| ABCP conduits. See Asset-backed commercial paper (ABCP) conduits ABX index family, 406–407 Acceptance region, 662 Accounting balance sheet, 193 | Asset-backed securities (ABS), 10, 299–309, 431–432 spreads, 550 Asset-liability management (ALM), 464 |
|---|--|
| Accounting triggers, 547 | Asset-price targeting, 622–624 |
| Adverse price impact, 463, 467 | Asset return correlation, see Correlation |
| Adverse selection, 198, 462 | Asset prices and returns. See also |
| Agency debt, 639 | Kurtosis, Skewness, Volatility |
| Agency MBS, 298, 446 | and default correlation, 279-281 |
| Agency securities lending, 441 | behavior, 43, 72, 349-363, 514 |
| Aggregate credit, 517 | return correlation, 343 |
| Alternative hypothesis, 661 | statistical behavior of, 43 |
| Amaranth (hedge fund), 505 | statistical properties of, 356, 358 |
| American International Group (AIG), | time variation of distribution of, 352 |
| 211 | Asset-swap spread, 232 |
| American option, 121 | Asymmetric information, 197, 583, |
| Analytical approach, 123–126 | 599 |
| Arbitrage, regulatory, 644 | Asymptotic behavior, 142 |
| Arbitrage CDOs, 343 | Attachment point, 303 |
| Arbitrage pricing theory (APT), 81–82. | At-the-money-forward, 122 |
| See also Multiple risk factors | Automotive industry, 402–405 |
| Arithmetic rate of return, 44–49 | Available-for-sale securities, 615 |
| Arithmetic return approximation, 164, 165–166 | AXA Rosenberg, 394 |
| Arranger. See | Backtesting, 407–413 |
| Underwriters/underwriting | Bagehot's rule, 630-631 |
| Asian financial crisis of 1997, 42–43, | Balance sheet CDOs, 343 |
| 588 | Balance sheet of firm, 216 |
| Asset and default correlation, 279-281 | Balance sheet risk, 422 |
| Asset-backed commercial paper (ABCP) | Bank examinations, 619-621 |
| conduits, 299, 431–432, 524–525, | Bank for International Settlements, 8, |
| 528-529, 644-645 | 602 |
| Asset-Backed Commercial Paper Money | Bank of America, 260 |
| Market Mutual Fund Liquidity | Bank runs, 428, 523–524, 528–535, |
| Facility (AMLF), 429 | 617 |

| Bankruptcy, 620. See also Resolution | Bill of exchange, 643 |
|--|--|
| defined, 200 | Binomial distribution, 653-654 |
| too-big-to-fail doctrine, 613, | Black-Scholes implied volatility, 177 |
| 636–638, 640, 646 | Black-Scholes-Merton option pricing |
| Bankruptcy remote, 299 | model, 7, 122–123, 176–180, 372, |
| Banks, Banking: | 381–383, 588, 596, 657–660 |
| commercial paper borrowing, 429, | Black Wednesday, 569 |
| 430 | Black volatility, 151 |
| fractional-reserve, 427–428, 530, 632 | BNP Paribas, 531 |
| fragility of, 2, 427–428, 632 | Bogle, John, 4 |
| historical evolution of, 2–4, 431–432 | Bond-CDS basis, 513 |
| liquidity, 425–429 | Bond duration, 137 |
| liquidity transformation by, 426-427 | Bond price volatility, 150–152 |
| Barrier options, 7, 545–546 | Bonds: |
| Base correlation, 340 | as collateral, 443 |
| Basel Capital Accord (I, II, and III), | convertible bond trading, 491 |
| 608–612 | convexity, 154–155 |
| and capital composition, 612-613 | duration, 149–150 |
| Market Risk Amendment, 615-616 | duration-convexity mapping, 156 |
| minimum capital requirements, 610 | duration-only VaR, 152–154 |
| risk haircuts, 610–611 | DV01, 149–150 |
| Basel Committee on Banking | interest-rate risk, 138–156 |
| Supervision, 609 | interest-rate volatility, 150–152 |
| Basis points, 45 | payment in kind (PIK), 195 |
| Basis point volatility, 150–152 | risk-neutral default rates, 242–245 |
| Basis risk, 512–516 | during subprime crisis, 526 |
