

Contents

Foreword		xiii
PART I INTRODUCTION		
1 Credit Securitizations and Derivatives		3
1.1 Economic Cycles and Credit Portfolio Risk		3
1.2 Credit Portfolio Risk Measurement		6
1.3 Credit Portfolio Risk Tranching		7
1.4 Credit Ratings		7
1.5 Actuarial vs. Market Credit Risk Pricing		7
1.6 Regulation		8
1.7 Thank You		9
References		9
2 Developments in Structured Finance Markets		11
2.1 Impairments of Asset-Backed Securities and Outstanding Ratings		11
2.2 Issuance of Asset-Backed Securities and Outstanding Volume		17
2.3 Global CDO Issuance and Outstanding Volume		19
Concluding Remarks		29
Notes		29
References		31
PART II CREDIT PORTFOLIO RISK MEASUREMENT		
3 Mortgage Credit Risk		35
3.1 Introduction		35
3.2 Five “C”s of Credit and Mortgage Credit Risk		38
3.3 Determinants of Mortgage Default, Loss Given Default and Exposure at Default		41
3.3.1 Determinants of Mortgage Default		41
3.3.2 Determinants of Mortgage LGD		43
3.3.3 Determinants of Mortgage EAD		48
3.4 Modeling Methods for Default, LGD and EAD		48
3.5 Model Risk Management		48

3.6	Conclusions	51
	References	51
4	Credit Portfolio Correlations and Uncertainty	53
4.1	Introduction	53
4.2	Gaussian and Semi-Gaussian Single Risk Factor Model	54
4.3	Individual and Simultaneous Confidence Bounds and Intervals	55
4.4	Confidence Intervals for Asset Correlations	57
4.5	Confidence Intervals for Default and Survival Time Correlations	59
	4.5.1 Confidence Intervals for Default Correlations	60
	4.5.2 Confidence Intervals for Survival Time Correlations	61
4.6	Example	63
4.7	Conclusion	65
	Appendix	66
	Notes	69
	References	69
5	Credit Portfolio Correlations with Dynamic Leverage Ratios	71
5.1	Introduction	71
5.2	The Hui et al. (2007) Model	72
	5.2.1 The Method of Images for Constant Coefficients	73
	5.2.2 The Method of Images for Time-Varying Coefficients	74
5.3	Modelling Default Correlations in a Two-Firm Model	75
	5.3.1 Default Correlations	75
	5.3.2 A Two-Firm Model with Dynamic Leverage Ratios	75
	5.3.3 Method of Images for Constant Coefficients at Certain Values of ρ_{12}	78
	5.3.4 Method of Images for Time-Varying Coefficients at Certain Values of ρ_{12}	79
	5.3.5 Alternative Methodologies for General Values of ρ_{12}	81
5.4	Numerical Results	81
	5.4.1 Accuracy	83
	5.4.2 The Impact of Correlation between Two Firms	84
	5.4.3 The Impact of Different Credit Quality Paired Firms	86
	5.4.4 The Impact of Volatilities	87
	5.4.5 The Impact of Drift Levels	88
	5.4.6 The Impact of Initial Value of Leverage Ratio Levels	89
	5.4.7 Impact of Correlation between Firms and Interest Rates	89
	5.4.8 The Price of Credit-Linked Notes	91
5.5	Conclusion	92
	Notes	93
	References	94
6	A Hierarchical Model of Tail-Dependent Asset Returns	95
6.1	Introduction	95
6.2	The Variance Compound Gamma Model	97
	6.2.1 Multivariate Process for Logarithmic Asset Returns	97
	6.2.2 Dependence Structure	101

6.2.3	Sampling	105
6.2.4	Copula Properties	105
6.3	An Application Example	110
6.3.1	Portfolio Setup	110
6.3.2	Test Portfolios	113
6.3.3	Parameter Setup	113
6.3.4	Simulation Results	114
6.4	Importance Sampling Algorithm	116
6.5	Conclusions	120
	Appendix A: The VCG Probability Distribution Function	121
	Appendix B: HAC Representation for the VCG Framework	123
	Notes	124
	References	124
7	Monte Carlo Methods for Portfolio Credit Risk	127
7.1	Introduction	127
7.2	Modeling Credit Portfolio Losses	128
7.2.1	Risk Measures	128
7.2.2	Modeling Dependency	129
7.3	Estimating Risk Measures via Monte Carlo	129
7.3.1	Crude Monte Carlo Estimators	130
7.3.2	Importance Sampling	131
7.4	Specific Models	133
7.4.1	The Bernoulli Mixture Model	133
7.4.2	Factor Models	135
7.4.3	Copula Models	139
7.4.4	Intensity Models	143
7.4.5	An Example Point Process Model	145
	Appendix A: A Primer on Rare-event Simulation	146
	7.A.1 Efficiency	147
	7.A.2 Importance Sampling	147
	7.A.3 The Choice of g	148
	7.A.4 Adaptive Importance Sampling	149
	7.A.5 Importance Sampling for Stochastic Processes	150
	References	151
8	Credit Portfolio Risk and Diversification	153
8.1	Introduction	153
8.2	Model Setup	154
8.3	Independent Asset Values	155
8.4	Correlated Asset Values	159
8.5	Large Portfolio Limit	161
8.5.1	Correlated Diffusion	161
8.5.2	Correlated GARCH Process	166
8.6	Applications of the Structural Recovery Rate	168
8.7	Conclusions	169
	References	169

