Abnormal returns (AR), 121
Absolute measures, 38
Academic studies, 385
Accounting beta and systemic risk (beta), 300
Accounting perspective, 383–384
Actuarial methodology, 156
Adjusted cover approach, 345, 346, 349, 352, 353, 354
Advanced internal ratings-based (AIRB) method, 312, 313
Advanced measurement approach (AMA) as a benefit, 254
framework of, 4
home-host recognition, 49
and insurance, 338
methodology described, 155–175
purpose of, 220
vs. Standardized Approach (TSA), 88
total loss distribution in, 134
use of, in U.S. banks, 313
Advanced measurement approach (AMA) methodology, 315
Advanced measurement approach (AMA) modeling, 86
Advanced measurement approach (AMA) models, overview
integrating LDA and sbAMA, 7–9
loss distribution approach (LDA), 6
scenario-based AMA (sbAMA), 6–7
Aggregate loss distribution (ALD), 6–7
Aggregation bias by data pooling, 44
Aggregation model via copula, 199, 215
Aggregation via copula estimating copulas with discrete distributions, 210–211
Poisson shock model, 212–213
Alarmist language, 277
Allied Irish Banks, 383
All-risk insurance, 340
Alternate standard approach (ASA), 33
Alternative Investment Management Association (AIMA), 474
Alternative investments, 454
Amaranth Advisors, LLC, 439–442
Anchoring bias, 10
A New Capital Adequacy Framework, 30
Aon Corporation, 43
Archimedean copulas, 208
Archimedean Pareto Lévy copula, 227
ASC v. Bank Leumi, 427
Asian currency crisis (October 1997), 364, 455
Assets under management (AUM), 449
Asset volatility, 383
Association of British Insurers (ABI), 43
Assumptions, 182–184
Asymmetric serial correlation in returns, 447
Asymptotic tail convergence of extreme losses, 36
Asymptotic theory, 182–184
Australia, 362, 416, 419, 427
Australian hedge funds, 420
Australian Securities and Investments Commission (ASIC), 423
Availability bias, 10
Average abnormal returns (AAR), 123
INDEX

