Index

ABCP conduits. See Asset-backed commercial paper (ABCP) conduits
ABX index family, 406–407
Acceptance region, 662
Accounting balance sheet, 193
Accounting triggers, 547
Adverse price impact, 463, 467
Adverse selection, 198, 462
Agency debt, 639
Agency MBS, 298, 446
Agency securities lending, 441
Aggregate credit, 517
Alternative hypothesis, 661
Amaranth (hedge fund), 505
American International Group (AIG), 211
American option, 121
Analytical approach, 123–126
Arbitrage, regulatory, 644
Arbitrage CDOs, 343
Arbitrage pricing theory (APT), 81–82.
See also Multiple risk factors
Arithmetic rate of return, 44–49
Arithmetic return approximation, 164, 165–166
Arranger. See Underwriters/underwriting
Asian financial crisis of 1997, 42–43, 588
Asset and default correlation, 279–281
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), 429
Asset-backed securities (ABS), 10, 299–309, 431–432
spreads, 550
Asset-liability management (ALM), 464
Asset-price targeting, 622–624
Asset return correlation, see Correlation
Asset prices and returns. See also Kurtosis, Skewness, Volatility and default correlation, 279–281
behavior, 43, 72, 349–363, 514
return correlation, 343
statistical behavior of, 43
statistical properties of, 356, 358
time variation of distribution of, 352
Asset-swap spread, 232
Asymmetric information, 197, 583, 599
Asymptotic behavior, 142
Attachment point, 303
At-the-money-forward, 122
Automotive industry, 402–405
Available-for-sale securities, 615
AXA Rosenberg, 394
Backtesting, 407–413
Bagehot’s rule, 630–631
Balance sheet CDOs, 343
Balance sheet of firm, 216
Balance sheet risk, 422
Bank examinations, 619–621
Bank for International Settlements, 8, 602
Bank of America, 260
Bank runs, 428, 523–524, 528–535, 617
INDEX

Bankruptcy, 620. See also Resolution defined, 200
too-big-to-fail doctrine, 613, 636–638, 640, 646
Bankruptcy remote, 299
Banks, Banking:
  commercial paper borrowing, 429, 430
  fractional-reserve, 427–428, 530, 632
  fragility of, 2, 427–428, 632
  historical evolution of, 2–4, 431–432
  liquidity, 425–429
  liquidity transformation by, 426–427
Barrier options, 7, 545–546
Base correlation, 340
Basel Capital Accord (I, II, and III), 608–612
and capital composition, 612–613
  Market Risk Amendment, 615–616
  minimum capital requirements, 610
  risk haircuts, 610–611
Basel Committee on Banking Supervision, 609
Basis points, 45
Basis point volatility, 150–152
Basis risk, 512–516
Bearer securities, 211
Bear Stearns, 260, 432–433, 448, 531
Behavioral finance, 50
Benchmark interest rates, 88–90
Bernoulli distribution, 236–237, 266–267, 653
Bernoulli trial, 236–237, 653
Bespoke tranches, 339
Beta, 60
and capital asset pricing model (CAPM), 80–82
  correlation and, 79
  default correlation and, 281
  and market risk, 76–82
  and subprime crisis, 556–559
  volatility and, 80
Bid-ask spread, 463
“Big bang,” 248
Bilateral netting, 209. See also Netting
Bill of exchange, 643
Binomial distribution, 653–654
Black-Scholes implied volatility, 177
Black Wednesday, 569
Black volatility, 151
BNP Paribas, 531
Bogle, John, 4
Bond-CDS basis, 513
Bond duration, 137
Bond price volatility, 150–152
Bonds:
  as collateral, 443
  convertible bond trading, 491
  convexity, 154–155
  duration, 149–150
  duration-convexity mapping, 156
  duration-only VaR, 152–154
  DV01, 149–150
  interest-rate risk, 138–156
  interest-rate volatility, 150–152
  payment in kind (PIK), 195
  risk-neutral default rates, 242–245
during subprime crisis, 526
tax treatment, 142
Bond valuation, 137–138
  cash-flow mapping, 137
  duration, 137
  duration-convexity mapping, 148–156
  factor models, 138
Bootstrapping, 142–143, 252–256
Breeden-Litzenberger formula, 374, 380, 383
Bretton Woods system, 22–24, 567–568
Bridge bank, 620. See also Dodd-Frank Act
Broad Index Secured Trust Offering (BISTRO), 11
Brokerage relationships, and counterparty risk, 208
Broker-dealers, 2. See also Investment banks
Index

Brownian motion, 67–74
gamma, 64, 71–74
in Merton model, 213–214
Bubbles, 578–582, 622, 624
Bullet bonds, 298
Business cycle theory, 562
Butterfly spread, 377–380

Call reports, 535
CAMELS ratings, 619
Capital, 193, 610, 612–613
Capital asset pricing model (CAPM), 80–82
Capital charges, 498–499. See also Basel Capital Accord
Capital pools, large, 17–20
Capital standards, 608–619
Basel Capital Accord (I, II, and III), 609–612
composition of capital, 612–614
procyclicality of, 617–618
and reserve requirements, 618–619
Capital structure, 194–195, 301–304.
See also Tranches/tranching
Cash balances, in hedge funds, 465
Cash-flow securitizations, 301
Cash-flow mapping, 137, 397–398
CDO. See Collateralized debt obligations (CDOs)
CDO-squareds, 300
Central limit theorem, 653
Charge-off, 535
Charter, 603
Chicago Mercantile Exchange (CME), 505
China, and U.S. current-account deficit, 573–574
Chi-square distribution, 410
Citigroup, 262–263, 532, 540–542, 641. See also Credit spreads
Clearing banks, 472
Clearinghouses, 209, 428
CMBS. See Commercial mortgage-backed securities (CMBSs)
Coherence, 414–419
Collateral, 195–196. See also Markets for collateral
Collateral, security of, 539
Collateral devaluation, 542–543
Collateralized bond obligations (CBOs), 300
Collateralized debt obligations (CDOs), 11, 299
arbitrage CDOs, 345
balance sheet CDOs, 345
Collateralized loan obligations (CLOs), 299
Collateralized mortgage obligations (CMO), 8, 298–300, 309
Collateral markets. See Markets for collateral
Collateral pool, 300
Collective action problems, 199
Commercial banks, 2–3, 427–429
Commercial mortgage-backed securities (CMBS), 13–14, 308–309,
431–432
Commercial paper borrowing, 429–430
Commercial Paper Funding Facility (CPFF), 429
Commercial paper markets, 424
Committee of European Banking Supervisors (CEBS), 602–603
Commodities Futures Trading Commission (CFTC), 605
Communication, 40
Community of European Banking Supervisors (CEBS), 602
Component value-at-risk, 483
Component variances, 483
Component volatilities, 483
Compounding interval, 138
Compression, 212
Concave function, 52
Concentration risk, 337
Conditional expectations, 203, 592
Conditional independence, 236, 276
Conditional probability, 281
INDEX

