

## Contents

**Foreword** 13

**Introduction and Acknowledgements** 17

**Part I Markets** 19

**1 Market Structure** 21

- 1.1 Market Development 22
  - 1.1.1 Historical Development 22
  - 1.1.2 Size and Growth of the Market 27
- 1.2 Market Participants 27
  - 1.2.1 Banks 28
  - 1.2.2 Insurance Companies 29
  - 1.2.3 Funds and Asset Managers 30
  - 1.2.4 Retail Clients 30
  - 1.2.5 Hedge Funds 30
- 1.3 Issuing Debt from a Company's Viewpoint 31
- 1.4 Ratings and Rating Agencies 33
  - 1.4.1 Are Ratings an Efficient Source for Pricing Credits? 36
- 1.5 Credit Classes 39
  - 1.5.1 High-Grade Universe 39
  - 1.5.2 High-Yield and Crossover Credits 40
  - 1.5.3 High-Quality Segment 41
  - 1.5.4 Asset Backed Securities 42

**2 Instruments** 45

- 2.1 Straight Bonds 45
- 2.2 Bonds with Embedded Options 47
- 2.3 Exotics 48
  - 2.3.1 Payment-in-Kind Notes 49

2.3.2	Hybrids or Subordinated Corporate Bonds	50
2.4	Hybrid Bank Capital	53
2.5	Single-Name Credit Derivatives	55
2.5.1	Credit Default Swaps	55
2.5.2	Digital Default Swaps	58
2.5.3	Equity Default Swaps	58
2.5.4	Recovery Default Swaps	60
2.5.5	Constant Maturity Credit Default Swaps	61
2.6	Portfolio Credit Derivatives	62
2.6.1	Basket/Index Swaps – iTraxx Europe Benchmark	62
2.6.2	Default Baskets	65
2.6.3	Standardized iTraxx Tranches	67
2.6.4	Spread Options	68
2.6.5	Future Contracts	70
2.7	Outlook on Product Development	70

### **3 Company and Debt Instrument Analysis 73**

3.1	Sovereign Risk and Government Support	74
3.2	Business Risk	74
3.3	Financial Risk	82
3.3.1	Off-Balance-Sheet Adjustments	86
3.3.2	Adjustment of Ratios	91
3.4	The Rating Agencies' Methodology	93
3.5	Evaluation of Specific Debt Instruments	96
3.6	Recovery Rate Estimates	99

### **4 The Economics of Credit Spreads 103**

4.1	Macro Drivers	103
4.1.1	Credits in the Business Cycle	103
4.1.2	Yields and Spreads	106
4.1.3	Credits and Exchange Rates	108
4.1.4	Credits and Commodity Prices	109
4.1.5	Credits and Inflation	111
4.1.6	Credits and External Shocks	113
4.2	Micro Drivers	115
4.3	Credit Quality	117
4.3.1	Credit Quality Trend	117

- 4.3.2 Default Rates 117
- 4.3.3 Recovery Rates: The Collins & Aikman Case 120
- 4.3.4 Implied Ratings 122
- 4.4 Equity–Debt Linkage 123
  - 4.4.1 The Basic Merton Approach: Structural Models 123
  - 4.4.2 Merton in Practice 128
  - 4.4.3 Leap-Put Skewness as an Equity–Debt Indicator 131
  - 4.4.4 Empirical Evidence for the Equity–Debt Linkage 133
- 4.5 Market Technicals 136
  - 4.5.1 Is there a New Issuance Premium? 137
  - 4.5.2 Technical Bid 138
  - 4.5.3 The Impact of Syndicated Loans on Corporate Bonds 139

## **Part II Models** 141

### **5 Fixed Income Basics** 143

- 5.1 Basic Valuation Concepts 143
  - 5.1.1 The Discount Function 143
  - 5.1.2 Spot Rates and the Term Structure of Interest Rates 149
  - 5.1.3 Forward Rates 154
- 5.2 Obtaining the Term Structure of Interest Rates 158
- 5.3 The Yield to Maturity 159
- 5.4 Measurement of Interest Rate Risk 162

### **6 Spread Measures** 171

- 6.1 Basic Considerations 171
- 6.2 Yield Spreads 173
- 6.3 Z-Spreads 177
- 6.4 Asset Swap Spreads 180
- 6.5 Spread Measures for Floaters 184
- 6.6 Spreads and the Real Economy 186
- 6.7 Conclusion 192