Back testing, 280
Balkema-deHaan Pickands theorem, 318
Bank corporations, 420
Bank failures, 383, 400, 404. See also fraud; rogue trading
Bank for International Settlements (BIS), 250, 273
Banking Regulation and Supervision Agency (BRSA), 117, 125
Banking risk, types of, 365–366
Banking systems, benchmarking indicator for, 361–377
about, 361–362
economic and regulatory capital model, 370–374
international comparative advantage in banking systems, 369
legal framework, importance of, 362–363
market risk and economic capital, 365–368
model and methodology, 369–370
stock market returns and country risk, 363–365
systemic earnings at risk model, 368–369
Banking systems performance indicator (BI), 370, 373
Banking system stock market indices, 363
Bank losses, 85
Bank money, loss of confidence in, 404
Bank of England (BoE), 404
Bank of Italy, 333
Banks
functions of, 361–362
global meltdown effect on, 420
Bank safety, 366
Bank secrecy, 425, 429
Bank service chain, 97–111
consumer buying process, 105–106
investment vehicles, 106
uncertainty management, 106–108
Banks in the post–subprime era, 100–103
Barclay Trading Group (BAR) database, 455
Barings Bank, 116, 220, 273, 282, 383
Basel Committee on Banking Supervision’s (BCBS), 232, 382
Basel Committee’s Accord Implementation Group for Operational Risk AIGOR (2006), 326
Basel II (New Capital Adequacy Framework) (Basel II Accord)
Advanced Measurement Approaches (AMA), 69–70
aggregation approach in, 207
canonical aggregation model via copula use in, 215
confidence level for, 159
diffusion and institutionalization, 278
enforced self-regulation overview, 274–276
exceptions and deficiencies in, 415
framework and insurance coverage, 292
introduction to, 3
legal intermediaries and regulatory indeterminacy, 276–277
operational risk defined in, 198
operational risk requirements, 278
Op Risk initiatives, 249
origins of, 24
Pillars described, 385–386
purpose of modeling under, 220
regulated group, 277–278
section summary, 278–279
United States implementation of, 431
Basic indicator approach (BIA), 4, 28, 33, 274, 315
as moral hazard, 389
vs. standardized approach, 353
<table>
<thead>
<tr>
<th>Index</th>
<th>481</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayesian belief networks, 70</td>
<td></td>
</tr>
<tr>
<td>Baye's rule, 83</td>
<td></td>
</tr>
<tr>
<td>Bayou Management, LLC, 442–444, 466, 470, 472</td>
<td></td>
</tr>
<tr>
<td>Beacon Hill, 466</td>
<td></td>
</tr>
<tr>
<td>Bear Stearns, 102, 220, 414</td>
<td></td>
</tr>
<tr>
<td>Behavioral finance theory, 296</td>
<td></td>
</tr>
<tr>
<td>Beneficial ownership and control information, 427</td>
<td></td>
</tr>
<tr>
<td>Best practices guide, 252</td>
<td></td>
</tr>
<tr>
<td>Beta, 370</td>
<td></td>
</tr>
<tr>
<td>Biases, types of, 10</td>
<td></td>
</tr>
<tr>
<td>Biro, Same M. El, 470</td>
<td></td>
</tr>
<tr>
<td>Black Scholes options pricing approach, 296</td>
<td></td>
</tr>
<tr>
<td>Borel measure, 234</td>
<td></td>
</tr>
<tr>
<td>British Bankers' Association (BBA), 43</td>
<td></td>
</tr>
<tr>
<td>Business lines, 116–117, 198, 250, 315</td>
<td></td>
</tr>
<tr>
<td>Business process management (BPM), 90</td>
<td></td>
</tr>
<tr>
<td>Business process reengineering (BPR), 90</td>
<td></td>
</tr>
<tr>
<td>Business risks, 369</td>
<td></td>
</tr>
<tr>
<td>Canada, 385</td>
<td></td>
</tr>
<tr>
<td>Canonical maximum likelihood (CML), 209</td>
<td></td>
</tr>
<tr>
<td>Capital adequacy implementation and country risk, 362</td>
<td></td>
</tr>
<tr>
<td>Capital Asset Pricing Model (CAPM), 254, 289, 294, 295, 296, 299, 300</td>
<td></td>
</tr>
<tr>
<td>Capital funds, 416</td>
<td></td>
</tr>
<tr>
<td>Capital guidelines for financial institutions, 382</td>
<td></td>
</tr>
<tr>
<td>Capital requirements approach for operational risk, 385</td>
<td></td>
</tr>
<tr>
<td>Capital standards, 313</td>
<td></td>
</tr>
<tr>
<td>Catastrophic failures, 70</td>
<td></td>
</tr>
<tr>
<td>Central bank functions, 364</td>
<td></td>
</tr>
<tr>
<td>Central counterparties (CCPS), 398</td>
<td></td>
</tr>
<tr>
<td>Central risk management functions, 265</td>
<td></td>
</tr>
<tr>
<td>Champernowne distribution, 186, 190</td>
<td></td>
</tr>
<tr>
<td>Citigroup, 102</td>
<td></td>
</tr>
<tr>
<td>Civil liabilities, 446</td>
<td></td>
</tr>
<tr>
<td>Clayton Lévy copula, 241–243</td>
<td></td>
</tr>
<tr>
<td>Clayton Pareto Lévy copulas, 227, 238, 241</td>
<td></td>
</tr>
<tr>
<td>Closed-form approximation based on MSHM in the moderately heavy-tailed case</td>
<td></td>
</tr>
<tr>
<td>OpR modeling, 138–139</td>
<td></td>
</tr>
<tr>
<td>sensitivity to tail dependence, 142–143</td>
<td></td>
</tr>
<tr>
<td>setup for aggregation, 139–141</td>
<td></td>
</tr>
<tr>
<td>CMC value at risk (VaR), 157</td>
<td></td>
</tr>
<tr>
<td>Coincident losses, joint distribution functions of, 230</td>
<td></td>
</tr>
<tr>
<td>Collaborative governance, 274</td>
<td></td>
</tr>
<tr>
<td>Collateralized debt obligations (CDOs), 102</td>
<td></td>
</tr>
<tr>
<td>Commodity Futures Trading Commission (CFTC), 442</td>
<td></td>
</tr>
<tr>
<td>Commodity pools, 416</td>
<td></td>
</tr>
<tr>
<td>Commodity trading advisors (CTAs) risk of ruin approach for evaluation of, 453–463</td>
<td></td>
</tr>
<tr>
<td>summary statistics for 50 largest, 458–459</td>
<td></td>
</tr>
<tr>
<td>Common Poisson shock modules, 70</td>
<td></td>
</tr>
<tr>
<td>Common shocks, 70, 228</td>
<td></td>
</tr>
<tr>
<td>Common solvency ratio reporting (COREP) regulation, 92</td>
<td></td>
</tr>
<tr>
<td>Community banks, 313</td>
<td></td>
</tr>
<tr>
<td>Comonotonicity and independence, 133</td>
<td></td>
</tr>
<tr>
<td>Comonotonic models, 198</td>
<td></td>
</tr>
<tr>
<td>Comonotonic risks, 135</td>
<td></td>
</tr>
<tr>
<td>Compensation structure, 284</td>
<td></td>
</tr>
<tr>
<td>Complementary loss evaluations about, 73–74</td>
<td></td>
</tr>
<tr>
<td>integration of the subjective and quantitative analysis, 82–84</td>
<td></td>
</tr>
<tr>
<td>loss distribution approach, 71–73</td>
<td></td>
</tr>
<tr>
<td>operational risk based on, 69–84</td>
<td></td>
</tr>
<tr>
<td>subjective information analysis, 74–82</td>
<td></td>
</tr>
<tr>
<td>Complementary loss evaluations (CLE) framework, 69, 70</td>
<td></td>
</tr>
<tr>
<td>Compliance industries, 270</td>
<td></td>
</tr>
<tr>
<td>Compliance methods, 314–315</td>
<td></td>
</tr>
<tr>
<td>Compound distributions, 158</td>
<td></td>
</tr>
</tbody>
</table>
Compounding via Monte Carlo methods, 206–207
Compound-Pareto models, 163
Compound-Poisson models, 163
Compound-Poisson process, 220–221, 224, 232, 340
Conditional distribution, 15
Conditional value at risk (CVaR), 199
Confidence level, 159
Connectors, 90
Consensus problem, 12
Consumer buying process, 105–106
Consumer risk, 108
Continuous models, 319
Continuous observations, 312
Control, 99
Control Risks Group, 437–438
Control system designed to address the intangible nature of service risks uncertainty management, 108–109
Convolution, 327
Cooperative bank study, 316
Copula approach, 197–216
Copula functions, 207
Core Principles (CP) VII, 400–401
Cornish-Fisher expansion, 131, 134, 139, 140, 141, 142, 148
Corporate governance practices, 414
Corporate groups and nominee companies, 426–427
Corporate reporting, 418
Corporate risk management, 295
Costas, John, 100
Coughlin Stoia Geller (law firm), 102
Country risk, 363, 370
and capital adequacy implementation, 362
and international banking risk, 365
Country risk measures, 364
Cover, 340
Cover approaches, 344–345, 346, 352, 353
CPSS Core Principles on Systemically Important Payment Systems (2001), 400
CPSS-IOSCO Recommendations for Central Counterparties (2004), 400
Credit risk, 116
failure to supervise, 418
and operational risk, 366
Credit Suisse, 85, 101, 102
Crossborder consolidation, 403
Cross-entropy (CE), 164
Crosseye approach of coincident losses, 313
Cross-sectional bias, 44
Cross validation method, 192
Crude Monte Carlo (CMC) simulation, 156
Cumulative abnormal stock returns (CAR), 121, 123, 125
Current practices of operational risk measurement and regulatory approaches, 26–35
Current prudential regulatory system governing NBFIs, 415–416
Currie scale, 418–419, 420, 431
Damage risk, 108
Data collection and loss reporting, 36
Data envelopment analysis, 455
Data generating processes (DGP), 186
Data generating processes and numerical results, 186–189
Data pooling, aggregation bias by, 44
Data sources, 42–44
Data transformation and boundary correction, 189–191
Decision maker (DM), 12
Deductible, 340, 346
Defensive mixtures approach (DMA), 163, 165–169
Degenerate laws, 320, 323
Degree of heaviness, 162
Density, 161, 163
Dependence structure, 228–230
Detective controls, 110
Deutsche Bank, 85, 442
Dickey, James R., 469–470
Diffusion and institutionalization, 278
Dillon Read Capital Management, 100, 101, 415
Dimensional Funds Managers, 420
Disclosure requirements under the BCBS (Pillar 3), 383
Dispersion (volatility), 368
Dispositive risk, 304
Distribution, types of, 202
Diversification benefits, 48, 136
Diversity of risk, 294
Drawdowns, 460
Due diligence, 438
Due diligence and manager transparency, 437–439
Due diligence of hedge funds, 473
Due diligence review, 442
Duration approach, 15