Conditional value-at-risk (CVaR), 114–117
Conditional volatility, 103. See also GARCH model
Confidence level, 97
Constant hazard rate, 239
Consumer Financial Protection Bureau (CFPB), 603
Consumer protection, 598–600
Consumption process, 56
Contagion, 518, 540
Contingent capital, 617
Contingent claims, 62–63
Contingent leg, 249
Convertible bonds, 194–195, 389, 398, 436. See also Convertible preferred shares, Mandatory convertible bonds
convertible bond arbitrage, 19, 498
Convertible preferred shares, 195
Convexity, 119, 154–155, 327
Coordination failures, 199
Copulas, 284–295, 319. See also Simulation
copula correlation, 340–341, 342
Core capital, 612
See also Default correlation, Financial crises, Implied correlation, Single-factor model, Spread correlation
Correlation skew, 340. See Implied correlation
Cost of capital, 423
Cost of debt financing, 499
Cost of equity capital, 499
Countercyclical monetary policy, 625
Countercyclical policy orientation, 624–628
Counterparty risk, 207–213
brokerage relationships and, 208
and custodial risk, 211–212
and derivatives, 209–210, 457
double default risk, 210–211
mitigation of, 212–213
netting and clearinghouses, 208–209
OTC derivatives trading, 208
Counterparty valuation adjustment (CVA), 209
Coupon bonds, 144–147
Covariance, 60, 76
Coverage, 247
Covered bonds, 7, 298
Covered interest rate parity, 123
Cover pool, 298
Crashes, 578–582
Credibility, 642
Credit, defined, 192
Credit contracts, 196–199
Credit correlation episode of 2005, 399–405
Credit crunch, 519, 522
Credit default swaps (CDS), 11, 196, 246–249. See also Credit index default swaps (CDX/iTraxx) bootstrapping, 247
CDS credit curves, 247–248
compression of, 212
and counterparty risk, 212
and default probability curve, 253–259
defined, 192
and double default risk, 210–211
mark-to-market of, 261–262
“runs” on, 528–529
Credit default swap spread, 232
Credit derivatives. See Derivatives
Credit enhancement, 303
Credit events, 192
Credit expansion/contraction, 520–521, 569–574
Credit exposure, 201
Credit factor models, 222–226
Credit index default swaps (CDXs/iTraxx), 338–340, 399–405
Credit losses, 301–304, 319
Credit migration, 202–203
Credit portfolio risk measurement, 270–274
Index