| Bearer securities, 211 | tax treatment, 142 |
| Bear Stearns, 260, 432–433, 448, 531 | Bond valuation, 137–138 |
| Behavioral finance, 50 | cash-flow mapping, 137 |
| Benchmark interest rates, 88–90 | duration, 137 |
| Bernoulli distribution, 236–237, | duration-convexity mapping, |
| 266–267, 653 | 148–156 |
| Bernoulli trial, 236–237, 653 | factor models, 138 |
| Bespoke tranches, 339 | Bootstrapping, 142–143, 252–256 |
| Beta, 60 | Breeden-Litzenberger formula, 374, |
| and capital asset pricing model | 380, 383 |
| (CAPM), 80–82 | Bretton Woods system, 22–24, 567–568 |
| correlation and, 79 | Bridge bank, 620. See also Dodd-Frank |
| default correlation and, 281 | Act |
| and market risk, 76–82 | Broad Index Secured Trust Offering |
| and subprime crisis, 556–559 | (BISTRO), 11 |
| volatility and, 80 | Brokerage relationships, and |
| Bid-ask spread, 463 | counterparty risk, 208 |
| "Big bang," 248 | Broker-dealers, 2. See also Investment |
| Bilateral netting, 209. See also Netting | banks |

Brownian motion, 67–74 Coherence, 414–419 geometric, 64, 71-74 Collateral, 195-196. See also Markets in Merton model, 213-214 for collateral Bubbles, 578-582, 622, 624 Collateral, security of, 539 Bullet bonds, 298 Collateral devaluation, 542–543 Business cycle theory, 562 Collateralized bond obligations (CBOs), Butterfly spread, 377–380 300 Collateralized debt obligations (CDOs), Call reports, 535 11, 299 CAMELS ratings, 619 arbitrage CDOs, 345 Capital, 193, 610, 612-613 balance sheet CDOs, 345 Capital asset pricing model (CAPM), Collateralized loan obligations (CLOs), 80 - 82299 Capital charges, 498-499. See also Collateralized mortgage obligations Basel Capital Accord (CMO), 8, 298–300, 309 Capital pools, large, 17–20 Collateral markets. See Markets for Capital standards, 608-619 collateral Basel Capital Accord (I, II, and III), Collateral pool, 300 609 - 612Collective action problems, 199 composition of capital, 612-614 Commercial banks, 2–3, 427–429 procyclicality of, 617-618 Commercial mortgage-backed securities and reserve requirements, 618-619 (CMBS), 13-14, 308-309, Capital structure, 194-195, 301-304. 431-432 See also Tranches/tranching Commercial paper borrowing, Cash balances, in hedge funds, 465 429-430 Commercial Paper Funding Facility Cash-flow securitizations, 301 Cash-flow mapping, 137, 397–398 (CPFF), 429 CDO. See Collateralized debt Commercial paper markets, 424 obligations (CDOs) Committee of European Banking CDO-squareds, 300 Supervisors (CEBS), 602-603 Central limit theorem, 653 Commodities Futures Trading Charge-off, 535 Commission (CFTC), 605 Charter, 603 Communication, 40 Chicago Mercantile Exchange (CME), Community of European Banking 505 Supervisors (CEBS), 602 China, and U.S. current-account deficit, Component value-at-risk, 483 573-574 Component variances, 483 Chi-square distribution, 410 Component volatilities, 483 Citigroup, 262–263, 532, 540–542, Compounding interval, 138 641. See also Credit spreads Compression, 212 Clearing banks, 472 Concave function, 52 Clearinghouses, 209, 428 Concentration risk, 337 CMBS. See Commercial Conditional expectations, 203, 592 mortgage-backed securities Conditional independence, 236, 276 (CMBSs) Conditional probability, 281

