and keen insight. He will be most fondly remembered and greatly missed.

C.L.C.

# contents

<b>INTRODUCTION</b>	<b>ix</b>
<b>PART ONE</b>	
<b>Risk Management and Corporate Finance</b>	<b>1</b>
<b>CHAPTER 1</b>	
<b>The Nature of Risk</b>	<b>3</b>
<b>CHAPTER 2</b>	
<b>Risk Aversion, Insurance, and Hedging</b>	<b>31</b>
<b>CHAPTER 3</b>	
<b>The Irrelevance of Corporate Financing and     Risk Management Decisions</b>	<b>60</b>
<b>CHAPTER 4</b>	
<b>Increasing Expected Cash Flows or Reducing the Cost of Capital     by Managing Risk</b>	<b>94</b>
<b>CHAPTER 5</b>	
<b>Reducing Conflicts between Security Holders and Managers by     Managing Risk</b>	<b>112</b>
<b>CHAPTER 6</b>	
<b>Reducing Conflicts among Security Holders by Managing Risk</b>	<b>129</b>
<b>CHAPTER 7</b>	
<b>Controlling and Exploiting Informational Asymmetries by     Managing Risk</b>	<b>152</b>



<b>CHAPTER 8</b>	
Value versus Cash Flow versus Earnings Risk Management	<b>188</b>
<b>CHAPTER 9</b>	
Total versus Selective Risk Management	<b>202</b>
<b>PART TWO</b>	
Risk Management and Business Strategy	<b>207</b>
<b>CHAPTER 10</b>	
Risk Culture and Risk Management Business Models	<b>209</b>
<b>CHAPTER 11</b>	
Integrating People, Technology, and Processes through Enterprise-Wide Risk Management	<b>226</b>
<b>CHAPTER 12</b>	
Identifying Market Risk Exposures and Defining Risk Tolerances	<b>248</b>
<b>CHAPTER 13</b>	
Spot, Forward, and Forward-Like Exposures	<b>260</b>
<b>CHAPTER 14</b>	
Identifying Option, Option-Like, and Real Option Exposures	<b>281</b>
<b>CHAPTER 15</b>	
Measuring and Monitoring Market Risk	<b>321</b>
<b>CHAPTER 16</b>	
Identifying, Measuring, and Monitoring Credit Risk	<b>372</b>
<b>CHAPTER 17</b>	
Identifying, Measuring, and Monitoring Liquidity Risk	<b>418</b>
<b>CHAPTER 18</b>	
Identifying, Measuring, and Monitoring Operational Risk	<b>432</b>
<b>CHAPTER 19</b>	
Identifying and Managing Legal Risk	<b>440</b>

---

<b>PART THREE</b>	
<b>The Tactics of Risk Control</b>	<b>455</b>
<b>CHAPTER 20</b>	
<b>Ex Ante Capital Allocation</b>	<b>457</b>
<b>CHAPTER 21</b>	
<b>Ex Post Performance Measurement and Compensation</b>	<b>474</b>
<b>CHAPTER 22</b>	
<b>Internal Controls</b>	<b>485</b>
<b>CHAPTER 23</b>	
<b>Tactical Risk Control with Derivatives</b>	<b>500</b>
<b>CHAPTER 24</b>	
<b>Tactical Risk Control through Actual and Synthetic Asset Divestitures</b>	<b>530</b>
<b>CHAPTER 25</b>	
<b>Strategic Risk Control with Structured Liabilities</b>	<b>542</b>
<b>CHAPTER 26</b>	
<b>Insurance and ART</b>	<b>548</b>
<b>NOTES</b>	<b>569</b>
<b>BIBLIOGRAPHY</b>	<b>584</b>
<b>INDEX</b>	<b>597</b>



# introduction

**D**iscussions of risk management almost always center more on risk than management. How to measure value at risk is often regarded as more important to risk management, for example, than how conflicts between shareholders, creditors, and managers contribute to the need for risk management and inhibit its effective implementation. In business school programs as in actual practice, risk managers are more often viewed as “finance nerds” than general managers. In corporations, risk managers are usually perceived to be a cost center whose jobs senior managers and directors only sometimes understand and very rarely utilize to productive ends. Risk management, in short, is traditionally viewed as the necessary evil by which firms try to quantify—and, if possible, avoid—financial Armageddon.