Credit rating agencies, 204–205
Credit ratings, 204, 546
Credit ratings industry, 645–646
Credit return skewness, 226
Credit risk, 89, 191–229
counterparty risk, 207–213
credit factor models, 222–226
credit-risky securities, 193–196
credit VaR, 227–228
creditworthiness, 204–207
default and recovery, 199–204
defining, 192, 611
internal model approach, 611, 614
jump-to-default risk, 228–229
vs. market risk, 204
Merton model, 213–222
overview, 191–192
standard model approach, 612, 614
transaction cost problems in credit contracts, 196–199
Credit risk measures, 226–229
Credit risk models, 207
Credit risk transfer, 344
Credit-risky securities, 193–196
Credit scoring, 207
Credit-spread risk, 399
Credit spreads, 191, 231–235, 548–551
Citigroup, 513–514, 532, 641–642
defined, 192
in Merton model, 217
Credit Value-at-Risk (VaR), 228–229
and loss distributions, 327–333
non-subadditivity of, 418–419
with single-factor model, 281–284
Creditworthiness, 204–207
credit risk models, 207
internal ratings, 207
Critical region, 662
Cross-margining agreements, 440
Cumulative probability distribution function (CDF), 376–377, 383
Cumulative shares, 194
Currency hedge, 515
Currency speculation, 565–569
Currency swaps, 7, 643
Custodial risk, 211–212
Custodial services, 211–212
Custodian, 309
Day-count conversions, 139
Daylight exposure, 472
Debasement, 563
Debt-deflations, see Fisher, Irving
Debt financing cost, 499
Debt obligation, 193
Debt priority, 196
Debt seniority, 194
Decay factor, 104
Default, 192, 243
defined, 199–200
expected loss (EL), 202–203
exposure at, 201
loss given default (LGD), 201–202, 203–204
probability of, 200–201
Default01, 333–336
Default correlation. See also Implied correlation
and asset returns, 279–281
and beta, 281
and default probability, 325–327. See also Basel Capital Accord
defining, 266–269
order of magnitude of, 270
summary of concepts, 341–342
Default curve analytics. See Default probabilities
Default intensity. See Default probabilities
Default mode, 207
Default probabilities, 200–202, 213–217
conditional cumulative default probability function, 278–279
conditional default density function, 279
conditional default distributions, 275–279
conditional default probability, 240–241
Default probabilities (Continued)
   default time density function, 239
   default time distribution function, 239
   hazard rate/default intensity, 237–238
   marginal default probability, 239
   risk-neutral estimates, 236, 241–261
   single-factor model, 276–278
   time scaling of, 245–246
Default rates, 205, 547
Default sensitivities of the tranches, 333–337
Default threshold, 276
Default timing, 307, 319
Definition of capital, 610
Delegated monitoring, 197
Delinquencies, 535
Delta, 128, 135–136
Delta equivalent, 164
Delta-gamma, 121
   for bonds, 134–136
   for options, 127–134
   and vega risk, 184
Delta-hedged long option portfolios, 400
Delta-hedged positions, 125–126
Delta-normal approach to VaR, 163–174
   portfolio of securities, 169–174
   single position/several risk factors, 166–168
   single position/single risk factor, 164–166
   with vega risk, 185–189
Demand deposits, 6
Density functions of portfolio, losses in the single-factor model, 286
Deposit insurance, 605–608, 636
Depositor, 307
Depository institutions, 2. See also Banks
Deposits insurance, 598–599
Depth, 463
Derivatives. See also Forwards; Futures; Hedging; Options; Swaps
   and counterparty risk, 209–210
   credit default swaps (CDSs), 11, 192, 196
   defined, 6–7
   leverage and, 456–460
   OTC derivatives, 208
   types of, 120
   Detachment point, 303
   Diffusion model, 64
   Discharge of debt, 200
   Discount bonds. See Interest rates
   Discount curve. See Interest rates
   Discounting, of utility functions, 51
   Discount margin, 232
   Discount window. See Monetary policy
   Disintermediation, 3–4, 9–10
   Dispersion trade. See Implied correlation
   Distance to default, 214
   Distressed exchanges, 199–200
   Diversification, 82–85, 477, 506–507
   Diversification benefit, 506
   Diversity score, 507
   Dividends, 193
   Dodd-Frank Wall Street Reform and Consumer Protection Act, 309, 344, 428, 597, 600, 608, 620, 637
   Double default risk, 211
   Dual mandate, 622
   Duration, 149–150, 518
   Duration approach, 137–138
   Duration-convexity mapping, 148–156
   Duration-only VaR, 152–154
   DV01, 149–150
   Dynamic hedging, 120, 544–545
   Dynamic strategy, 82
   Early amortization trigger, 303
   Easy credit terms, 452
   EBITDA (earnings before interest, taxes, depreciation, and amortization), 450
   Economic activity, 518
Economic balance sheet, 193
Efficiency, 85–88, 508
Efficient frontier, 87
Elan Corporation, 365, 366
Elasticities, 483–484
Electronic trading, 8
Elementary claims, 62–63
Embedded leverage, 344, 453
Embedded options, 141–142
Endogenous liquidity risk, 534
Endogenous risk, 542
Endowment process, 53, 57
Enron, 549, 553, 554
Enterprise value, 193
Equilibrium asset prices and returns, 56–61
Equilibrium model, 49
Equity, 193
Equity capital, 479, 499
Equity index, 387–389
Equity long-short trading, 19
Equity market-neutral strategy, 487
Equity ratio, 193
Equity tranche, 302, 331
Equity value of firm, 215
Euler property, 482
Euro bullish/yen bearish strategy, 511
European Banking Authority (EBA), 602
European monetary system (EMS), 568–569
European option, 121
European Union (EU), 592
Event-driven strategies, 398
EVT. See Extreme value theory (EVT)
EWMA model. See Exponentially weighted moving average (EWMA)
Exceedance, 369
Excession, 408
Excess return, 53
single-asset to market, ratio of, 81
Excess spread, 303
Exchange rate mechanism (ERM) crisis, 556
Exchange-rate risk, 89
Exchange rates:
and currency speculation, 565–569
implied correlation and, 390
Exchange-traded funds (ETFs), 6, 47
Exotic options, 7
Expected loss (EL), 202–203. See also Unexpected loss
Expected present value, 54–56
Expected return, 53
Expected shortfall (ES), 114–117
Expected tail loss, 114–117
Expected utility, 51
Expected utility function, 51
Exponential distribution, 237
Exponentially weighted moving average (EWMA), 104–106, 350
Exposure at default, 201
Extension risk, 304
External costs, 469
Externalities, 198–199
Extreme value distribution, 367
Extreme value theory (EVT), 365–372
Face value, 138, 144
Factor models, 138, 207. See also single-factor model
Factor-push approach. See Stress testing
Fails. See Settlement fails
Fair market value (FMV), 543
Fannie Mae, 537, 639
Fat tails, 120
Federal Deposit Insurance Corporation (FDIC), 606–608
Federal Reserve membership, 603–604
Fee leg, 249
Feedback rule, 570
Fiduciary responsibility standard, 599
Final-year cash flow tracking, 314–318
Financial advisors, 19
Financial crises. See also Subprime crisis
accounting triggers, 546–547
anticipating, 582–589
Asian financial crisis of 1997, 588–589
asset price behavior during, 547–561
Financial crises (Continued)
asset-price predictors of, 584–589
bubbles and crashes, 578–582
causes of, 561–582 (see also Financial crisis causes)
characteristics of, 517
and collateral devaluation, 542–543
contraction of bank lending, 521–525
contraction of securities markets, 525–526
and correlation, 556–561
credit expansion and contraction, 520–521
exchange rate mechanism (ERM) crisis, 556
financial causes of, 574–577
Great Depression, 517–519, 627
Icelandic banking collapse, 607
impact of high correlation in, 559–561
impairment of market functioning, 536–539
leverage and, 582–584
liquidity impasses and hoarding, 530–535
Long Term Capital Management (LTCM), 556–557
macroeconomic predictors, 584
net worth and asset price declines, 540–542
panics, 528–535, 630–632
public policy toward, 621–635
rising insolvencies, 535–536
risk triggers, 543–546
security of collateral, 539
volatility and, 551–555
Financial crisis causes:
currency speculation, 565–569
debt and international causes, 563–565
historical overview, 563–565
interest rates and credit expansion, 569–574
Financial innovation, 5–9
Financial intermediaries, 2, 16–17, 601–602
Financial liberalization, 564–565
Financial market infrastructures/utilities, 471
Financial regulation. See Regulation
Financial Services Authority (FSA), 603
Financial services industry, historical background, 1–33
Financial Stability Oversight Council (FSOC), 600, 626
Financial stability policies, 621–628.
See also Macroprudential supervision, Regulation
Financing risk, 114
Fisher, Irving, 575, 627–628
Fisher’s schema, 575
Fixed foreign exchange rates, 15–16
Flash crash, 491
Flight into real assets, 548
Flight to quality, 548
Fluctuations in interest rates, 89
Foreign exchange rates, fixed, 15–16
Form of organization, 604
Forward and term premiums, 587
Forward call delta, 179
Forward rate agreements, 141
Forwards, 7, 120, 457
Fragility, financial, 2–3, 582–584, 600, 608, 621, 644, 646
Frechet distribution, 367
Freddie Mac, 537, 639
Fremont General, 585
Frictions, 196–199
Full repricing. See Monte Carlo simulation
Funding by guarantees, 10
Funding liquidity/risk, 421, 422–436
bank liquidity, 425–429
hedged funds, 434–435, 465–466
measurement of, 464–466
money and maturity transformation, 423–425
money market mutual funds (MMMFs), 433–434
Index