Early warning signs systems (EWSs), 390
Earnings and risks vs. shareholder value, 297–298
Earnings at risk models, 368
Economic and regulatory capital model discussion, 374
interdependence in a model interacting with more than one other system, 373
regulatory capital for a banking system interacting with more than one other system, 374
regulatory capital for a banking system interacting with one other bank system, 373
single banking system market risk, 371–372
single bank system performance, 372

steps for the calculation of systemic regulatory capital, 375–376
systemic economic capital, 370–371
two bank systems interdependence, 372
Economic capital for operational risk, 392
Economic value added (EVA), 299
Economist, 100, 333
Efficient market hypothesis, 369
Empirical analysis, 213–216
Endwave, 446, 449
Energy markets, 441
Enforced self-regulation, 272–279
Enterprise value (EVA), 300
Epanechnikov kernel, 184, 185, 191, 192
Equal employment opportunity (EEO) laws, 277
Equity capital (EC), 299
Equity hedge strategies, 418
Esscher principle, 353
Estimated risk of ruin, 456
Estimating copulas with discrete distributions, 210–211
Estimation bias, 45
Estimation types, 55
European Central Bank (ECB), 404
European Commission and the Working Group of the Insurance Companies, 338, 343
European Union, 382
Event-driven process chain (EPC) analysis, 90
Event-driven strategies, 418
Event risk, 108
Event-risk chains, 108
Events, 90
Event types (ETs), 197
Event types and business lines, 198
Ex ante combination, 7–8
Expected losses (EL), 26, 44–46, 75
Expected losses (EL) ratio, 312
Expected loss impact on the OpVar, 330–331
INDEX

Expected shortfall (ES), 160, 199
Expected value principle, 341
Expertise, 104
Experts’ opinions
combining, 12–14
integration of, 7
to model operational risk, 9–11
operational risk modeling based on, 3–18
Supra-Bayesian Approach, 13–14
weighted opinion pool, 12–13
Exploratory data analysis (EDA), 93
Ex post combination, 7
Exposure indicator (EI), 75
Extent of risk (RAC), 299
External data sources of operational risk loss events, 43
Extradition procedures, 425
Extreme losses, asymptotic tail
convergence of, 36
Extreme value theory (EVT), 15, 30, 70, 318
copula approach using, 197–216
LDA approaches, 38–39
and Poisson shock models, 197–216
Extreme value theory (EVT) distribution, 200
Fairfax Financial Holdings Limited, 430
Fama, Eugene, 369
Fannie Mae, 414
FAS 157 (FASB), 468, 474
Fat tails, 368
Federal Banking Commission, 102
Federal Energy Regulatory Commission (FERC), 442
Federal Financial Institutions
Examination Council (FFIEC), 35
Federal Reserve Bank, 415, 430
Fed Funds market, 397
Fedwire, 397
Fedwire payments, 404
Financial Accounting Standards Board
(FASB), 468
Financial Action Task Force, 425
Financial contagion threat, 366
Financial reports, 383
Financial risk measures, 364
Financial risks in PCSSs, containment of, 400
Financial Services Act of 1986, 362
Financial services firms (FSFs)
Basel II compliance of, 389
disclosure by, 382
operational risk disclosure in, 381–393
Financial statement fraud, 428
Finite sample performance, 184–189
Firm culture, 283, 284
First-order approximations to
operational risk (OpR), 219–244
about, 218–223
dependence structure, 228–230
Pareto copulas to Pareto Lévy copulas, 223–227
total OpVaR approximation, 230–243
Five forces model, 293
Forbes, 444
Formulas, 54–57
Four-eyes principle, 250
Framework on Capital Measurement and Capital Standards, 4
Framing bias, 11
France, 362. See also Société Générale
Fraud, 24, 88, 92, 117, 200, 281, 414, 469
Amaranth Advisors, LLC, 439–442
Bayou Management, LLC, 442–444
in hedge funds, 439–450
Lancer Group, 444–446
Wood River Capital Management, 446–447
Freddie Mac, 414
Frequency, 156, 158
Frequency estimation, 326–327
Frequency model, 201–202
Functions, 90
Funds of hedge funds (FOHF), 417
Index