Conditional value-at-risk (CVaR), mitigation of, 212–213 114-117 netting and clearinghouses, 208-209 Conditional volatility, 103. See also OTC derivatives trading, 208 GARCH model Counterparty valuation adjustment Confidence level, 97 (CVA), 209 Constant hazard rate, 239 Coupon bonds, 144-147 Consumer Financial Protection Bureau Covariance, 60, 76 (CFPB), 603 Coverage, 247 Covered bonds, 7, 298 Consumer protection, 598–600 Consumption process, 56 Covered interest rate parity, 123 Contagion, 518, 540 Cover pool, 298 Contingent capital, 617 Crashes, 578-582 Contingent claims, 62–63 Credibility, 642 Credit, defined, 192 Contingent leg, 249 Convertible bonds, 194–195, 389, 398, Credit contracts, 196–199 436. See also Convertible preferred Credit correlation episode of 2005, shares, Mandatory convertible 399-405 bonds Credit crunch, 519, 522 convertible bond arbitrage, 19, 498 Credit default swaps (CDS), 11, 196, Convertible preferred shares, 195 246-249. See also Credit index Convexity, 119, 154-155, 327 default swaps (CDX/iTraxx) Coordination failures, 199 bootstrapping, 247 Copulas, 284–295, 319. See also CDS credit curves, 247–248 compression of, 212 Simulation copula correlation, 340-341, 342 and counterparty risk, 212 Core capital, 612 and default probability curve, Correlation, 76–79, 82–85, 269, 284, 253-259 325-327, 341, 556-561, 652. defined, 192 See also Default correlation, and double default risk, 210-211 Financial crises, Implied mark-to-market of, 261–262 correlation, Single-factor model, "runs" on, 528–529 Spread correlation Credit default swap spread, 232 Correlation skew, 340. See Implied Credit derivatives. See Derivatives correlation Credit enhancement, 303 Cost of capital, 423 Credit events, 192 Cost of debt financing, 499 Credit expansion/contraction, 520–521, Cost of equity capital, 499 569-574 Countercyclical monetary policy, 625 Credit exposure, 201 Credit factor models, 222-226 Countercyclical policy orientation, 624-628 Credit index default swaps Counterparty risk, 207–213 (CDXs/iTraxx), 338-340, 399-405 brokerage relationships and, 208 Credit losses, 301–304, 319 and custodial risk, 211-212 Credit migration, 202-203 and derivatives, 209-210, 457 Credit portfolio risk measurement, double default risk, 210-211 270-274

Credit rating agencies, 204–205 Custodial risk, 211–212 Credit ratings, 204, 546 Custodial services, 211–212 Credit ratings industry, 645–646 Custodian, 309 Credit return skewness, 226 Credit risk, 89, 191-229 Day-count conversions, 139 counterparty risk, 207-213 Daylight exposure, 472 credit factor models, 222-226 Debasement, 563 credit-risky securities, 193–196 Debt-deflations, see Fisher, Irving credit VaR, 227-228 Debt financing cost, 499 creditworthiness, 204-207 Debt obligation, 193 default and recovery, 199-204 Debt priority, 196 defining, 192, 611 Debt seniority, 194 internal model approach, 611, 614 Decay factor, 104 jump-to-default risk, 228-229 Default, 192, 243 vs. market risk, 204 defined, 199-200 Merton model, 213–222 expected loss (EL), 202-203 exposure at, 201 overview, 191-192 standard model approach, 612, 614 loss given default (LGD), 201–202, transaction cost problems in credit 203-204 contracts, 196-199 probability of, 200-201 Credit risk measures, 226-229 Default01, 333-336 Credit risk models, 207 Default correlation. See also Implied Credit risk transfer, 344 correlation Credit-risky securities, 193-196 and asset returns, 279-281 Credit scoring, 207 and beta, 281 Credit-spread risk, 399 and default probability, 325–327. Credit spreads, 191, 231-235, 548-551 See also Basel Capital Accord Citigroup, 513-514, 532, 641-642 defining, 266-269 defined, 192 order of magnitude of, 270 in Merton model, 217 summary of concepts, 341-342 Credit