To make the risk manager’s image problem worse, *financial* risk management is regarded as a relatively new and fad-like phenomenon. Before the great derivatives disasters of the 1990s—Barings, Procter & Gamble, Metallgesellschaft, Orange County, and so forth—risk management was not seen as much more than insurance. Or risk management might have been seen by a trader as, say, how to leg out of one side of a straddle without getting too exposed on the other side. But in general, risk management was *not* seen as a discipline or function by its own right until after a number of mainstream, household corporate giants lost big money on so-called risky derivatives.

But to view *risk management* as novel, independent from, or even secondary to *general management* is to miss the whole point. If anything, risk management is first and foremost about sound general management. In that sense, risk management is an organizational function and business process is hardly new. Principles of sound general management have been around quite a while, and applications of those principles to risk management are not a particularly recent phenomenon—just ask the insurance industry.

Nor is risk management the exclusive playground of financial mathematicians and droll economists. Technical finance problems only enter the picture as distant subordinate issues to the management problems that both necessitate risk management and contribute to the difficulties with its

implementation. Even then, the rocket science can usually be done in a back room by a specialist.

This book offers readers an integrated, comprehensive explanation for how a sound risk management process fits into a sound general management framework, whether it be at a bank, a pharmaceutical company, or a pension plan. Risk management as a process is rationalized, investigated, and demystified in terms of the new business strategies and tactics it engenders as well as the old strategies and tactics it impacts. A picture of risk management is painted that strives to *eliminate* thinking of risk management as a separate field. More than anything, a good understanding of risk management requires not an understanding of calculus or value at risk, but rather a solid grasp of the basic tenets of corporate finance and strategy.

## WHAT THIS BOOK DOES NOT COVER

---

This book adds value by bringing together subjects that usually appear in many different places, often without reference to one another. But on any given detailed subject, earlier writings are certainly available.

I deliberately avoid getting into inordinate details about three very well-covered areas in particular, the first of which is asset pricing. Cochrane (2000) provides a serious, complete, and thoroughly current academic treatment of asset pricing, with Campbell, Lo, and MacKinlay (1996) in a distant second place. More narrowly focused and/or dated but nevertheless still solid references include Merton (1992), Duffie (1996), and Ingersoll (1987). For the not-too-faint-at-heart, a more rigorous presentation of asset pricing in a measure-theoretic framework is found in Duffie (1988). And always a classic no matter how old the original text is Fama and Miller (1972).

*Risk measurement* gets only a few chapters here. Those chapters are reasonably long, granted, but are intended to be broad surveys of methodologies and not toolkits for software programmers. For a deeper look at risk measurement, see Smithson (1998), Jorion (2000), Dowd (1998), and Best (1999). Further, there is no substitute for reading the current academic and trade literature.

A third area that has received enough attention and thus is not dealt with much in this book is financial engineering (e.g., derivatives pricing, hedging, trading strategies, and product design). Essential references in this area include the now-standard text by Hull (2000), as well as Jarrow and Turnbull (1999). For a good mixture of asset pricing and trading strategies, see Petzel (1989).

Two other subjects receive less attention than I would have liked to give them. For lack of space, these subjects—real options and risk-adjusted

capital allocation—are given only brief coverage. The stack of books to pull off the shelf is fewer in number in these two areas than the others mentioned. For anyone remotely interested in risk-adjusted capital allocation, the book by Matten (2000) is required reading. For the basics of real options, Dixit and Pindyck (1994) and Trigeorgis (1996) still lead the field. Probably the best collection of actual cases of companies using real options theories in practice is Trigeorgis (1999).