Gambler’s ruin, 453
G-and-h distribution (GHD)
  formula for, 56–57
  LDA approaches, 38–39
Gaussian copulas, 208
Gaussian credit risk, 143
Gaussian distribution, 202
Gaussian kernel, 184, 185
Generalized Pareto distribution (GPD), 39, 134, 139, 143
  formula for, 54
  peak-over-threshold (POT) estimation method for, 39
Gerali, Andrea, 404
Global asset allocation, 418
Global Data Feeder, 425
Globally systemically important systems, 407
Global meltdown effect on banks, 420
Global Operational Loss Database (GOLD), 43
Goldman Sachs, 414
Goodwill, 297
Governance arrangements, 408
Governance issues, 262
Granularity, 44, 47–48, 90
Great Depression, 404
Gross income, 315
Gross loss history, 342
Guideline No. 10, 93
Heat maps, 90
Heavy-tailed distributions and importance sampling, 162–163
Heavy-tailed losses, 221
Hedge fund assets valuation, 450
Hedge fund failures, 466
Hedge fund investments, identifying and mitigating valuation risk in
  about, 465–466
  hedge fund valuation guidelines, 474–476
  operational valuation described, 466–467
  valuation risk, control related, 469–472
valuation risk, evaluating and mitigating, 472–474
valuation risk, strategy related, 467–469
Hedge fund operational risks case studies
  about, 435–436
due diligence and manager transparency, 437–439
market risk and operational risk, 436–437
partial transparency proposal, 447–450
recent frauds, 439–450
red flags in the hedge fund industry, 447
Hedge funds
  due diligence of, 473
  fraud in, 439–450
  performance reports, 440
  role of, 416–418
  and subprime credit crisis, 419
  systemic risk and contagion, 418–420
  valuation of, 417
Hedge fund valuation guidelines, 474–476
Hedge fund valuations, 445
Hermite polynomials, 140
Herstatt Bank, 400
High leverage vs. survival time, 454
Historical qualitative data, 73
Historical quantitative data, 73
Home-Host Recognition of AMA Operational Risk, 34
Home-host recognition under AMA, 49
Homogeneous Poisson distribution, 201
Human judgment, 7, 270
Hunter, Brian, 441, 442
Identifying and mitigating risks about, 98–100
  in the bank service chain, 97–111
  banks in the post–subprime era, 100–103
  perceived risk, 103–105
INDEX

Idiosyncratic bias, 48
Idiosyncratic shocks, 70
Ignorance risk, 108
IHIP paradigm, 98
Illiquidity discount, 444
Illiquid securities, 450, 473
Illiquid shares, 444
“Implications of the Growth of Hedge Funds” (SEC), 417
Implicit function issue, 141
Importance sampling, 160
Importance sampling and cross-entropy, 159–162
Importance sampling techniques for large quantile estimation, 155–175
about, 155–157
moderately heavy-tailed case
lognormal severity, 165–169
Poisson mixtures and importance sampling, 158–165
simulation results, 170–173
Increase in returns vs. leverage, 454
Independence, 283
Independence and comonotonicity, 133
Independent and identically distributed losses, 200
Independent losses, frequency of, 229
Independent operational risk cells, 241
Industry-wide data bases, 345
Inference of margins (IFM), 209
Inference of margins (IFM) estimator, 210
In-house auditing firm, 443
Instability problems, 139
Institutional Investors, 444
Instrumental density, 160
Instrumental density choice, 163–165
Insurance, 337
Insurance companies, 156
Insurance concepts for Op Risk management, 296–297
efficient markets, 296
inefficient markets hypothesis, 296–297
internal risk information, 297
Insurance contract, limit on loss distribution, 338
Insurance contracts pricing
premium calculation principles, 341–342
risk-neutral pricing, 341
Insurance premiums, 291
Intangibility, 104
Integral Investment Management, 466, 469–470
Integrated risk, estimates of, 138
Integrated risk management in the presence of OpR hypothesis, 136–137
marginal increase of risk due to extra risk in general and OpR, 135–136
portfolio VaR with Gaussian Dependence Structure, 137–138
portfolio VaR with Modified Weibull Margins, 137–138
problems arising for an integrated measurement, 135
stylized facts on typical loss distributions for OpR, 134
subadditivity and methods for the calculation of a total risk measure, 134–135
Integrated squared error (ISE), 184
Integrated value at risk (VaR) calculation, 132
Integrating Op Risk into Total VaR, 131–150
about, 131–134
closed-form approximation based on MSHM in the moderately heavy-tailed case, 138–143
integrated risk management in the presence of OpR, 134–138
simulation results, 143–148
Interconnected and interoperable multiple points of failure, 403
Interdependencies, growth of payment, clearing and settlement systems, 406–407
Index