securities firms, 432–433
systematic funding liquidity risk, 435–437
Futures, 120, 457
Gamma, 128, 136
GARCH model, 106–108
Generalized autoregressive conditionally heteroskedastic model. See GARCH model
Generalized Pareto distribution, 369
Geometric Brownian motion, 64, 71–74
and jump-diffusion model, 363–365
in Merton model, 219
Quadratic variation process, 68
Total variation process, 68
and volatility estimation, 99–103
Glass-Steagall Act of 1933, 2, 17
Global minimum-variance portfolio, 85
Going-concern capital, 612
Goldman Sachs, 260
Golden-concern capital, 612
Goodwill, 612
Government National Mortgage Association (GNMA), 7
Government-sponsored enterprises (GSEs), 639
Gramm-Leach-Bliley Financial Services Modernization Act of 1999, 17
Granularity, 270–274, 281, 337
Great Deleveraging, the, 421
Great Depression, the, 517–518, 627
Great Moderation, the, 26–30, 421, 571
Gross leverage, 456
Gross return, 45
Guarantees, 211, 308, 525, 530, 569, 598, 614, 636, 639. See also Deposit Insurance; Too-big-to-fail; Wrap implicit guarantees, 525, 639
Haircuts. See Margin
Hard credit enhancement, 303
Hard-to-borrow securities, 446
Hazard rate, 237–238, 242–245, 364
Hedge finance. See Minsky, Hyman
Hedge funds, 5, 17–19, 434–435, 444–445
funding liquidity risk management for, 465–466
risk capital measurement in, 490–499
Hedging, 512–516, 544–545
dynamic hedging, 120, 457
static hedging, 120, 450
Held-to-maturity securities, 616
Herding behavior, 540
Hermindahl index, 507
High-frequency trading, 491
High-yield bonds, 3, 7
Hill’s estimator, 368–370
Historical return distributions, 357–363
Historical simulation, 111–113, 411
and expected shortfall, 116
with full repricing, 126–127
portfolio VaR, 174–175
Historical stress tests. See Stress testing
Historical timeline of financial mishaps, 30–33
Hoarding, 530–535
Homogeneity of degree one, 414
Homogeneous function, 482, 664–666
Homogeneous of degree, 664
Housing, leveraged returns to, 452–453
Hurdle rate, 316
Hybrid capital, 450, 613
Hypothesis testing, 661–662
Icelandic banking collapse, 607
Idiosyncratic risk, 275, 281
Idiosyncratic shock, 275–276
Immediacy, 424
Impairment. See Material impairment
Implicit guarantees, 639
Implied binomial trees, 386
Implied correlation
  correlation skew, 340
dispersion trading, 388, 400
implied credit correlation, 338, 342, 399–405, 559–561
implied currency correlation, 390
implied equity correlation, 387–389, 555
Implied views, 507–508
Implied volatility, 122, 176–189, 553–554
  Black-Scholes implied volatility, 177
  Black volatility, 151
  and delta-normal approach, 184–189
  in financial crises, 587–589
  implied volatility-based crisis
  predictors, 579
  volatility function, 181
  volatility smile, 180–181, 188, 370, 381–382
  volatility surface, 181, 182, 187, 189
Implied volatility index (VIX). See VIX volatility index
Implied volatility smile. See Volatility smile
Implied volatility surface. See Volatility surface
Incremental value-at-risk (VaR), 480, 490, 509–512
Independent asset returns, 278
Index funds, 6
Indicators of financial stability, 625
IndyMac Bancorp, 530
Inflation, 23–24
Inflation risk, 89
Inflation-targeting, 622
Initial haircut. See Margin
Initial public offering (IPO), 20
Insolvency/solvency, 469–470, 535–536
Intensity models, 235–241, 274
Interest rate controls, 15
Interest rates:
  continuously compounded forward
  curve, 138–139
  continuously compounded spot
  curve, 139
Discount bonds, 138–141
Discount curve, 142, 145
effects of low rates, 569–574
fluctuations, 89
forward curve, 138–141, 142, 145
instantaneous forward curve, 140
government bonds, 88–90
money market rates, 90
principal components of, 138
spot curve, 138–141, 142, 145
zero-coupon curve, 139
Interest-rate smoothing, 571
Interest-rate swap, 7
Interest-rate volatility, 150–152
Intermediaries, 424
Intermediation, 11–13
Internal drain, 633
Internal model approach to credit risk, 611, 614
Internal rate of return (IRR), 316, 323–327
Internal ratings, 207
International Monetary Fund (IMF), 584
International monetary reserves, 25–26
International Organization of Securities
  Commissions (IOSCO), 602
International transmission, 564
Intertemporal consumption decisions, 50
Intraday credit, 472
Intrinsic value, 179, 457
Inverse function, 126
Inverse probability distribution, 655
Inversion principle, 635
Investment banks, 2–3
Investment Company Act of 1940, 5–6
Investment-grade RMBS, 407
Involuntary reintermediation, 524–525
ISDAs. See Master agreements
I-spread, 231–232
Issuer, 307
Issuer-pays model, 205
Issuer-weighted default rates, 205
ITraxx, 338
Jarque-Bera test, 357
Joint defaults simulation, 288–295
J.P. Morgan Chase, 640
Jump-diffusion models, 363–365
Jump process, 363
Jump-to-default risk, 229
Junior debt, 194, 302
Junk bonds, 3, 7
Kernel estimator, 357–359
bandwidth, 359
kernel function, 359
optimal bandwidth, 359
Keynes, John Maynard, 425, 576–577
Knight, Frank H., 34
Knock-ins/knock-outs, 545–546
Known vs. random, 202
Kolmogorov-Smirnov goodness-of-fit test, 357
Kurtosis, 350, 351, 355, 357, 361
Kurtosis excess, 350
Latent factor, 223
Law of iterated expectations, 579
Lehman Brothers, 210, 260, 429, 525
Leibniz’s Rule, 375
Lender of last resort function, 621, 628–635
Leptokurtosis. See Kurtosis
Leverage:
and asset volatility, 460–461
contribution to crises, 582–584
defining/measuring, 448–453
and derivatives, 456–460
during financial crises, 540–542
gross vs. net leverage, 456–457
leveraged returns to housing, 452–453
margin lending and, 453–455
in Merton model, 216
and required returns, 451–452
and short positions, 455–456
and structured credit, 460–461
Leveraged buyouts (LBOs), 20, 195, 435
Leveraged ETFs, 47
Leveraged loans, 435
Leverage effect, 352, 449, 450
Leverage ratios, 193, 609, 627
LIBOR (London Interbank Offered Rate), 90, 533–534
Lien, 196
Linear congruential generator, 663
Linearity, linearization, 164–165
Liquidity-adjusted VaR, 467
Liquidity and maturity transformation, 422–425
Liquidity crunch, 519
Liquidity impasses, 530–535
Liquidity/liquidity risk, 421–448.
See also Bank liquidity; Funding liquidity/risk; Transactions liquidity/risk
credit default swaps (CDSs), 247
lender of last resort and, 632–635
measurement of, 464–469
and systemic risk, 469–473
in yield curve estimation, 141
Liquidity preference, 425
Liquidity premium, 421–422
Liquidity ratios, 609, 627
Liquidity spreads, 584–585
Liquidity transformation, 6
Living will, 620
Loan originator, 307
Loan pool, 300
Loan-to-value (LTV) ratio, 449
Lockout period, 303
Logarithmic returns, 44–49, 71–74
Logarithmic utility, 52, 55–56
Lognormal distribution, 48, 656–660, 760
Long equity/short mezz trade, 401
Long-short strategy, 487
Long Term Capital Management (LTCM), 556–557
INDEX