Value-at-Risk (VaR), 228-229 Default curve analytics. See Default and loss distributions, 327–333 probabilities non-subadditivity of, 418-419 Default intensity. See Default with single-factor model, 281-284 probabilities Creditworthiness, 204–207 Default mode, 207 credit risk models, 207 Default probabilities, 200–202, internal ratings, 207 213-217 Critical region, 662 conditional cumulative default probability function, 278–279 Cross-margining agreements, 440 Cumulative probability distribution conditional default density function, function (CDF), 376–377, 383 279 Cumulative shares, 194 conditional default distributions, 275-279 Currency hedge, 515 Currency speculation, 565–569 conditional default probability, 240-241 Currency swaps, 7, 643

| Default probabilities (Continued) | Derivatives. See also Forwards; Futures |
|---|---|
| default time density function, 239 | Hedging; Options; Swaps |
| default time distribution function, | and counterparty risk, 209-210 |
| 239 | credit default swaps (CDSs), 11, 192, |
| hazard rate/default intensity, | 196 |
| 237–238 | defined, 6–7 |
| marginal default probability, 239 | leverage and, 456-460 |
| risk-neutral estimates, 236, | OTC derivatives, 208 |
| 241–261 | types of, 120 |
| single-factor model, 276-278 | Detachment point, 303 |
| time scaling of, 245–246 | Diffusion model, 64 |
| Default rates, 205, 547 | Discharge of debt, 200 |
| Default sensitivities of the tranches, | Discount bonds. See Interest rates |
| 333–337 | Discount curve. See Interest rates |
| Default threshold, 276 | Discounting, of utility functions, 51 |
| Default timing, 307, 319 | Discount margin, 232 |
| Definition of capital, 610 | Discount window. See Monetary policy |
| Delegated monitoring, 197 | Disintermediation, 3–4, 9–10 |
| Delinquencies, 535 | Dispersion trade. See Implied |
| Delta, 128, 135–136 | correlation |
| Delta equivalent, 164 | Distance to default, 214 |
| Delta-gamma, 121 | Distressed exchanges, 199-200 |
| for bonds, 134–136 | Diversification, 82–85, 477, 506–507 |
| for options, 127–134 | Diversification benefit, 506 |
| and vega risk, 184 | Diversity score, 507 |
| Delta-hedged long option portfolios, | Dividends, 193 |
| 400 | Dodd-Frank Wall Street Reform and |
| Delta-hedged positions, 125-126 | Consumer Protection Act, 309, |
| Delta-normal approach to VaR, | 344, 428, 597, 600, 608, 620, 637 |
| 163–174 | Double default risk, 211 |
| portfolio of securities, 169–174 | Dual mandate, 622 |
| single position/several risk factors, | Duration, 149–150, 518 |
| 166–168 | Duration approach, 137–138 |
| single position/single risk factor, | Duration-convexity mapping, 148–156 |
| 164–166 | Duration-only VaR, 152-154 |
| with vega risk, 185-189 | DV01, 149–150 |
| Demand deposits, 6 | Dynamic hedging, 120, 544–545 |
| Density functions of portfolio, losses in | Dynamic strategy, 82 |
| the single-factor model, 286 | , |
| Deposit insurance, 605–608, 636 | Early amortization trigger, 303 |
| Depositor, 307 | Easy credit terms, 452 |
| Depository institutions, 2. See also | EBITDA (earnings before interest, |
| Banks | taxes, depreciation, and |
| Deposits insurance, 598–599 | amortization), 450 |
| Depth, 463 | Economic activity, 518 |

707