Internal capital adequacy assessment process (ICAAP), 9
Internal control system (ICS), 102, 108
Internal fraud, 92
Internal operational loss data, 390
Internal risk governance, 9
Internal Accounting Standards, 384
International banking risk, 364
International banking risk and country risk, 365
International Convergence of Capital Measurement and Capital Standards (Basel II), 31. See also Basel II (New Capital Adequacy Framework) (Basel II Accord)
International Country Risk Guide, 367
International financial instability, 364
International organized crime. See Transnational crime
International Securities Enforcement Cooperation Act of 1990 (USA), 362
Interrisk diversification, 133
Invariance principle, 219, 222
Investment Company Act of 1940, 417
Investment vehicles, 106
Investors, 423
IS density, 161
Israel, Samuel, III, 442–444
Istanbul Stock Exchange, 121
Italian banking capital regulation, operational risk versus capital requirements, 311–334
about, 311–314
data, 316
methodology, 316–331
operational risk capital requirements, 314–316
results, 331–332
Iterative Cumulative Sums of Squares (ICSS) algorithm, 124, 125
Joint distribution functions of coincident losses, 230
J.P. Morgan Chase & Co., 102
Jumbo loss behavior, 214
Jump size risk, 353
Kernel density estimation, one-sided cross-validation for, 178
Kernel estimator, 178
Kerviel, Jérôme, 109, 110, 220, 282
Kerzner, Harold, 266, 267
Key risk indicators (KRI), 41, 390
Knowledge, 104
KRI Library and Service, 390
Kullback-Leibler distance, 164
Kundro and Feffer (2004, 2005), 436
Lamfalussy report, 399–400
Lamfalussy Standards; Bank for International Settlements [BIS] (1990), 399
Lancer Group, 444–446, 466, 472
Large banks, 415
Laurer, Michael, 444–446, 472
Law of small numbers, 74
Leadership issues, 262
Leverage vs. increase in returns, 454
Lévy copulas, 223, 226
Lévy measures, 223, 224, 225, 231–232, 235, 238
Lévy Pareto copulas, 226
Lévy processes, 224, 231
Likelihood function, 14
Limit approaches, 337, 338, 344, 346
Limited scope operational risk management under Basel II, 250–254
<table>
<thead>
<tr>
<th>INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear opinion pool, 12</td>
</tr>
<tr>
<td>Liquidity risk, 116</td>
</tr>
<tr>
<td>Loan capital (LC), 299</td>
</tr>
<tr>
<td>Local density approximation (LDA) approach, 38–39, 199</td>
</tr>
<tr>
<td>Local density approximation (LDA) approach caused by data collection, 42–51</td>
</tr>
<tr>
<td>Local linear density estimator, 180</td>
</tr>
<tr>
<td>Logarithmic opinion pool, 13</td>
</tr>
<tr>
<td>Lognormal distribution, 163</td>
</tr>
<tr>
<td>Lognormal severity, 170–172</td>
</tr>
<tr>
<td>Long-Term Capital Management, 439</td>
</tr>
<tr>
<td>Loss aggregation, 47–48</td>
</tr>
<tr>
<td>Loss data, 42–44</td>
</tr>
<tr>
<td>Loss Data Collection Exercise (LDCE), 35, 43</td>
</tr>
<tr>
<td>Loss distribution approaches (LDA) measurement challenges</td>
</tr>
<tr>
<td>shortcomings of LDA caused by data collection: ORM systems and data characteristics, 42–51</td>
</tr>
<tr>
<td>shortcomings of quantitative estimation methodologies for LDA, 37–41</td>
</tr>
<tr>
<td>Loss distribution approaches (LDAs), 3, 4, 5, 6, 30, 70, 86</td>
</tr>
<tr>
<td>complementary loss evaluations, 71–73</td>
</tr>
<tr>
<td>model, 220</td>
</tr>
<tr>
<td>and scenario-based approaches (sbAMA), integration of, 7–9</td>
</tr>
<tr>
<td>Loss distribution parameters, 347</td>
</tr>
<tr>
<td>Loss distributions in the advanced measurement approach, 158–159</td>
</tr>
<tr>
<td>Losses, 200</td>
</tr>
<tr>
<td>methodology to explore</td>
</tr>
<tr>
<td>unprecedented catastrophes, 88–89</td>
</tr>
<tr>
<td>model evolution by learning, 93–94</td>
</tr>
<tr>
<td>operational risk models and, 85–96</td>
</tr>
<tr>
<td>risk-generating nodes, 90–91</td>
</tr>
<tr>
<td>stochastic dynamics to drive events, 89–90</td>
</tr>
<tr>
<td>in a stochastic multistep dynamic, 92–93</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
ordinary least squares
   cross-validation, 179–180
Method of cross-validation, 178
Method of simulated higher moments
   (MSHM) approach, 131
Methodology, operational risk versus
capital requirements, 316–331
Methodology for evaluating commodity
   trading advisors (CTAs)
   optimal leverage and risk of ruin,
   456–457
   risk of ruin, 455–456
Methodology to explore unprecedented
catastrophes, 88–89
Mexican crisis of 1994 to 1995, 364
MF Global Ltd., 270
Minimum cross-entropy approach, 161
Mixed approach, 312, 320, 334
Mixing coefficients, 326
Möbius transformation, 190
Model criticism
   cost of capital rates, deriving realistic,
   301–302
   inefficient capital markets
   consequences, 302–303
   total cost of risk optimization,
   303–304
Model evolution by learning, 93–94
Modeling operational risk, 3–18
Modeling operational risk based on
   multiple experts’ opinion
   about, 3–5
   AMA models, overview of, 5–9
Model risk, 149
Models and tools, 390
Moderately heavy-tailed case lognormal
   severity, 165–169
defensive mixture approach, 165–169
standard cross-entropy approach,
   166–167, 169
Modified Weibull distribution, 137
Money laundering, 427
Monotonicity of total value at risk
   (VaR), 141
Monte Carlo methods, 87, 93, 94, 144,
   207
Monte Carlo simulation
   contract characteristics and
   regulatory capital arbitrage,
   348–349
   influence of different pricing kernels,
   353
   results, 348–357
   scaling factors, 353
   setup, 347–348
   simple measures and RRVaR,
   structural differences between,
   349–352
Moody’s, 367
Moral hazard problem, 284
Mortgage lenders and real estate
   investment trusts, 423
Mortgage lenders and unregulated
   finance companies, 418–420
Movements, 473
MSE relative error, 171
Multiple experts’ opinion, 3–18
Multivariate compound Poisson model,
   240
Multivariate compound Poisson model
   with completely dependent cells,
   231–232
Multivariate compound Poisson model
   with independent cells, 232–233
Multivariate compound Poisson
   process, 239
Multivariate distribution functions, 233
Multivariate models, 197–216
Multivariate models for operational
   risk, 197–216
   about, 197–198
   aggregation via copula, 207–213
   empirical analysis, 213–216
   standard LDA approach, 199–207
Multivariate regularly varying Lévy
   measure, 233–240
Multivariate regularly varying with
   index, 236
INDEX

