Contents

Business Snapshots xxi

Preface xxiii

CHAPTER 1
Introduction 1
1.1 Risk vs. Return for Investors 2
1.2 The Efficient Frontier 5
1.3 The Capital Asset Pricing Model 8
1.4 Arbitrage Pricing Theory 13
1.5 Risk vs. Return for Companies 13
1.6 Risk Management by Financial Institutions 17
1.7 Credit Ratings 18
Summary 19
Further Reading 19
Practice Questions and Problems (Answers at End of Book) 19
Further Questions 20

PART ONE
FINANCIAL INSTITUTIONS AND THEIR TRADING

CHAPTER 2
Banks 25
2.1 Commercial Banking 26
2.2 The Capital Requirements of a Small Commercial Bank 28
2.3 Deposit Insurance 30
2.4 Investment Banking 31
2.5 Securities Trading 36
2.6 Potential Conflicts of Interest in Banking 37
2.7 Today's Large Banks 38
2.8 The Risks Facing Banks 41
Summary 42
Further Reading 43
Practice Questions and Problems (Answers at End of Book) 43
Further Questions 44

CHAPTER 3
Insurance Companies and Pension Plans **45**
3.1 Life Insurance 45
3.2 Annuity Contracts 49
3.3 Mortality Tables 50
3.4 Longevity and Mortality Risk 53
3.5 Property-Casualty Insurance 54
3.6 Health Insurance 56
3.7 Moral Hazard and Adverse Selection 58
3.8 Reinsurance 59
3.9 Capital Requirements 60
3.10 The Risks Facing Insurance Companies 61
3.11 Regulation 61
3.12 Pension Plans 63
Summary 66
Further Reading 67
Practice Questions and Problems (Answers at End of Book) 68
Further Questions 69

CHAPTER 4
Mutual Funds and Hedge Funds **71**
4.1 Mutual Funds 71
4.2 Hedge Funds 79
4.3 Hedge Fund Strategies 84
4.4 Hedge Fund Performance 88
Summary 89
Further Reading 90
Practice Questions and Problems (Answers at End of Book) 90
Further Questions 91

CHAPTER 5
Trading in Financial Markets **93**
5.1 The Markets 93
5.2 Clearing Houses 94
5.3 OTC Market Changes 95
5.4 Long and Short Positions in Assets 96
5.5 Derivatives Markets 97
5.6 Plain Vanilla Derivatives 98
5.7 Non-Traditional Derivatives 108
5.8 Exotic Options and Structured Products 112
5.9 Risk Management Challenges 114
Summary 116
Further Reading 116
Practice Questions and Problems (Answers at End of Book) 117
Further Questions 119

CHAPTER 6
The Credit Crisis of 2007 121
6.1 The U.S. Housing Market 121
6.2 Securitization 124
6.3 The Crisis 130
6.4 What Went Wrong? 131
6.5 Lessons from the Crisis 133
Summary 134
Further Reading 135
Practice Questions and Problems (Answers at End of Book) 135
Further Questions 136

CHAPTER 7
Valuation and Scenario Analysis: The Risk-Neutral and Real Worlds 137
7.1 Volatility and Asset Prices 138
7.2 Risk-Neutral Valuation 139
7.3 Scenario Analysis 144
7.4 When Both Worlds Have to be Used 144
7.5 The Calculations in Practice 145
7.6 Estimating Real-World Processes 146
Summary 147
Further Reading 148
Practice Questions and Problems (Answers at End of Book) 148
Further Questions 148

PART TWO
MARKET RISK

CHAPTER 8
How Traders Manage Their Risks 153
8.1 Delta 153
8.2 Gamma 160
8.3 Vega 162
8.4 Theta 164
8.5 Rho 165
8.6 Calculating Greek Letters 166
8.7 Taylor Series Expansions 167
8.8 The Realities of Hedging 168
8.9 Hedging Exotic Options 169
8.10 Scenario Analysis 170
Summary 172
Further Reading 172
Practice Questions and Problems (Answers at End of Book) 172
Further Questions 173

CHAPTER 9
Interest Rate Risk **175**
9.1 The Management of Net Interest Income 175
9.2 Types of Rates 178
9.3 Duration 182
9.4 Convexity 185
9.5 Generalization 187
9.6 Nonparallel Yield Curve Shifts 189
9.7 Interest Rate Deltas in Practice 191
9.8 Principal Components Analysis 193
9.9 Gamma and Vega 196
Summary 197
Further Reading 197
Practice Questions and Problems (Answers at End of Book) 198
Further Questions 199