Economic balance sheet, 193 Exchange rates: Efficiency, 85–88, 508 and currency speculation, 565-569 implied correlation and, 390 Efficient frontier, 87 Elan Corporation, 365, 366 Exchange-traded funds (ETFs), 6, 47 Elasticities, 483–484 Exotic options, 7 Expected loss (EL), 202-203. See also Electronic trading, 8 Elementary claims, 62–63 Unexpected loss Embedded leverage, 344, 453 Expected present value, 54–56 Embedded options, 141-142 Expected return, 53 Endogenous liquidity risk, 534 Expected shortfall (ES), 114–117 Endogenous risk, 542 Expected tail loss, 114–117 Endowment process, 53, 57 Expected utility, 51 Enron, 549, 553, 554 Expected utility function, 51 Enterprise value, 193 Exponential distribution, 237 Equilibrium asset prices and returns, Exponentially weighted moving average 56 - 61(EWMA), 104–106, 350 Equilibrium model, 49 Exposure at default, 201 Equity, 193 Extension risk, 304 Equity capital, 479, 499 External costs, 469 Equity index, 387–389 Externalities, 198–199 Equity long-short trading, 19 Extreme value distribution, 367 Equity market-neutral strategy, 487 Extreme value theory (EVT), 365-372 Equity ratio, 193 Equity tranche, 302, 331 Face value, 138, 144 Equity value of firm, 215 Factor models, 138, 207. See also Euler property, 482 single-factor model Euro bullish/yen bearish strategy, 511 Factor-push approach. See Stress testing European Banking Authority (EBA), Fails. See Settlement fails Fair market value (FMV), 543 Fannie Mae, 537, 639 European monetary system (EMS), 568-569 Fat tails, 120 European option, 121 Federal Deposit Insurance Corporation European Union (EU), 592 (FDIC), 606-608 Event-driven strategies, 398 Federal Reserve membership, 603–604 EVT. See Extreme value theory (EVT) Fee leg, 249 EWMA model. See Exponentially Feedback rule, 570 weighted moving average (EWMA) Fiduciary responsibility standard, 599 Exceedance, 369 Final-year cash flow tracking, 314–318 Excession, 408 Financial advisors, 19 Excess return, 53 Financial crises. See also Subprime crisis single-asset to market, ratio of, 81 accounting triggers, 546-547 Excess spread, 303 anticipating, 582–589 Exchange rate mechanism (ERM) crisis, Asian financial crisis of 1997, 588-589 556 Exchange-rate risk, 89 asset price behavior during, 547-561

| Financial crises (Continued) | Financial intermediaries, 2, 16–17, |
|--|--|
| asset-price predictors of, 584–589 | 601–602 |
| bubbles and crashes, 578–582 | Financial liberalization, 564–565 |
| causes of, 561–582 (see also Financial | Financial market |
| crisis causes) | infrastructures/utilities, 471 |
| characteristics of, 517 | Financial regulation. See Regulation |
| and collateral devaluation, 542–543 | Financial Services Authority (FSA), 603 |
| contraction of bank lending, | Financial services industry, historical |
| 521–525 | background, 1–33 |
| contraction of securities markets, 525–526 | Financial Stability Oversight Council (FSOC), 600, 626 |
| and correlation, 556-561 | Financial stability policies, 621–628. |
| credit expansion and contraction, | See also Macroprudential |
| 520-521 | supervision, Regulation |
| exchange rate mechanism (ERM) | Financing risk, 114 |
| crisis, 556 | Fisher, Irving, 575, 627–628 |
| financial causes of, 574-577 | Fisher's schema, 575 |
| Great Depression, 517-519, 627 | Fixed foreign exchange rates, 15–16 |
| Icelandic banking collapse, 607 | Flash crash, 491 |
| impact of high correlation in, | Flight into real assets, 548 |
| 559–561 | Flight to quality, 548 |
| impairment of market functioning, | Fluctuations in interest rates, 89 |
| 536–539 | Foreign exchange rates, fixed, 15-16 |
| leverage and, 582-584 | Form of organization, 604 |
| liquidity impasses and hoarding, | Forward and term premiums, 587 |