712

Loss distributions:
  characteristics of, 327–331
  and credit VaR, 327–333
single-factor model, 285–286, 294
Loss given default (LGD), 201–202,
203–204, 218–219. See also
  Expected loss, Unexpected loss
Low put deltas, 384

Macroprudential supervision, 600, 627
Maddison, Angus, 20
Maintained hypothesis, 661
Managed floating, 24
Managed pool, 301
Mandatory convertible bonds, 194–195
Mapping, risk factor, 98, 162–163
  defined, 94, 162
  and model risk, 397–399
Margin, 196, 209, 434, 535, 599–600.
  See also Counterparty risk,
  Custodial risk, Markets for
collateral, Rehypothecation
cross-margining agreements, 442
initial margin or haircut, 196
margin accounts, 211–212
margin call, 447
remargining, 441
repledging, 440
Marginal rate of substitution, 55
Marginal utility, 52
Marginal Value-at-Risk (VaR), 480,
482, 509–512
Marginal volatility, 482
Margin lending. See Markets for
collateral
Market data, 396
Market functioning, 510, 518, 536–538
Market liquidity/risk, 461–464, 471,
517
Market micro structure, 461, 464
Market-neutral strategies, 490
Market portfolio, 80–81
Market risk:
  beta and, 76–82
  vs. credit risk, 204
speculative finance, 577
Ponzi finance, 577
Model risk, 393–407
and 2005 credit correlation episode, 399–405
consequences of, 394
defined, 393–395
mapping issues, 397–399
valuation risk, 395
variability of VaR estimates, 393–397
Modern finance theory, 44
Modified duration, 149–150
Monetary policy and operations, 26–30, 570–572, 626–628
credit channel, 577
open-market operations, 626
risk-taking channel, 573
Monetary Control Act of 1980, 15
Money and maturity transformation, 423–425
Money market mutual funds (MMMFs), 6, 10, 424–425, 433–434, 525, 529–530
Money market spreads, 533–534, 585
Money rate of interest, 570
Monitoring, delegated, 197
Monoline insurers, 17, 211, 308.
See also Wrap
Monotone increasing/decreasing, 124–126, 136
Monotonic function. See Monotone increasing/decreasing
and expected shortfall, 116
with full repricing, 126–127
non-uniform random variate generation, 664
portfolio VaR, 174–175
random variable generation, 663–664
Moody’s, 394
Moral hazard, 198, 620. See also Too-big-too-fail
examples of, 636–640
mitigating, 640–642
and time consistence, 642–643
Morgan Stanley, 259–260, 261
Mortgage-backed securities (MBSs), 8, 299, 431–432, 545
Mortgage bond position, 8
Mortgage pass-through securities, 298
Mortgage securitization, 7
Multilateral netting. See Netting
Multiple equilibria, 581. See also Bubbles, Rational expectations
Multiple risk factors:
covariance and correlation matrices, 160–161
delta-normal approach, 163–174
mapping and, 162–163
overview, 159–160
Municipal bonds, 192
Mutual funds, 5–6. See also Money market mutual funds (MMMFs)
National Association of Securities Dealers (NASD), 604
Nationally Recognized Statistical Rating Organization (NRSRO), 205
Natural rate of interest, 570
Negative amortization, 599
Negative convexity. See Convexity
Nelson-Siegel, 143–144
Net asset value (NAV), 6, 478
Net interest margin, 423
Net leverage, 456
Net present value (NPV), 120, 457
Netting, 209–210
Net worth, 449
No-arbitrage, 142
Noise traders and information traders, 462, 576, 582
Nonlinearity, 119–120, 123–126
Nonlinear risk management, 121
Nonuniqueness. See Multiple equilibria
Normal copula. See Copulas
Northern Rock, 528
Novation, 212
NRSROs (Nationally Recognized Statistical Rating Organizations), 205, 621
Null hypothesis, 408–409, 661
Obligor, 193
Order-driven systems, 463
Off-balance-sheet vehicles, 10, 431–432
Orderly Liquidation Authority (OLA). See Dodd-Frank Act
On- and off-the-run issues, 141, 556–557
Order statistics, 359
Operational risk, 611
Options. See also Derivatives, Hedging, Implied volatility, Vega risk
Optimal portfolio selection, 54–56
Order pricing: and implied correlation, 387–390
Optimization, 507–508
Options-based risk-neutral distributions. See Options
Operational risk, 611
Option-adjusted spread, 232
Option pricing: and implied correlation, 387–390
Option ARM (adjustable rate mortgage), 599
Options, 189. See also Derivatives, Hedging, Implied volatility, Vega risk
Option-based risk-neutral distributions. See Options
Options combining and spread, 183, 382
Options combining and spread, 183, 382
Option vega risk. See Vega risk
Par amount, 138
Par bond, 146
Parabolic VaR, 108–109
Pass-through certificates, 7–8
Paso explanation, 355
Physical probabilities, 61. See also Options
Physical probabilities, 61. See also Options
Portfolio credit products, 297
Portfolio insurance, 545
Portfolio credit risk, 265–295. See also Structured credit
default correlation, 266–270
estimating with simulation and copulas, 284–295
measuring, 270–274
portfolio credit VaR, 270–274
and single-factor model, 275–284
Portfolio efficiency, 85–88
Portfolio insurance, 545
Peso problem, 355
Pfandbriefbanken, 7
Phillips Curve, 22
Physical probabilities, 61. See also Options
Point hypothesis, 661
Points upfront, 210
Poison distribution, 237, 363
Poisson process, 237, 363–364
Ponzi finance. See Minsky, Hyman
Portfolio credit products, 297
Portfolio credit risk, 265–295. See also Structured credit
default correlation, 266–270
estimating with simulation and copulas, 284–295
measuring, 270–274
portfolio credit VaR, 270–274
and single-factor model, 275–284
Portfolio efficiency, 85–88
Portfolio insurance, 545
Index