CHAPTER 10
Volatility **201**
10.1 Definition of Volatility 201
10.2 Implied Volatilities 204
10.3 Are Daily Percentage Changes in Financial Variables Normal? 205
10.4 The Power Law 207
10.5 Monitoring Daily Volatility 209
10.6 The Exponentially Weighted Moving Average Model 212
10.7 The GARCH(1,1) Model 214
10.8 Choosing Between the Models 216
10.9 Maximum Likelihood Methods 216
10.10 Using GARCH(1,1) to Forecast Future Volatility 222
Summary 225
Further Reading 226
Practice Questions and Problems (Answers at End of Book) 227
Further Questions 228

CHAPTER 11
Correlations and Copulas **231**
11.1 Definition of Correlation 231
11.2 Monitoring Correlation 233
11.3 Multivariate Normal Distributions 236
11.4 Copulas 238
11.5 Application to Loan Portfolios: Vasicek's Model 244
Summary 250
Further Reading 250
Practice Questions and Problems (Answers at End of Book) 250
Further Questions 252

CHAPTER 12
Value at Risk and Expected Shortfall 255
12.1 Definition of VaR 255
12.2 Examples of the Calculation of VaR 257
12.3 A Drawback of VaR 258
12.4 Expected Shortfall 259
12.5 Coherent Risk Measures 260
12.6 Choice of Parameters for VaR and ES 263
12.7 Marginal, Incremental, and Component Measures 268
12.8 Euler's Theorem 269
12.9 Aggregating VaRs and ESs 270
12.10 Back-Testing 270
Summary 273
Further Reading 274
Practice Questions and Problems (Answers at End of Book) 274
Further Questions 275

CHAPTER 13
Historical Simulation and Extreme Value Theory 277
13.1 The Methodology 277
13.2 Accuracy of VaR 282
13.3 Extensions 284
13.4 Computational Issues 289
13.5 Extreme Value Theory 289
13.6 Applications of EVT 292
Summary 295
Further Reading 295
Practice Questions and Problems (Answers at End of Book) 296
Further Questions 297

CHAPTER 14
Model-Building Approach 299
14.1 The Basic Methodology 299
14.2 Generalization 302
14.3 Correlation and Covariance Matrices 303
14.4 Handling Interest Rates 307
14.5 Applications of the Linear Model 310
14.6 Linear Model and Options 311
14.7 Quadratic Model 314
14.8 Monte Carlo Simulation 316
14.9 Non-Normal Assumptions 317
14.10 Model-Building vs. Historical Simulation 318
Summary 319
Further Reading 319
Practice Questions and Problems (Answers at End of Book) 319
Further Questions 321

PART THREE
REGULATION

CHAPTER 15
Basel I, Basel II, and Solvency II **325**
15.1 The Reasons for Regulating Banks 325
15.2 Bank Regulation Pre-1988 326
15.3 The 1988 BIS Accord 327
15.4 The G-30 Policy Recommendations 330
15.5 Netting 331
15.6 1996 Amendment 333
15.7 Basel II 336
15.8 Credit Risk Capital Under Basel II 337
15.9 Operational Risk Capital Under Basel II 346
15.10 Pillar 2: Supervisory Review 346
15.11 Pillar 3: Market Discipline 347
15.12 Solvency II 347
Summary 349
Further Reading 349
Practice Questions and Problems (Answers at End of Book) 350
Further Questions 351

CHAPTER 16
Basel II.5, Basel III, and Other Post-Crisis Changes **353**
16.1 Basel II.5 353
16.2 Basel III 357
16.3 Contingent Convertible Bonds 365
16.4 Dodd–Frank Act 366
16.5 Legislation in other Countries 368
Summary 370
Further Reading 371
Practice Questions and Problems (Answers at End of Book) 371
Further Questions 372

CHAPTER 17
Fundamental Review of the Trading Book **373**
17.1 New Market Risk Measures 373
17.2 Trading Book vs. Banking Book 377
17.3 Credit Trades 378
Summary 379
Further Reading 379
Practice Questions and Problems (Answers at End of Book) 379
Further Questions 380

PART FOUR
CREDIT RISK

CHAPTER 18
Managing Credit Risk: Margin, OTC Markets, and CCPs **383**
18.1 Margin and Exchanges 383
18.2 OTC Markets 388
18.3 Consequences of New OTC Regulations 392
18.4 The Risk of a CCP Failure 396
Summary 396
Further Reading 397
Practice Questions and Problems (Answers at End of Book) 397
Further Questions 398

CHAPTER 19
Estimating Default Probabilities **399**
19.1 Credit Ratings 399
19.2 Historical Default Probabilities 401
19.3 Recovery Rates 403
19.4 Credit Default Swaps 404
19.5 Credit Spreads 409
19.6 Estimating Default Probabilities from Credit Spreads 412
19.7 Comparison of Default Probability Estimates 414
19.8 Using Equity Prices to Estimate Default Probabilities 419
Summary 422
Further Reading 422
Practice Questions and Problems (Answers at End of Book) 423
Further Questions 424