Multivariate regular variation, 219
Mutual Assistance in Business Regulation Act of 1992, 362

Negative binomial distribution, 201
Negotiated governance, 274
Net asset values (NAVs), 467, 470
New Basel Capital Accord, 35, 155
operational risk under, 23, 25
regulatory inconsistencies of, 48–51
New Capital Adequacy Framework (Basel II), 198
New finance approach, 296
New York Times, 442
Nicolaus, Stifel, 430
Nonparametric local regression, 456
NYMEX future markets, 441

Observable prices, 466

*Observed Range of Practice in Key Elements of Advanced Measurement Approaches (AMA),* 36, 37

Omega Advisors, 443
One dominating cell severity, 230–231
One-sided cross-validation, 178, 180–182
One-sided cross-validation for density estimation, 172–194
about, 177–178
asymptotic theory, 182–184
finite sample performance, 184–189
method for, 179–182
practical remarks and data applications, 189–193
One-sided cross validation method, 192
One-sided density estimator, 180
OpBase, 43
Operational losses, types of, 117
Operational risk (Op Risk), 465
based on complementary loss evaluations, 69–84
versus capital requirements, 311–334
and credit risk, 366
defined, 131, 280

as dynamic process, 41
economic capital for, 392
execution, delivery, and process management, 191–193
first-order approximations to, 219–244
integrating into Total VaR, 131–150
loss types and business lines, 221
into market risk, 446
modeling of, 138
multivariate models for, 197–216
under New Basel Capital Accord, 23
one-sided cross-validation for density estimation, 172–194
at payment, clearing and settlement systems (PCSSs), 399
in payment and securities settlement systems, 397–410
quantitative analysis of, 198
volume-based measures of, in standardized approaches, 49

Operational risk (Op Risk) and stock market return about, 115–117
operational losses and the banking sector in Turkey, 118–120
reaction of stock returns to operational risk (OpR) (Op Risk) events, 120–128

Operational risk (Op Risk) BEICFs, 42
Operational risk (Op Risk) capital, 117
Operational risk (Op Risk) capital charges, methods for calculating, 33
Operational risk (Op Risk) capital requirements, 314–316
Operational risk (Op Risk) capital requirements methodology about, 316–317
expected loss impact on the OpVar, 330–331
frequency estimation, 326–327
OpVar methodology, 327–330
severity estimation, 317–326
Operational Riskdata eXchange Association (ORX), 43, 391
Operational Risk Insurance Consortium (ORIC), 43
Operational valuation, described, 466–467
Operational valuation risk vs. risk of valuation, 466
Operational value at risk (OpVaR), 4
Op Risk (vendor), 117
“Optimalf”, 456
Optimal leverage factor, 457
OpVantage (vendor), 117, 347
OpVar methodology, 327–330
Ordinary least squares cross-validation, 179–180
ORM systems and data characteristics, 42–51
Ospel, Marcel, 100, 101
Outsourcing of activities, 409
Over-the-counter (OTC) futures contracts, 109
Over-the-counter (OTC) markets, 441
Pareto copulas, defined, 223
Pareto copulas to Pareto Lévy copulas, 223–227
Pareto distributed marginals vs. uniform marginals, 223
Pareto distribution, 132–133, 162, 203
Pareto Lévy copulas, 219, 223, 224, 225, 230, 237, 238
Pareto Severity, 173
Partial transparency proposal, 447–450
Passacantando, Franco, 404
Payment, clearing and settlement systems (PCSSs) operational risks, 397–410
about, 397–399
continuity of, 399
globally systemically important systems, 407
interdependencies, growth of, 406–407
operational risks at, 399, 402–407
payment, clearing and settlement systems, 402–407
policy challenges, 405–407
regulatory approaches to operational risk, 399–402
regulatory standards, consistency between different sets of, 405
regulatory standards and their implementation across different markets, 405–406
risk-based functional approach, 406
Payment, clearing and settlement systems (PCSSs), oversight of, 402
Payoff function, 340
Peak-over-threshold (POT) estimation method, 39
Peak Ridge Capital, 442
Peaks over threshold (POT) model, 318
Perceived risk, 103–105
“Perfect fraud storm” theory, 428
Petri nets, 91, 92, 93
Pillar I (capital requirements for operational risk), 9
approaches for, 385
calculations, 86
Pillar II (supervisory review/authorities), 9, 25, 33, 250, 261, 385
Pillar III (market discipline), 30
market disclosures, 385–386
review of, 387–388
Pilot estimator, 178
Plug-in methods, 178
Point masses, 312, 320, 334
Points of failure, 403
Poisson GPD approach, 167
Poisson mixtures and importance sampling
choosing the instrumental density, 163–165
heavy-tailed distributions and importance sampling, 162–163
importance sampling and cross-entropy, 159–162
loss distributions in the advanced measurement approach, 158–159
Index