Portfolio strategies, 510–512
Portfolio return volatility, 83–88, 481, 485
Position data, 396
Positive convexity, 327. See Convexity
Positive semi-definite matrix, 161
Power laws, 368
Predictive stress testing, 506
Preferences, 49
Preferred stock, 194
Prepayment risk, 8, 304
Price controls, 15
Price of risk, 60
Pricing kernel. See Stochastic discount factor
Primary credit facility, 629
Primary Dealer Credit Facility (PDCF), 473
Prime brokers, 444–445
Principal, principal amount, 138, 144, 304
Principal-agent problems, 197
Principal components, 138
Priority, 194
Private equity funds, 19–20
Private sector deleveraging, 584
Probability of default. See Default probabilities
Procyclicality, 540, 574–577, 617–618
Procyclicality of capital requirements, 552
Prompt corrective action, 620
Prudential supervision. See Safety and soundness supervision
Pseudo-random number, 663
Pull-to-par, 137
Pure contagion, 540
Pure diffusion, 364
Put skew, 373
QQ plot, 359–363, 367
Quantile function, 635
Quantiles, 654–655, 657. See also Percentile
Quantile transformation, 655
Quantitative strategies, risk capital measurement for, 490–499
Quanto risk, 515
Quote-driven systems, 462–463
Random seed, 663
Random walk, 64–71, 364, 653–654
Rating agencies, 204–207, 307–308, 663–664
Rating migration, 204
_ratings curves, 407
_Ratings shopping, 646
Recovery, 201–202, 203–204, 243
_recovery of face, 202
_recovery of market, 202
_recovery of Treasury, 202
Recovery swap, 249
Reduced-form models, 207, 235–241
Reference entity, 248
Reference portfolio, 301
Refinancing risk, 304
Regime-switching models, 355. See also Peso problem
Regulation, 597–647. See also Macroeconomic supervision, Microeconomic supervision, Regulation, Safety and soundness supervision
_bank examinations and resolution, 619–621
_capital standards, 608–619
_for consumer protection, 598–600
_deposit insurance, 606–608
_for efficiency and growth, 600–601
_for financial stability, 600, 621–628
_of firms vs. securities or markets, 603–604
_goals of, 598–601
_historical background, 15–17
_lender of last resort, 628–635
Regulation (Continued)
methos of, 605–621
moral hazard and adverse selection, 636–643
pitfalls in, 635–647
regulatory authorities, 601–605
regulatory evasion, 643–644
scope and structure, 598–605
unintended consequences, 628–630
Regulatory arbitrage, 345, 644
Regulatory authorities, 601–605
Regulatory capture, 647
Regulatory forbearance, 603
Rehypothecation, 437
Remargining. See Margin
Repledging. See Rehypothecation
Replications, 663
Repo rate. See Repurchase agreements,
Risk-free rate
Representative agent model, 49
Repurchase agreements, 8, 90, 440
Reserve requirements, 618–619
Residential mortgage-backed securities
(RMBS), 398, 405–407, 546, 600,
626, 641
Resiliency, 463
Resolution, 619–620. See also
Bankruptcy, Dodd-Frank Act
Reverse optimization. See Implied views
Reverse repo transactions, 442–443
Revolving pool, 300–301
Riegle–Neal Interstate Banking and
Branching Efficiency Act of 1994, 15
Risk. See also Credit risk, Market risk,
Operational risk
appetites, 373
balance sheet, 422
basis, 512–516
concentration, 337
counterparty, 207–213
custodial, 211–212
defining, 50–54
double default, 210–211
endogenous, 543
exchange-rate, 89
financial, 34, 40
financing, 114
idiosyncratic, 275, 281
inflation, 89
jump-to-default, 228–229
liquidity (see Liquidity/liquidity risk)
market (see Market risk)
mark-to-market (MTM), 471
operational, 611
prepayment, 8, 304
quanto, 515
refinancing, 304
retention, 344
rollover, 423
specific, 616
spread, 35, 261–264
systematic, 336–337
systemic (see Systemic risk)
types of, 35–39, 611–612
uncertainty vs., 34
valuation, 395
vega (see Vega risk)
warehousing, 307
yield curve (see Yield curve risk)
Risk aversion, 50, 52. See also
Preferences, Risk Premium
Arrow-Pratt measure of risk aversion,
52
Risk budgeting, 478
Risk capital:
defining, 478–480
hedging and basis risk, 512–516
measurement, for quantitative
strategies, 490–499
risk contributions in long-only
strategies, 481–485
risk contributions using delta
equivalents, 485–490
risk reporting, 509–512
and sizing positions, 506–508
Risk contributions, 480–499
defined, 480
in long-only strategies, 481–485
risk capital measurement for
quantitative strategies, 490–499
using delta equivalents, 485–490
Risk factors, 43, 509–510
Risk-free rate, 88
definition in representative agent
model, 58
government bond yields as, 88–90
money market rates as, 90
repo rate as, 90
Risk management, defined, 40
Risk management alpha, 478
Risk measure, coherence of, 414
Risk measurement systems:
types of data, 396
Risk-neutral asset price probability
distributions. See Options
Risk-neutral probabilities. See Default
probabilities
Risk-neutral hazard rate, 242–245
Risk-neutral implied equity correlation,
387
Risk-neutral probability measure,
61–63
Risk premium, 54, 59, 81, 548
Risk reporting, 509–512
Risk reversals. See Options
Risk set, 414
Risk shifting, 197, 460
Risks in collateral markets, 445–448
Risk triggers, 543–546
Risk-weighted assets, 610
Rollover risk, 423
Root mean square (RMS), 103, 357
Runs and panics, 433–434, 439–440,
456, 476–477, 480, 481, 528–544,
590–592, 594, 628–640. See also
Deposit insurance, Financial crises
Safe-haven buying, 548
Safety and soundness supervision, 600,
605–621
Sample path, 64
Savings and loan (S&L) crisis, 606–607,
640, 648, 650
Savings glut hypothesis, 573
Savings and loan crisis, 42, 618–619,
662
Search/reach for yield, 436, 549, 572,
594, 646
Sec-lending programs, 445
Secured obligations, 195–196. See also
Collateral
Securities and Exchange Commission
(SEC), 605
Securities exchange, 8
Securities firms, 432–433
Securities lending, 431, 440–441, 445
Securities markets and securities firms,
604
Securities markets contraction, 525–528
Securitization, 7, 10. See also Structured
credit products
bond losses in, 304
capital structure/tranching in,
301–304
collateralized mortgage obligations
(CMOs), 8, 298–299, 299–300, 309
covered bonds, 7
credit losses in, 301–304
credit scenario analysis of, 309–318
issuer incentives, 342–344
material impairment vs. default, 304
mortgage-backed securities (MBSs),
8, 299, 431–432, 545
pass-through certificates, 7–8, 298
repurchase agreement, 8
standard tranches, 337–340
waterfall, 305–307, 323
Security master data, 396
Self-fulfilling crises, 581
Self-regulation, 603–604
Senior debt. See Seniority, debt
Seniority debt, 194, 308, 337
Sequential-pay structure, 8, 299
Servicers, 298, 308
Settlement date, 139
INDEX