## OBJECTS AND CONTENT OF THE BOOK

---

Most books on risk management and/or financial instruments give very little time and attention to the issue of why corporations—whether trading houses, banks, pharmaceuticals, or windmills—should *care* about risk management. Doherty (2000) is a truly notable exception.

The absence of the treatment of things like expected utility theory and the M&M propositions at the front of many financial instrument and risk management books is not so much the failures of authors, but rather to the unfortunate association that exists between the rise of risk management and the advent of the great derivatives disasters. Risk management gained popularity in the 1990s as a response to large, well-publicized losses—and the regulatory and political scrutiny that followed them. Risk management was around well before Orange County went bust. But the sad linkage often made between risk management and loss avoidance has muddied the waters on why firms manage risk, both in rendering the question unimportant in many people's minds and in severing the link between *why* firms hedge and *how* firms hedge. This book attempts to explore and reestablish that linkage.

Part One begins with a discussion of risk management and corporate finance. Beginning a book on the business strategy and tactics or risk management with a discussion of basic principles of corporate finance may seem strange. But in fact, risk management and corporate finance are inextricably related, with corporate finance being the backbone of the *strategy* of risk management.

In many ways, risk management itself is a substitute for equity capital. Companies that have enough equity, after all, may well prefer to take an occasional loss rather than to spend considerable sums of money managing their risks. Indeed, the first principles of the theory of corporate finance—the Modigliani-Miller capital structure irrelevance propositions—tell us that value-maximizing firms *should not* spend money to manage their risks—at least not under certain assumptions.

For many years, the reasons why firms *should not* manage risk were swept to the side by assumptions that firms behave just like risk-averse

individuals. As the modern theory of corporate finance has evolved, however, theories that explain why corporations can sometimes increase their value by pursuing formal risk management initiatives started to appear with increasing frequency. Today, the list of reasons for a corporation to pay serious attention to risk management is impressive.

Nevertheless, without a solid understanding of *why* risk management makes sense, the design of a risk management strategy and the implementation of that strategy can easily fall flat. At best, a failure to connect explanations for why managing risk can add shareholder value with the design of a risk management program will leave some unexploited efficiency gains and opportunities on the table. But at worst, the disconnect between corporate finance and risk management can lead a firm to implement the wrong risk management program altogether, sometimes leaving it exposed to even greater risks than if it had done nothing.

Chapter 1 begins with an introduction to the four-letter word that will reappear hundreds of times in this book—*risk*. This opening chapter offers some context to the definitional conundrum facing us when we use the term risk, and attempts to address some of those ambiguities by classifying risk into different perspectives that will be used throughout the book. In Chapter 2, the effect of risk on individuals is examined—specifically in the context of how risk affects individual behavior and how that behavior can be modeled using expected utility theory. The basic model of portfolio selection by a risk-averse investor—the Markowitz mean-variance portfolio selection model—is developed and extended to the problem of *hedging* by individual traders.

In Chapter 3, the various reasons why models of *individual hedging* do not extend to models of *corporate hedging* are presented, including a basic proof of the M&M capital structure irrelevance propositions. The inability of financial instruments such as derivatives to change the value of the firm in an M&M world is also explained. This then sets the stage for the next four chapters, each of which deal with explanations for why risk management *can* add value to a firm. The explanations include adding value by reducing expected costs, increasing expected cash flows, and decreasing the cost of capital (Chapter 4), reducing conflicts between security holders and managers (Chapter 5), reducing conflicts among different classes of security holders (Chapter 6), and managing or exploiting informational asymmetries (Chapter 7).

Chapters 8 and 9 conclude Part One by raising two strategic risk management issues often neglected in the mainstream theories of why firms hedge. The first issue, discussed in Chapter 8, is that firms can have a risk management focus aimed at any of three measures of financial strength—value, cash flows, and earnings. But these objectives are not always