### **7 Basics of Credit Risk Models** 195

- 7.1 The Components of Credit Risk 196
- 7.2 A Single-Step, Two-Stage Model 198

7.3	A Multi-Step Model for Zero Coupon Bonds	202
7.4	The Multi-Step Model	208
7.5	Continuous-Time Approach	210
7.6	Recovery Treatment	217
7.6.1	Fitch's Recovery-Rating Methodology	228
7.7	The Term Structure of Credit Spreads	231

## **8 Single-Name Models** 237

8.1	Reduced-Form Models	238
8.1.1	Binomial Tree Models for Default Risk	244
8.1.2	Reduced-Form Models and Illiquid Claims	249
8.2	Structural Models	250
8.3	Rating-Based Transition Matrix Models	260
8.3.1	Redefining the Default Event	265

## **9 Portfolio Models** 271

9.1	The Loss Distribution and its Impact on Portfolio Derivatives	273
9.2	Independent Defaults	276
9.3	Default Dependency	282
9.4	Term-Structure Effects	288
9.5	Valuing First-to-Default Baskets	289
9.6	Valuing CDO Tranches with the HLPGC Model	292
9.7	Spread Dispersion	296
9.8	Price Discovery versus Model Competition	300

## **10 Valuation of Credit Derivatives** 303

10.1	Credit Default Swaps	304
10.1.1	Discrete-Time Model	305
10.1.2	Obtaining the Survival Probability Curve	311
10.1.3	Forward CDS Valuation	314
10.1.4	CDS Sensitivities	316
10.1.5	Continuous-Time Model	318
10.1.6	Bloomberg's CDSW Function	319
10.2	Options on Credit-Risky Instruments	322
10.2.1	Single-Name Credit Default Swaptions	323
10.2.2	Index Swaptions	326
10.3	CDS Indices	327

- 10.4  $n^{\text{th}}$ -to-Default Baskets 330
- 10.5 Collateralized Debt Obligations 337
  - 10.5.1 Standardized iTraxx Tranches 338
  - 10.5.2 Compound and Base Correlation 341
  - 10.5.3 Sensitivities of iTraxx Index Tranches 346
- 10.6 Exotic Derivatives 357
  - 10.6.1 Equity Default Swaps 357
  - 10.6.2 Constant Maturity Structures 358
  - 10.6.3 Digital Default Swaps and Recovery Swaps 360

## **11 Portfolio Risk Measurement 365**

- 11.1 Risk Measures 365
  - 11.1.1 Market Risk versus Credit Risk 365
  - 11.1.2 Value at Risk and Conditional Value at Risk 367
  - 11.1.3 Risk Components 372
- 11.2 Credit Portfolio Models 373

## **Part III Management 377**

### **12 Principles of Credit Portfolio Management 379**

- 12.1 The Role of ACPM in the Asset Allocation Process 379
- 12.2 Management Styles: Passive or Active 386
  - 12.2.1 Passive Management 386
  - 12.2.2 Active Management 388
- 12.3 Quantitative and Fundamental Credit Research 389
- 12.4 Diversification in Credit Portfolios 391
- 12.5 Credit Risk Management in an ALM Environment 393
- 12.6 Credits in the Global Asset Allocation 394
  - 12.6.1 Increasing Importance of Credit-Risky Instruments 394
  - 12.6.2 Credits, Government Bonds, and Equities 395
- 12.7 Building Blocks of Credit Portfolio Management 397
  - 12.7.1 Step 1: Investment Targets 398
  - 12.7.2 Step 2: Risk Factors 400
  - 12.7.3 Step 3: Economic Variables 401
  - 12.7.4 Step 4: Forecasting and Scenario Assessment 401
  - 12.7.5 Step 5: Sensitivities 402
  - 12.7.6 Step 6: Portfolio Optimization Analysis 403