| 530–535 | Forward call delta, 179 |
| Long Term Capital Management | Forward rate agreements, 141 |
| (LTCM), 556–557 | Forwards, 7, 120, 457 |
| macroeconomic predictors, 584 | Fragility, financial, 2–3, 582–584, 600, |
| net worth and asset price declines, | 608, 621, 644, 646 |
| 540–542 | Frechèt distribution, 367 |
| panics, 528–535, 630–632 | Freddie Mac, 537, 639 |
| public policy toward, 621–635 | Fremont General, 585 |
| rising insolvencies, 535–536 | Frictions, 196–199 |
| risk triggers, 543–546 | Full repricing. See Monte Carlo |
| security of collateral, 539 | simulation |
| volatility and, 551-555 | Funding by guarantees, 10 |
| Financial crisis causes: | Funding liquidity/risk, 421, 422–436 |
| currency speculation, 565-569 | bank liquidity, 425-429 |
| debt and international causes, | hedge funds, 434–435, 465–466 |
| 563–565 | measurement of, 464-466 |
| historical overview, 563-565 | money and maturity transformation, |
| interest rates and credit expansion, | 423–425 |
| 569–574 | money market mutual funds |
| Financial innovation, 5–9 | (MMMFs), 433–434 |

Haircuts. See Margin securities firms, 432-433 Hard credit enhancement, 303 and solvency, 469-470 systematic funding liquidity risk, Hard-to-borrow securities, 446 435-437 Hazard rate, 237-238, 242-245, 364 Hedge finance. See Minsky, Hyman Futures, 120, 457 Futures markets, 7 Hedge funds, 5, 17–19, 434–435, 444-445 Gamma, 128, 136 funding liquidity risk management Gamma trading, 491 for, 465–466 risk capital measurement in, GARCH model, 106-108 490-499 Generalized autoregressive conditionally heteroskedastic Hedging, 512–516, 544–545 model. See GARCH model dynamic hedging, 120, 457 Generalized Pareto distribution, 369 static hedging, 120, 450 Geometric Brownian motion, 64, Held-to-maturity securities, 616 71 - 74Herding behavior, 540 and jump-diffusion model, 363-365 Herfindahl index, 507 in Merton model, 219 High-frequency trading, 491 High-yield bonds, 3, 7 Quadratic variation process, 68 Total variation process, 68 Hill's estimator, 368–370 and volatility estimation, 99-103 Historical return distributions, Glass-Steagall Act of 1933, 2, 17 357-363 Global minimum-variance portfolio, 85 Historical simulation, 111–113, 411 Going-concern capital, 612 and expected shortfall, 116 Goldman Sachs, 260 with full repricing, 126-127 portfolio VaR, 174-175 Gone-concern capital, 612 Goodwill, 612 Historical stress tests. See Stress testing Government National Mortgage Historical timeline of financial mishaps, Association (GNMA), 7 30 - 33Government-sponsored enterprises Hoarding, 530-535 Homogeneity of degree one, 414 (GSEs), 639 Homogeneous function, 482, 664-666 Gramm-Leach-Bliley Financial Services Modernization Act of 1999, 17 Homogeneous of degree, 664 Granularity, 270-274, 281, 337 Housing, leveraged returns to, 452-453 Great Deleveraging, the, 421 Hurdle rate, 316 Hybrid capital, 450, 613 Great Depression, the, 517–518, 627 Great Moderation, the, 26-30, 421, Hypothesis testing, 661–662 571 Gross leverage, 456 Icelandic banking collapse, 607 Idiosyncratic risk, 275, 281 Gross return, 45 Guarantees, 211, 308, 525, 530, 569, Idiosyncratic shock, 275–276 598, 614, 636, 639. See also Immediacy, 424 Impairment. See Material impairment Deposit Insurance; Too-big-to-fail; Wrap Implicit guarantees, 639 Implied binomial trees, 386 implicit guarantees, 525, 639

| v 1: 1 1 : | |
|--|---|
| Implied correlation | continuously compounded spot |
| correlation skew, 340 | curve, 139 |