PART III CREDIT PORTFOLIO RISK SECURITIZATION AND TRANCHING

9	Differences in Tranching Methods: Some Results and Implications	173
9.1	Introduction	173
9.2	Defining a Tranche	174
9.3	The Mathematics of Tranching	175
9.3.1	PD-based Tranching	175
9.3.2	EL-based Tranching	176
9.4	The EL of a Tranche Necessarily Increases When Either the Attachment Point or the Detachment Point is Decreased	177
9.5	Upper Bound on Tranche Expected LGD ($LG D_t$) Assumption Given EL-based Tranches	180
9.6	“Skipping” of Some Tranches in the EL-based Approach	182
9.7	Conclusion	183
	Notes	184
	References	185
10	Global Structured Finance Rating	187
10.1	Introduction	187
10.2	Asset-Backed Securities	188
10.2.1	The ABS Structure for the Experiment	188
10.2.2	Cash Flow Modeling	189
10.2.3	Modeling and Simulating Defaults	192
10.2.4	Expected Loss Rating	193
10.3	Global Sensitivity Analysis	194
10.3.1	Elementary Effects	195
10.3.2	Variance-based Method	196
10.4	Global Sensitivity Analysis Results	197
10.4.1	Uncertainty Analysis	197
10.4.2	Sensitivity Analysis	198
10.5	Global Rating	202
10.5.1	Methodology	203
10.6	Conclusion	204
	Acknowledgment	205
	Notes	205
	References	205

PART IV CREDIT DERIVATIVES

11	Analytic Dynamic Factor Copula Model	209
11.1	Introduction	209
11.2	Pricing Equations	210
11.3	One-factor Copula Model	211
11.4	Multi-period Factor Copula Models	212
11.5	Calibration	218
11.6	Numerical Examples	219
11.7	Conclusions	222

Notes	223
References	223
12 Dynamic Modeling of Credit Derivatives	225
12.1 Introduction	225
12.1.1 General Model Choice	225
12.1.2 Modeling Option Prices	226
12.1.3 Modeling Credit Risk	227
12.2 Portfolio Credit Derivatives	229
12.3 Modeling Asset Dynamics	230
12.3.1 The Market Model	230
12.3.2 The Asset-value Model	234
12.4 Empirical Analysis	236
12.4.1 Elementary Data	236
12.4.2 Implied Dividends	236
12.4.3 Market Dynamics	237
12.4.4 Asset Value Model	239
12.4.5 Tranche Pricing	240
12.4.6 Out-of-time Application	240
12.5 Conclusion	242
Notes	243
References	243
13 Pricing and Calibration in Market Models	245
13.1 Introduction	245
13.2 Basic notions	246
13.3 The model	248
13.3.1 Modeling Assumptions	248
13.3.2 Absence of Arbitrage	249
13.4 An affine specification	252
13.5 Pricing	254
13.6 Calibration	258
13.6.1 Calibration Procedure	261
13.6.2 Calibration Results	263
Appendix A: Computations	265
References	270
14 Counterparty Credit Risk and Clearing of Derivatives – From the Perspective of an Industrial Corporate with a Focus on Commodity Markets	271
14.1 Introduction	271
14.2 Credit exposures in commodity business	272
14.2.1 Settlement Exposure	272
14.2.2 Performance Exposure	273
14.2.3 Example of Fixed Price Deal with Performance Exposure	274
14.2.4 Example of a Floating Price Deal with Performance Exposure	275
14.2.5 General Remarks on Credit Exposure Concepts	276