Settlement fails, 537–538
Shadow banking system, 9–14
Sharpe ratio, 88
Short positions, 113–114, 455–456
Simons, Henry C., 640
Simple hypothesis, 661
Simple rate of return, 44–49
Simulation, 284–295
and copulas, 288–295
for measuring structured credit risk, 318–336
and role of correlation, 318–323
and single-credit risk, 286–288 steps, 318–319
Single-factor model, 223–226
asset and default correlation, 279–281
conditional default distributions, 275–279
and credit VaR, 281–284
default distributions with, 275–281
distribution of losses, 285–286, 294
Single-obligor credit risk models, 213–226
Sizing positions, 506–508
Skewness, 226, 350, 355, 357, 361
Skewness coefficient, 350
Slippage, 463
SLM Corp. (Sallie Mae), 557–559
Slope of default probability curves, 259–261
Soft credit enhancement, 303
Solvency/insolvency, 469–470
Sovereign debt, 192
Sovereign wealth funds (SWF), 20
Special-purpose entities (SPE), 299
Special-purpose vehicles (SPV), 299, 431
Specialty finance companies, 11
Specific risk, 616
Speculative finance. See Minsky, Hyman
Speculative motive, 425
Spline interpolation, 143, 390
Sponsor, 307
Spread01, 233–235
Spread correlation, 342, 553
Spread curve, 241, 259
Spread duration, 235
Spread mark-to-market, 233–235
Spread risk, 35, 261–264
Spread volatility, 261–263
Square-root-of-time rule, 75
Standard asset distribution model, 63–75
asset return volatility, 74–75
beta and market risk, 76–82
geometric Brownian motion, 71–74
portfolio in, 75–88
random walks and Wiener processes, 63–71
Standard asset pricing model, 49–63
defining risk, 50–54
diversification, 82–85
ranking securities, 51
Standard model alternatives, 363–372
Standard tranches, 337–340, 404–408
State price securities, 62–63
State pricing approach, 57–58
State space, 50
Static pool, 300
Statistical arbitrage, 19, 437, 491
Sticky delta approach. See Vega risk
Sticky strike approach. See Vega risk
Still-liquid assets, 542
Stochastic differential equation (SDE), 71, 363
Stochastic discount factor (SDF), 57–61
Stochastic dominance, 51
Stochastic processes, 44, 64
Stock market crash of October 1987, 519
Stop-loss orders, 544
Strangles. See Options
Stress testing, 499–506
element of, 501–503
factor-push approach, 505
historical, 504–505
maximum loss approach, 505
predictive, 506
types of, 504–506
Index

Structural models, 207. See also Factor models; Merton model; single-factor model
Structured credit. See Structured credit products
Structured credit products, 192
basics of, 297–309
collateralized mortgage obligations (CMOs), 8, 298–299, 299–300, 309
covered bonds, 7, 298
default correlation summary, 345–348
and implied correlation, 341–345
leverage and, 460–461
mortgage pass-through securities, 7–8, 298
overview, 297–299
and off-balance sheet funding, 429–432
risk measurement, 318–337
securitization analysis, 309–318
standard tranches, 337–340
time-tranching, 304
Structured investment vehicles (SIVs), 431–432, 531–532
Subadditivity of VaR, 415–418
Subjective probabilities, 61
Subordinated debt, 194, 613, 617, 640–642
Subprime crisis, 1. See also Financial crises
and asset-price targeting, 622
bank lending and, 525–528
and capital standards, 613–614
collateral markets and, 445–448
credit spreads and, 548–551
default model errors, 405–407
double default risk during, 210–211
and fixed income securities lending, 446
liquidity impasses and hoarding, 530–535
and ratings triggers, 546
settlement fails during, 537–539
and shadow banking system, 9–14
spread curves, 259–261
and spread volatility, 262–263
subordinated debt and, 640–642
and time consistency problems, 642–643
Subprime default models, 405–407
Sunspots, 581. See also Bubbles
Survival time distribution, 239
Suspension of convertibility, 428
Swaps, 120, 457
credit default swaps (CDS) (see Credit default swaps)
interest-rate, 7
total return swaps (TRS), 441
Swap spreads, 550–551
Swedish banking crisis of 1992, 530
Syndicated loans, 435
Synthetic CDO, 11
Synthetic securitizations, 301
Systematic funding liquidity risk, 435–437
Systematic risk, 336–337
Systemic risk, 422, 518, 600
funding liquidity and solvency, 469–470
interconnectedness, 473
liquidity and, 469–473
and “plumbing”, 471–473
Systemic risk charges, 626–627
Systemic risk regulator, 626
Tail index, 368
Tangible common equity (TCE), 613
Target federal funds rate, 27
Taxes
impact of tax-deductibility of interest costs, 631, 660
in yield curve estimation, 142
Taylor approximation, 49, 134–136
Taylor rule, 570
TED spread, 533
Temporary suspension of convertibility, 428
INDEX