| dispersion trading, 388, 400 | Discount bonds, 138–141 |
| implied credit correlation, 338, 342, | Discount curve, 142, 145 |
| 399–405, 559–561 | effects of low rates, 569–574 |
| implied currency correlation, 390 | fluctuations, 89 |
| implied equity correlation, 387–389, | forward curve, 138–141, 142, 145 |
| 555 L 1: 1 : 507 500 | instantaneous forward curve, 140 |
| Implied views, 507–508 | government bonds, 88–90 |
| Implied volatility, 122, 176–189, | money market rates, 90 |
| 553–554 | principal components of, 138 |
| Black-Scholes implied volatility, 177 | spot curve, 138–141, 142, 145 |
| Black volatility, 151 | zero-coupon curve, 139 |
| and delta-normal approach, 184–189 | Interest-rate smoothing, 571 |
| in financial crises, 587–589 | Interest-rate swap, 7 |
| implied volatility-based crisis | Interest-rate volatility, 150–152 |
| predictors, 579 | Intermediaries, 424 |
| volatility function, 181 | Intermediation, 11–13 |
| volatility smile, 180–181, 188, 370, | Internal drain, 633 |
| 381–382 | Internal model approach to credit risk, |
| volatility surface, 181, 182, 187, | 611, 614 |
| 189 | Internal rate of return (IRR), 316, |
| Implied volatility index (VIX). See VIX | 323–327 |
| volatility index | Internal ratings, 207 |
| Implied volatility smile. See Volatility smile | International Monetary Fund (IMF), 584 |
| Implied volatility surface. See Volatility | International monetary reserves, 25–26 |
| surface | International Organization of Securitie |
| Incremental value-at-risk (VaR), 480, | Commissions (IOSCO), 602 |
| 490, 509–512 | International transmission, 564 |
| Independent asset returns, 278 | Intertemporal consumption decisions, |
| Index funds, 6 | 50 |
| Indicators of financial stability, 625 | Intraday credit, 472 |
| IndyMac Bancorp, 530 | Intrinsic value, 179, 457 |
| Inflation, 23–24 | Inverse function, 126 |
| Inflation risk, 89 | Inverse probability distribution, 655 |
| Inflation-targeting, 622 | Inversion principle, 655 |
| Initial haircut. See Margin | Investment banks, 2–3 |
| Initial public offering (IPO), 20 | Investment Company Act of 1940, 5–6 |
| Insolvency/solvency, 469–470, 535–536 | Investment-grade RMBS, 407 |
| Intensity models, 235–241, 274 | Involuntary reintermediation, 524–525 |
| Interest rate controls, 15 | ISDAs. See Master agreements |
| Interest rates: | <i>I</i> -spread, 231–232 |
| continuously compounded forward | Issuer, 307 |
| curve, 138–139 | Issuer-pays model, 205 |

Issuer-weighted default rates, 205 and short positions, 455-456 ITraxx, 338 and structured credit, 460-461 Leveraged buyouts (LBOs), 20, 195, Jarque-Bera test, 357 Joint defaults simulation, 288–295 Leveraged ETFs, 47 J.P. Morgan Chase, 640 Leveraged loans, 435 Jump-diffusion models, 363–365 Leverage effect, 352, 449, 450 Jump process, 363 Leverage ratios, 193, 609, 627 Jump-to-default risk, 229 LIBOR (London Interbank Offered Junior debt, 194, 302 Rate), 90, 533-534 Junk bonds, 3, 7 Lien, 196 Linear congruential generator, 663 Linearity, linearization, 164-165 Kernel estimator, 357–359 bandwidth, 359 Liquidity-adjusted VaR, 467 kernel function, 359 Liquidity and maturity transformation, optimal bandwidth, 359 422-425 Keynes, John Maynard, 425, 576-577 Liquidity crunch, 519 Liquidity impasses, 530-535 Knight, Frank H., 34 Knock-ins/knock-outs, 545–546 Liquidity/liquidity risk, 421–448. Known vs. random, 202 See also Bank liquidity; Funding Kolmogorov-Smirnov goodness-of-fit liquidity/risk; Transactions test, 357 liquidity/risk Kurtosis, 350, 