Poisson noise, 201
Poisson process with intensity, 212
Poisson shock models, 199, 212–213, 214, 215
Policy challenges, 405–407
Ponzi scheme, 470
Porter, Michael, 293
Portfolio theory, 370
Posterior density, 83
Posterior distribution, 8
Posterior probability, 165
Power, Michael, 280
Practical remarks and data applications
  data transformation and boundary
  correction, 189–191
  operational risks: execution, delivery,
  and process management, 191–193
Premium approaches, 337, 338, 346, 349
Premium-based measures, 343–346
Preventative controls, 110
PricewaterhouseCoopers (PwC), 445
Pricing models, 475
Principles for Home-host Supervisory
  Cooperation and Allocation
  Mechanisms in the Context of
  Advanced Measurement
  Approaches (AMA), 34
Prior distribution, 8, 14
Private equity funds, 416
Private Investment in Public Equities
  (PIPEs), 466, 472
Probability Integral Transform, 327
Probability weighted moment (PWM), 205, 206
Prolonged/frequent disruption, 403
Proposed Supervisory Guidance for
  Internal Ratings-Based Systems for
  Credit Risk, 25
Protective (recovery) control, 111
Prudential Insurance, 116

Quantification method conditions, 11
Quantitative analysis
  integration of the subjective, 82–84
  of operational risk, 198
Quantitative estimation methodologies
  for LDA shortcomings, 37–41
Quantitative operational risk
  measurement, 23–67
  current practices of operational risk
  measurement and regulatory
  approaches, 26–35
  main measurement challenges of
  LDA, 36–51
Quantitative techniques, 27
Quartic kernel, 185
Quasi-Monte Carlo (QMC) method,
  144, 148
Questionnaire output, 78–82
Radon measure, 234, 235, 237
Recommendations on Securities
  Clearance and Settlement Systems
  (9 G-30), 399
Red flags in the hedge fund industry,
  447
Regression mode modeling, 95
Regulated group and business as usual,
  280–285
Regulated groups, 277–278
Regulatory approaches to operational
  risk, 399–402
Regulatory arbitrage, 348, 349, 353
Regulatory black hole, 429–431
Regulatory capital, 365, 366
Regulatory capital and the constituents
  of regulatory capital, 385
Regulatory capital arbitrage, 339, 342,
  346, 367
Regulatory guidelines on risk
  disclosure, 385–386
Regulatory standards, consistency
  between different sets, 405
Regulatory standards and their
  implementation across different
  markets, 405–406
INDEX

Regulatory studies, 384
Relative error, 171
Relative measures, 38
Relative value strategies, 418
Representativeness bias, 10
Responsive regulation, 274
Returns and volatility, 460–461
Richmond-Fairfield, 443
Risk, cost of capital, and shareholder value, 297–300
Risk-adjusted capital (RAC), 301
Risk and control self-assessments (RCSA), 36, 41
Risk-Based Capital Guidelines: Internal Ratings-Based Capital Requirement (2006b), 34
Risk-based functional approach, 406
Risk-dependent capital cost rates, 300
Risk disclosure practices, 384
Risk disclosure studies academic studies, 385 accounting perspective, 383–384 regulatory studies, 384
Risk factor categories, 250
Risk-generating nodes, 90–91
Risk integration framework, 136
Risk management, inherent value contribution through, 297
Risk management integration, 261
Risk management measures, 304–305
RiskMetrics (third party services), 436
Risk-mitigating impact, 48
Risk of ruin on annualized returns, 462 regression of, 460 Spearman correlations of, 459
Risk of ruin approach for evaluating commodity trading advisors (CTAs), 453–463 about, 453–455 data, 455 methodology, 455–457 results, 457–463
Risk of valuation vs. operational valuation risk, 466
Risk ownership, 260
Risk perception, 103
Risk ratings agencies, 367
Risk tolerance, 108
Risk transfer, 304
Risk transfer mechanisms, 290, 294
Saloman Brothers, 284 Sample likelihood, 8 Sarbanes-Oxley Act, 382 Saving Deposits Insurance Fund (SDIF), 117 Scaling coefficients, 326 Scaling factors, 339, 342, 348, 353 Scenario analysis, 390 Scenario-based approaches (sbAMA), 5, 6–9 Secondary markets, 414 Securities and Exchange Commission (SEC), 417, 445, 446, 469
Index

