Contents

Foreword xi
Introduction xv

1 Banking Risk 1
1.1 Single Bank Risk 4
1.2 The Basel Committee on Banking Supervision Approach to Regulation 14
1.2.1 The Basel I Framework 16
1.2.2 The Basel II Framework 18
1.2.3 Credit Counterparty Risk 20
1.2.4 Market Risk 25
1.2.5 Operational Risk 28
1.2.6 Basel III 30
1.3 Banking Risk Modeling and Stress Testing 33
1.4 Contagion 36
1.5 System Modeling 41

2 Simulation Models 45
2.1 Simulating Shocks: Idiosyncratic Shocks, or Exogenous Failure of Individual Banks 49
2.2 Simulating Shocks: Stress Testing 54
2.3 Simulating Shocks: Systematic Common Shocks 56
2.4 Simulating Shocks: Common Shocks 58
2.4.1 The Monte Carlo Method 59
2.4.2 Monte Carlo-Based Simulation Models 63
2.5 Estimation of Losses Variability and Assets Riskiness 70
2.5.1 Sector-Historical Approach 71
2.5.2 Market Values-Based Approach 72
2.5.3 Capital Requirements-Based Approach 76
2.5.4 Ratings-Based Approach 79
2.5.5 CAMELS—Z-Score Approach 80
2.6 Simulating Shocks: Correlated Risk Factors 82
2.7 Simulating Shocks: Combining Idiosyncratic and Common Shocks 87
2.8 Correlation 89
2.9 The Interbank Matrix 98
2.9.1 Interbank Matrix Estimation 110
2.9.2 Robustness Checks on the Maximum Entropy Hypothesis 119
2.10 Loss Given Default 127
2.10.1 Constant LGD 128
2.10.2 Stochastic LGD 129
2.10.3 Endogenous LGD 130
2.11 Interbank Losses Attribution 132
2.12 Contagion Simulation Methods 133
2.13 Data and Applied Problems 140

3 Real Economy, Sovereign Risk, and Banking Systems Linkages 149
3.1 Effects of Bank Riskiness on Sovereign Risk 150
3.2 Effects of Sovereign Risk on Bank Riskiness 153
3.3 Linkages to the Real Economy 154
3.4 Modeling 156
3.4.1 Banks 156
3.4.2 Public Finances 158
3.5 Implementation 159
3.5.1 Public Finances 159
3.5.2 Banks 160

4 Applications 163
4.1 Testing for Banks–Public Finances Contagion Risk 163
4.2 Banking Systems Regulation What-If Tests  
4.3 Banks’ Minimum Capital Requirements: Cost–Benefit Analysis  
4.3.1 Costs  
4.3.2 Benefits  
4.4 Deposits Guarantee Schemes (DGS)/Resolution Funds Dimensioning  
4.4.1 DGS  
4.4.2 Resolution Funds  
4.5 Computing Capital Coverage from Assets PD and Bank PD  
4.6 Computing Banks Probability to Default from Capital Coverage and Assets PD  
4.7 Risk Contributions and SiFis  
4.7.1 Value at Risk (VaR)  
4.7.2 Expected Shortfall (ES)  
4.7.3 Conditional Value at Risk (CoVaR)  
4.7.4 Marginal Expected Shortfall (MES)  
4.7.5 Shapley Values  
4.7.6 The Leave-One-Out Approach  
4.7.7 Starting and Fueling Contagion: Risk Contribution Roles  
4.8 The Regulator’s Dilemma  

Appendix: Software References and Tools  

References  
Index