12.7.7	Step 7: Portfolio Adjustments	404
12.7.8	Step 8: Performance Analysis	405
12.8	Key Portfolio Figures	406

### **13 Portfolio Allocation** 409

13.1	Indices	410
13.1.1	The Function of Indices	410
13.1.2	The iBoxx € Index Universe	411
13.1.3	Analyzing the RDAX	413
13.2	Sector Allocation in a Markowitz Framework	418
13.3	Quality Allocation	421
13.4	Tools to Derive the Optimal Allocation	424
13.4.1	Alpha and Beta	425
13.4.2	The Shortcomings of a Beta Analysis	425
13.4.3	Aggregated Z-Scores	427
13.4.4	Equity Volatility as a Tool in the Allocation Process	428

### **14 Performance Measures** 431

14.1	Tracking Error	432
14.2	Sharpe Ratio and Treynor Ratio	433
14.3	Information Ratio	435
14.4	Summary	436

### **15 Performance Analysis** 437

15.1	Return Accumulation	437
15.2	Return Attribution Analysis	438

### **16 Hedging Credit Risk** 443

16.1	Hedging on a Single-Name Level	443
16.1.1	Basic Considerations	443
16.1.2	Hedging Default Risk	445
16.1.3	Hedging Spread Risk	448
16.2	Hedging on a Portfolio Level	452
16.2.1	Basic Considerations	453
16.2.2	Hedging Systematic Spread Risk for a Single Cash Bond	453
16.2.3	Hedging Systematic Spread Risk for a Credit Portfolio	458

16.2.4 Finding the Right Hedging Instrument 462

**17 Trading Strategies** 469

- 17.1 Trading Cash Bonds 469
- 17.2 Trading Strategies with Single-Name CDS 472
  - 17.2.1 Plain-Vanilla CDS Trades 474
  - 17.2.2 Switch Ideas 474
  - 17.2.3 Curve Trades 475
- 17.3 Portfolio Derivatives Trades 476
  - 17.3.1 Single Name versus Sector or Market 476
  - 17.3.2 Core–Satellite Strategies 477
  - 17.3.3 Sector and Segment Trades 478
  - 17.3.4 Trading the Skew 479
  - 17.3.5 Basis Trades 481
  - 17.3.6 First-to-Default Baskets 482
  - 17.3.7 iTraxx Tranches versus Default Baskets 485
  - 17.3.8 Playing the Steepness of the iTraxx Curve 488
- 17.4 Spread Options: Single and Complex Strategies 489
- 17.5 CPPI Strategies Including iTraxx Indices 490
- 17.6 Correlation Trading 492
- 17.7 Capital Structure Arbitrage Trades 494
- 17.8 Recovery Trades 495
- 17.9 EDS versus CDS and the Role of DDS 496
- 17.10 CDS–Cash–Repo Arbitrage 500
  - 17.10.1 The Repo Market 500
  - 17.10.2 How an Arbitrage Trade Works 501

**18 Operational Issues: Accounting** 503

- 18.1 An Introduction to IAS 39 504
  - 18.1.1 The Scope of IAS 39 504
  - 18.1.2 Categories of Financial Instruments 505
  - 18.1.3 Measurement 507
  - 18.1.4 Recognition and Derecognition 512
  - 18.1.5 Embedded Derivatives 513
  - 18.1.6 Hedge Accounting 515
- 18.2 IAS 39 Accounting for Credit Instruments 518
  - 18.2.1 Bonds and Loans 518

18.2.2	Credit Default Swaps	521
18.2.3	Total Return Swaps	523
18.2.4	Credit Linked Notes	525
18.2.5	iTraxx Products	526
18.2.6	Other Instruments of Interest	527

**19 Operational Issues: Basel II** 529

19.1	An Introduction to Basel II	529
19.1.1	The Basic Structure	529
19.1.2	The Standardized Approach	533
19.1.3	The Foundation IRB Approach	534
19.1.4	The Advanced IRB Approach	538
19.1.5	Securitization Transactions	540
19.1.6	Credit Risk Mitigation	543
19.2	Basel II for Credit Instruments	547
19.2.1	Credit Default Swaps	547
19.2.2	Total Return Swaps	550
19.2.3	Credit Linked Notes	551
19.2.4	Default Baskets	553
19.2.5	iTraxx Products	555

**Part IV Appendix** 557

A.1	Analytics with Bloomberg and Reuters	559
A.1.1	Bloomberg	559
A.1.2	Reuters	560
A.2	Default and Recovery Data from Rating Agencies	563

**References** 569

**Index** 575