

Quantitative Risk Management

A Practical Guide to Financial Risk

Thomas S. Coleman



WILEY

John Wiley & Sons, Inc.

Copyright © 2012 by Thomas S. Coleman. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118026586.html>
<http://www.amazon.com/dp/1118026586>

CONTENTS

Foreword	ix
Preface	xiii
Acknowledgments	xvii
Part I: Managing Risk	1
Chapter 1: Risk Management versus Risk Measurement	3
1.1: Contrasting Risk Management and Risk Measurement	5
1.2: Redefinition and Refocus for Risk Management	5
1.3: Quantitative Measurement and a Consistent Framework	6
1.4: Systemic versus Idiosyncratic Risk	12
Chapter 2: Risk, Uncertainty, Probability, and Luck	15
2.1: What is Risk?	15
2.2: Risk Measures	19
2.3: Randomness and the Illusion of Certainty	21
2.4: Probability and Statistics	39
2.5: The Curse of Overconfidence	62
2.6: Luck	64
Chapter 3: Managing Risk	67
3.1: Manage People	68
3.2: Manage Infrastructure – Process, Technology, Data	71
3.3: Understand the Basis	73
3.4: Organizational Structure	84
3.5: Brief Overview of Regulatory Issues	90
3.6: Managing the Unanticipated	92
3.7: Conclusion	99
Chapter 4: Financial Risk Events	101
4.1: Systemic versus Idiosyncratic Risk	102
4.2: Idiosyncratic Financial Events	103
4.3: Systemic Financial Events	132
4.4: Conclusion	135
Chapter 5: Practical Risk Techniques	137
5.1: Value of Simple, Approximate Answers	138
5.2: Volatility and Value at Risk (VaR)	139
5.3: Extreme Events	150
5.4: Calculating Volatility and VaR	153
5.5: Summary for Volatility and VaR	158
5.6: Portfolio Tools	158
5.7: Conclusion	167
Chapter 6: Uses and Limitations of Quantitative Techniques	169
6.1: Risk Measurement Limitations	170
Part II: Measuring Risk	173
Chapter 7: Introduction to Quantitative Risk Measurement	175
7.1: Project Implementation	176
7.2: Typology of Financial Institution Risks	178
7.3: Conclusion	184
Chapter 8: Risk and Summary Measures: Volatility and VaR	187

8.1: Risk and Summary Measures	187
8.2: Comments Regarding Quantitative Risk Measures	202
8.3: Methods for Estimating the P&L Distribution	206
8.4: Techniques and Tools for Tail Events	226
8.5: Estimating Risk Factor Distributions	244
8.6: Uncertainty and Randomness – The Illusion of Certainty	251
8.7: Conclusion	254
Appendix 8.1: Small-Sample Distribution of VaR and Standard Errors	254
Appendix 8.2: Second Derivatives and the Parametric Approach	262
Chapter 9: Using Volatility and VaR	269
9.1: Simple Portfolio	269
9.2: Calculating P&L Distribution	270
9.3: Summary Measures to Standardize and Aggregate	285
9.4: Tail Risk or Extreme Events	290
9.5: Conclusion	306
Appendix 9.1: Parametric Estimation using Second Derivatives	307
Chapter 10: Portfolio Risk Analytics and Reporting	311
10.1: Volatility, Triangle Addition, and Risk Addition	312
10.2: Contribution to Risk	317
10.3: Best Hedge	327
10.4: Replicating Portfolio	333
10.5: Principal Components and Risk Aggregation	337
10.6: Risk Reporting	346
10.7: Conclusion	361
Appendix 10.1: Various Formulae for Marginal Contribution and Volatilities	361
Appendix 10.2: Stepwise Procedure for Replicating Portfolio	369
Appendix 10.3: Principal Components Overview	370
Chapter 11: Credit Risk	377
11.1: Introduction	377
11.2: Credit Risk versus Market Risk	380
11.3: Stylized Credit Risk Model	383
11.4: Taxonomy of Credit Risk Models	409
11.5: Static Structural Models	411
11.6: Static Reduced Form Models – CreditRisk+	429
11.7: Static Models – Threshold and Mixture Frameworks	443
11.8: Actuarial versus Equivalent Martingale (Risk-Neutral) Pricing	458
11.9: Dynamic Reduced Form Models	464
11.10: Conclusion	472
Appendix 11.1: Probability Distributions	478
Chapter 12: Liquidity and Operational Risk	481
12.1: Liquidity Risk – Asset versus Funding Liquidity	481
12.2: Asset Liquidity	484
12.3: Funding Liquidity Risk	496
12.4: Operational Risk	513
12.5: Conclusion	527
Chapter 13: Conclusion	529
About the Companion Web Site	531
References	533
About the Author	539