Severity model, 202–206
Shareholder value vs. earnings and risks, 297–298
Sheather-Jones bandwidth, 184
Short selling strategies, 418
Side pockets, 475
Signers, Conrad P., 469–470
Silverman’s rule of thumb bandwidth, 185, 186, 191
Simple measures, 338
Simple measures and Op Risk insurance, 353
Simulation losses frequency, 228
Simulation results, 170–173
lognormal severity, 170–172
numerical results, 144–148
Pareto Severity, 173
simulation method, 144
specification of the stylized models for marginal risks, 143–144
Simultaneous losses, 232
Single-cell OpVaR, formula for, 233
Single point of failure, 403
Size and functional threshold, 312–314
Sklar’s theorem, 141, 207, 208, 226
Small and medium businesses (SMEs), 312
Small banks, 312, 331–333
under Italian banking capital regulation, 311–334
Social contract, 366
Society for Worldwide Interbank Financial Telecommunication (SWIFT), 403
Solengo Capital, 442
Solvency II, 292, 382
Sovereign risk ratings, 364
Spearman correlations, 459
Special purpose entities (SPEs), 423
Square root formula, 142, 147–148
Standard & Poor’s, 367
Standard cross-entropy approach, 166–167, 169
Standardized approach, 4
Standardized Approach (TSA), 28
vs. AMA, 88
vs. basic indicator approach (BIA), 353
Standard LDA approach, 199–207, 274
compounding via Monte Carlo methods, 206–207
frequency model, 201–202
in Italy, 315
severity model, 202–206
Standards for Interbank Netting Schemes, 399
“Standards for the Use of EU Securities Settlement Systems in ESCB Credit Operations,” 400
State Farm Insurance, 116
Statistical ties, 319
Stochastic dynamics to drive events, 89–90
Stock market return and operational risk, 115–126
Strategy risk, 465
Subadditivity, 135
Subjective analysis, integration quantitative analysis and, 82–84
Subjective information analysis questionnaire output, 78–82
self risk assessment questionnaire, 76–78
Subjective qualitative data, 73
Subjective quantitative data, 73
Subprime credit crisis, 415
actions taken after start of, 429–430
default levels, 430
and hedge funds, 419
motivation of, 428
timeline, 421–423
Subprime crisis
borrowers and lenders exposed, 420–424
as financial statement manipulation or operating risk system failure, 427–429
history, 413–415
Subprime loan crisis (August 2007), 455
Subprime mortgage crisis as Op Risk problem, 413
Subprime mortgage market, 362, 364, 415
Supervisory review (Pillar 2), 34
Supra-Bayesian Approach, 13–14
Supra-Bayesian model for operational risk modeling, 14–18
Survival time vs. high leverage, 454
Survivorship bias, 43
Switzerland, 102, 425
Systematic methodology for uncovered risks, 88
Systemically important payment systems (SIPS), 398
Systemic benchmark, 367
Systemic capital adequacy benchmark, 367
Systemic economic capital, 367
Systemic risk (beta), 300, 364, 366
System resilience, 402
Tail conditional expectation, 160
Tail integral, 224
Tail measure, 224
Tail probability, 159
Tail risk, 26
Tanona, W. F., 102
Tarasoff v. Regents of the Univ. of Calif., 276
Tax havens, 425–426, 429
TEID model application, 108, 109–111
The Treatment of Expected Losses by Banks Using the AMA under the Basel II Framework, 35
Third Consultative Paper (CP 3), 33, 35
Thornton, Grant, 443

Threat risk, 108
Ties, 319, 323
Ties problem, 334
Tilted density, 164
Time-unconditional VaR, 319
Total capital charges, 315
Total cost of risk (TCOR), 303, 304
Total cost of risk assessment, 304–306
Total loss distribution, 134
Total OpVaR approximation, 230–243
Clayton Lévy copula, 241–243
independent operational risk cells, 241
multivariate compound Poisson model with completely dependent cells, 231–232
multivariate compound Poisson model with independent cells, 232–233
multivariate regularly varying Lévy measure, 233–240
one dominating cell severity, 230–231
Total risk, 370
Total value at risk (VaR), 132
approximate method for, 133
integrating Op Risk into, 131–150
monotonicity of, 141
Traders, 283
Training programs, 263
Transfer techniques, 391
Transnational crime
Convention against Transnational Organised Crime (2001), 424
Palermo Convention, 424
Schloenhardt (2005), 424–425
Transnational crime, unregulated financial institutions for, 413–431
Transnational crime mechanisms, 424–429
corporate groups and nominee companies, 426–427
subprime crisis as financial statement manipulation or operating risk system failure, 427–429
tax havens, 425–426
Index

Transparency, 437–438, 440, 444, 447
Tremont (investor), 443
True regulatory risk reduction, 339
True value at risk (VaR), 157
Turkey, 115–126
UBS, 100, 101, 102, 415
Unauthorized trading, 446
Uncertainty management, 106–108
technology system designed to address the intangible nature of service risks, 108–109
TEID model application, 109–111
Uncovered risks, 88
Undercapitalized risks, 382
Unexpected loss (UL), 26, 75
distribution of, 82
effect of loss frequency on, 46–48
in scenario groups, 86–88
Uniform marginals vs. Pareto distributed marginals, 223
United Kingdom, 362, 385
United Nations, 424
United States, 313, 315, 362, 364, 382, 416, 418, 431
Unregistered pools of investments, 416
Unregulated financial institutions for transnational crime, 413–431
current prudential regulatory system governing NBFIs, 415–416
hedge funds, role of, 416–418
hedge funds, systemic risk and contagion from, 418–420
mortgage lenders and unregulated finance companies, 418–420
regulatory black hole, 429–431
subprime credit crisis, borrowers and lenders exposed by, 420–424
subprime crisis, history of, 413–415
transnational crime mechanisms, 424–429
Unsystemic risk, 370

Valuation
of hedge fund assets, 450
of hedge funds, 417
Valuation conflict, 444
Valuation process, 466
Valuation risk, 467
Valuation risk, control related, 469–472
Valuation risk, evaluating and mitigating, 472–474
Valuation risk, strategy related, 467–469
Value at risk (VaR), 30, 131, 156
Value-at-risk (VaR) methodology, 383
Variance principle, 341, 353
Vasicek large portfolio limiting formula, 139, 143
Verification requirements for model dynamics, 93
Virtual captive, 303
Volatility, 368
Volatility and returns, 460–461
Volume-based approach, 26
Wall Street Journal, 442
Watsa, Prem, 430
Weibull distribution, 76–77
Weight degeneracy, 163
Weighted average cost of capital (WACC), 299
Weighted average cost of capital (WACC) formula, 301
Weighted opinion pool, 12–13
Whittier, John, 446–447
Whole mortgage lending, 415–416
Wood River Capital Management, 446–447
Workflow management (WFM), 90
World Trade Center bombings, 273
Worst possible outcome (risk of ruin), 454
Wrongful discharge lawsuits, 277
Wuffli, Peter, 100