14.3	<i>Ex Ante</i> exposure-reducing techniques	277
14.3.1	Payment Terms	277
14.3.2	Material Adverse Change Clauses	277
14.3.3	Master Agreements	278
14.3.4	Netting	278
14.3.5	Margining	279
14.3.6	Close Out Exposure and Threshold	280
14.4	<i>Ex Ante</i> risk-reducing techniques	281
14.4.1	Credit Enhancements in General	281
14.4.2	Parent Company Guarantees	281
14.4.3	Letters of Credit	282
14.4.4	Credit Insurance	283
14.4.5	Clearing via a Central Counterparty	283
14.5	<i>Ex Post</i> risk-reducing techniques	287
14.5.1	Factoring	287
14.5.2	Novation	287
14.5.3	Risk-reducing Trades	288
14.5.4	Hedging with CDS	288
14.5.5	Hedging with Contingent-CDS	290
14.5.6	Hedging with Puts on Equity	290
14.6	<i>Ex Post</i> work out considerations	290
14.7	Practical credit risk management and pricing	291
14.8	Peculiarities of commodity markets	292
14.9	Peculiarities of commodity related credit portfolios	294
14.10	Credit Risk Capital for a commodity related portfolio – measured with an extension of CreditMetrics	295
14.11	Case study: CreditRisk ⁺ applied to a commodity related credit portfolio	300
14.12	Outlook	302
	Notes	303
	References	304
15	CDS Industrial Sector Indices, Credit and Liquidity Risk	307
15.1	Introduction	307
15.2	The Data	308
15.3	Methodology and Results	312
15.3.1	Preliminary Analysis	312
15.3.2	Common Factor Analysis	316
15.4	Stability of Relations	321
15.5	Conclusions	322
	References	323
16	Risk Transfer and Pricing of Illiquid Assets with Loan CDS	325
16.1	Introduction	325
16.2	Shipping Market	326
16.3	Loan Credit Default Swaps	327
16.3.1	LCDS Pricing	327
16.3.2	Modeling LCDS Under the Intensity-based Model	329

16.4	Valuation Framework for LCDS	331
16.4.1	The Structural Approach	331
16.4.2	Credit Risk in Shipping Loans	332
16.4.3	Valuation of LCDS on Shipping Loans	334
16.4.4	Simulation Model	335
16.5	Numerical Results	336
16.6	Conclusion	338
	Appendix A: Monte Carlo Parameterization	339
	References	339
PART V REGULATION		
17	Regulatory Capital Requirements for Securitizations	343
17.1	Regulatory Approaches for Securitizations	343
17.1.1	Ratings Based Approach (RBA)	343
17.1.2	Supervisory Formula Approach (SFA)	346
17.1.3	Standardized Approach (SA)	353
17.2	Post-crisis Revisions to the Basel Framework	353
17.3	Outlook	354
	Notes	355
	References	355
18	Regulating OTC Derivatives	357
18.1	Overview	357
18.2	The Wall Street Transparency and Accountability Part of the Dodd–Frank Act of 2010	358
18.2.1	Which Derivatives Will Be Affected?	359
18.2.2	Clearing	359
18.2.3	Transparency and Reporting Requirements	361
18.2.4	Bankruptcy Related Issues	361
18.2.5	Trading and Risk Mitigation	362
18.2.6	Extraterritorial Enforcement and International Coordination	363
18.3	Evaluation of Proposed Reforms	364
18.4	Clearing, Margins, Transparency, and Systemic Risk of Clearinghouses	369
18.4.1	Migration to Centralized Clearing Should Start with Credit Derivatives	369
18.4.2	Margin Requirements versus Transparency	370
18.4.3	Toward a Transparency Standard	374
18.4.4	Deal with the Dealers First	375
18.4.5	Proposed Reforms Will Help End Users	377
18.4.6	Centralized Clearinghouses: Too Systemic to Fail?	380
18.5	Conclusion: How Will the Derivatives Reforms Affect Global Finance in Future?	383
	Appendix A: Items Concerning OTC Derivatives Left by the Dodd–Frank Act for Future Study	385
	Appendix B: Current OTC Disclosure Provided by Dealer Banks	387
	Appendix C: Sovereign Credit Default Swaps Markets	392

xii Contents

Notes	398
References	401
19 Governing Derivatives after the Financial Crisis: The Devil is in the Details	403
19.1 Introduction	403
19.2 Securitization and Risk Management	404
19.2.1 Securitization and Interest Rate Risk	405
19.2.2 Securitization and Credit Risk	405
19.2.3 Securitization and Credit Risk Transfer	406
19.2.4 Skin in the Game	407
19.3 The Regulation of Derivative Contracts	407
19.3.1 Regulation Prior to 2000	407
19.3.2 The Commodity Futures Modernization Act (CFMA) of 2000	408
19.3.3 The Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010	408
19.4 Regulatory Challenges and Responses	409
19.4.1 Fostering an Exchange-traded Credit Derivatives Market	409
19.4.2 Counterparty Risk	410
19.4.3 Disclosure and Transparency	411
19.4.4 Accounting, Valuation and Stability Issues	412
19.5 Conclusions	412
Notes	413
References	415
About the Authors	417
Index	429