CHAPTER 20
CVA and DVA **427**
20.1 Credit Exposure on Derivatives 427
20.2 CVA 429
20.3 The Impact of a New Transaction 432
20.4 CVA Risk 434
20.5 Wrong-Way Risk 435
20.6 DVA 436
20.7 Some Simple Examples 437
Summary 441
Further Reading 442
Practice Questions and Problems (Answers at End of Book) 442
Further Questions 443

CHAPTER 21
Credit Value at Risk **445**
21.1 Ratings Transition Matrices 446
21.2 Vasicek's Model 448
21.3 Credit Risk Plus 449
21.4 Creditmetrics 451
21.5 Credit-Sensitive Instruments in the Trading Book 454
Summary 457
Further Reading 458
Practice Questions and Problems (Answers at End of Book) 458
Further Questions 459

PART FIVE
OTHER TOPICS

CHAPTER 22
Scenario Analysis and Stress Testing **463**
22.1 Generating the Scenarios 463
22.2 Regulation 469
22.3 What to Do with the Results 473
Summary 476
Further Reading 476
Practice Questions and Problems (Answers at End of Book) 477
Further Questions 478

CHAPTER 23
Operational Risk **479**
23.1 Defining Operational Risk 481
23.2 Determination of Regulatory Capital 481
23.3 Categorization of Operational Risks 483
23.4 Loss Severity and Loss Frequency 484
23.5 Implementation of AMA 485
23.6 Proactive Approaches 489
23.7 Allocation of Operational Risk Capital 492
23.8 Use of Power Law 492
23.9 Insurance 493
23.10 Sarbanes-Oxley 494
Summary 495
Further Reading 496
Practice Questions and Problems (Answers at End of Book) 496
Further Questions 497

CHAPTER 24
Liquidity Risk **499**
24.1 Liquidity Trading Risk 499
24.2 Liquidity Funding Risk 507

24.3	Liquidity Black Holes	515
	Summary	522
	Further Reading	522
	Practice Questions and Problems (Answers at End of Book)	523
	Further Questions	524

CHAPTER 25
Model Risk **525**

25.1	Marking to Market	525
25.2	Models for Linear Products	527
25.3	Physics vs. Finance	529
25.4	How Models are Used for Pricing Standard Products	530
25.5	Hedging	536
25.6	Models for Nonstandard Products	537
25.7	Dangers in Model Building	540
25.8	Detecting Model Problems	541
	Summary	542
	Further Reading	542
	Practice Questions and Problems (Answers at End of Book)	543
	Further Questions	543

CHAPTER 26
Economic Capital and RAROC **545**

26.1	Definition of Economic Capital	545
26.2	Components of Economic Capital	547
26.3	Shapes of the Loss Distributions	549
26.4	Relative Importance of Risks	551
26.5	Aggregating Economic Capital	552
26.6	Allocation of Economic Capital	555
26.7	Deutsche Bank's Economic Capital	557
26.8	RAROC	557
	Summary	559
	Further Reading	559
	Practice Questions and Problems (Answers at End of Book)	559
	Further Questions	560

CHAPTER 27
Enterprise Risk Management **563**

27.1	Risk Appetite	564
27.2	Risk Culture	568
27.3	Identifying Major Risks	572
27.4	Strategic Risk Management	574
	Summary	575
	Further Reading	576
	Practice Questions and Problems (Answers at End of Book)	576
	Further Questions	576

Państwowa Wyższa Szkoła Zawodowa w Nysie BIBLIOTEKA

CHAPTER 28
Risk Management Mistakes to Avoid **577**
28.1 Risk Limits 577
28.2 Managing the Trading Room 580
28.3 Liquidity Risk 582
28.4 Lessons for Nonfinancial Corporations 585
28.5 A Final Point 586
Further Reading 587

PART SIX
APPENDICES

Appendix A
Compounding Frequencies for Interest Rates **591**

Appendix B
Zero Rates, Forward Rates, and Zero-Coupon Yield Curves **595**

Appendix C
Valuing Forward and Futures Contracts **599**

Appendix D
Valuing Swaps **601**

Appendix E
Valuing European Options **603**

Appendix F
Valuing American Options **605**

Appendix G
Taylor Series Expansions **609**

Appendix H
Eigenvectors and Eigenvalues **613**

Appendix I
Principal Components Analysis **617**

Appendix J
Manipulation of Credit Transition Matrices **619**

Appendix K
Valuation of Credit Default Swaps **621**

Appendix L
Synthetic CDOs and Their Valuation 625

Answers to Questions and Problems 629

Glossary 669

DerivaGem Software 689

Table for $N(x)$ when $x \leq 0$ 695

Table for $N(x)$ when $x \geq 0$ 697

Index 699