A
Term Asset-Backed Securities Lending Facility, 646
Terminal cash flows, 314–318
Test statistic, 661
Theta, 128, 134
Thin-tailed return model, 503
Threads, 663
Tier I capital, 612–613
Tier II capital, 612–613
Tightness, 463
Time inconsistency, 642–643. See also Credibility
Time decay, 123
Time horizon, 97, 98, 100–103
Timeline of financial mishaps, 30–33
Time preference, pure rate of, 51
Time scaling of default probabilities, 245–246
Time separable utility function, 51
Time-tranching. See Structured credit products
Time value, 179, 457
Time variation of asset return distributions, 102–103, 350
Time-varying volatility, 102–103
Too-big-to-fail, 613, 636–637, 646
Total return swaps (TRS), 441
Total variation process. See Geometric Brownian motion
Tower rule. See Law of iterated expectations
Trade sizing, 447
Trading securities, 615
“Tragedy of commons,” 199
Tranches/tranching, 8, 299, 300–304
credit VaR of, 331–333
default sensitivities of liabilities, 333–337
thinness, 337
Transaction costs, 196–199
Transactions liquidity/risk, 421, 461–464
measurement of, 466–469
transaction cost liquidity risk, 466–467
Transformation principle, 664
Transition matrices, 205, 206
Translation invariance, 414
Transversality condition, 581
Treasury bond basis, 512–513
Tri-party repo system, 472–473, 630.
See also Financial market infrastructures
Trustee, 309
Trust preferred securities, 612
Trusts, 299
Tulip mania, 578
Turkish lira crisis, 355, 365
“Twin crises” literature, 564
Two-sided test, 662
Type I error (false positive), 409–410, 662
Type II error (false negative), 410, 662
UBS, 531
Unconditional default probability, 282–284
Underlying asset, 7
Underwriters/underwriting, 2, 307, 522
Unexpected loss, 228–229. See also Expected loss
Unit banking, 15
Unpledged assets, 465. See also Rehypothecation
Unsecured obligations, 195–196
Uptick rule, 605
U.S. current-account, 573–574
U.S. Financial Crisis Inquiry Commission, 591
U.S. government bond auction, 443
See also Preferences, Risk aversion, Time preference
Valuation risk, 395
Value-at-risk (VaR), 93–117. See also Volatility, Volatility estimation
accuracy of, 407–413
backtesting of, 407–413
coherence of estimates, 414–419
Index

computation modes, 108–113
confidence level, 97
defined, 94–97
delta-normal approach (see Delta-normal approach to VaR)
duration-convexity mapping, 148–156
duration-only, 152–154
estimating with extreme value theory (EVT), 370–371
historical simulation, 111–113, 411–413
incremental, 480, 490, 509–512
liquidity-adjusted, 467
marginal, 474, 509–512
model risk, 393–407
Monte Carlo simulation, 109–111, 174–175
nonlinearity and, 123–126
overview, 93–94
parametric, 108–109
and short positions, 113–114
steps in computing, 98
time horizon, 97
user-defined parameters, 97–98
variability of estimates, 395–397
VaR scenario, 95–96
VaR shock, 96
Value-at-risk (VaR) limits, 416–417
Value-at-risk (VaR) shock, 501–503
Value-at-risk (VaR) triggers, 543–544
VaR. See Value-at-risk (VaR)
Variance swaps, 389
Variation margin, 196
Vega risk, 175–189
and Black Scholes anomalies, 176–180
implied volatility surface, 180–183
measuring, 183–189
sticky delta approach, 188
sticky strike approach, 188
Velocity of money, 425
VIX volatility index, 356–358, 553–554
Volatility, 84, 85–88. See also Volatility estimation
asset-return, 74–75
basis point, 150–152
beta and, 80
black, 151
bond price, 150–152
conditional, 103 (see also GARCH model)
during crises, 547–548
estimation, 99–108
excess, 103
extreme realized, 551–553
financial crises and, 551–555
implied (see Implied volatility)
interest-rate, 150–152
leverage and, 460–461
marginal, 482
portfolio return, 83–88, 481, 485
spread, 261–263
time-varying, 102–103
volatility clustering, 102–103
yield, 150–152
Volatility estimation, 99–108
comparison of methods, 107
criteria for successful, 99
EWMA model, 104–106
GARCH model, 106–108
short-term conditional, 99–103
Volatility function. See Implied volatility
Volatility of volatility (vol of vol), 181, 548, 554
Volatility smile. See Implied volatility
Volatility surface. See Implied volatility
Volcker Rule, 428

Warehousing risk, 307
Washington Mutual, 640–641
Waterfall, 305–307, 323
Weighted average life (WAL), 303–304
When-issued, 442
Wicksell, Knut, 570. See also Money rate of interest, Natural rate of interest
Wiener process, 67, 71. See also Brownian motion
World income growth, 20–22
Wrap, 211, 308
Wrong-way exposure, 564
Yield curve risk, 136–147
coupon bonds, 144–147
estimating yield curves, 141–144
overview, 138–141
term structure of interest rates, 138–141
Yield curves, estimating, 141–144
Yield panic, 572
Yield spread, 231
Yield to maturity, 146
Yield volatility, 150–152
Zero-coupon bonds, 138–141. See also Discount bonds
risk-neutral default rates, 242–245
Zero drift assumption, 73. See also Geometric Brownian motion
Zero-mean assumption, 466
z-spread, 232, 233
Zweig, Stefan, 30