351, 355, 357, 361 credit default swaps (CDSs), 247 lender of last resort and, 632-635 Kurtosis excess, 350 measurement of, 464-469 Latent factor, 223 and systemic risk, 469-473 Law of iterated expectations, 579 in yield curve estimation, 141 Lehman Brothers, 210, 260, 429, Liquidity preference, 425 525 Liquidity premium, 421–422 Leibniz's Rule, 375 Liquidity ratios, 609, 627 Lender of last resort function, 621, Liquidity spreads, 584–585 628-635 Liquidity transformation, 6 Leptokurtosis. See Kurtosis Living will, 620 Leverage: Loan originator, 307 and asset volatility, 460–461 Loan pool, 300 contribution to crises, 582-584 Loan-to-value (LTV) ratio, 449 defining/measuring, 448-453 Lockout period, 303 and derivatives, 456-460 Logarithmic returns, 44–49, 71–74 Logarithmic utility, 52, 55-56 during financial crises, 540–542 gross vs. net leverage, 456-457 Lognormal distribution, 48, 656–660, leveraged returns to housing, 760 452-453 Long equity/short mezz trade, 401 margin lending and, 453-455 Long-short strategy, 487 in Merton model, 216 Long Term Capital Management

(LTCM), 556-557

and required returns, 451-452

| Loss distributions: | defined, 43, 611-612 |
|---------------------------------------|---------------------------------------|
| characteristics of, 327-331 | and derivatives positions, 209 |
| and credit VaR, 327-333 | regulatory capital for, 615-616 |
| single-factor model, 285-286, 294 | Markets for collateral, 10, 437–448 |
| Loss given default (LGD), 201-202, | economic function of, 441–444 |
| 203-204, 218-219. See also | and hedge funds, 444-445 |
| Expected loss, Unexpected loss | margin lending, 439-440, 443, |
| Low put deltas, 384 | 454–458 |
| | prime brokers, 444–445 |
| Macroprudential supervision, 600, 627 | repurchase agreements, 440, |
| Maddison, Angus, 20 | 442–443 |
| Maintained hypothesis, 661 | risks in, 445–448 |
| Managed floating, 24 | securities lending, 440-441 |
| Managed pool, 301 | structure of, 438–440 |
| Mandatory convertible bonds, 194–195 | Mark-to-model, 395 |
| Mapping, risk factor, 98, 162-163 | Mark-to-market (MTM), 94, 261-262, |
| defined, 94, 162 | 546–547 |
| and model risk, 397-399 | Mark-to-market (MTM) risk, 471 |
| Margin, 196, 209, 434, 535, 599-600. | Martingale property, 67 |
| See also Counterparty risk, | Master agreements, 210 |
| Custodial risk, Markets for | Matched funding, 423 |
| collateral, Rehypothecation | Material impairment, 304 |
| cross-margining agreements, 442 | Maturity mismatch, 422–423 |
| initial margin or haircut, 196 | maturity matching, 306 |
| margin accounts, 211-212 | Maturity transformation, 306 |
| margin call, 447 | Maximum loss approach. See Stress |
| remargining, 441 | testing |
| repledging, 440 | Mean-variance dominance, 51 |
| Marginal rate of substitution, 55 | Median, 655 |
| Marginal utility, 52 | Medium-term notes (MTN), 433 |
| Marginal Value-at-Risk (VaR), 480, | Memorylessness, 236. See also |
| 482, 509–512 | Martingale property |
| Marginal volatility, 482 | Merger arbitrage, 435 |
| Margin lending. See Markets for | Merrill Lynch, 260 |
| collateral | Merton model, 213–222 |
| Market data, 396 | credit VaR in, 227–228 |
| Market functioning, 510, 518, 536–538 | distribution of bond value, 226-227 |
| Market liquidity/risk, 461–464, 471, | equity value of firm, 215 |
| 517 | Mezzanine tranches, 302, 331, 345 |
| Market micro structure, 461, 464 | Microprudential supervision, 605–621 |
| Market-neutral strategies, 490 | Migration mode, 207 |
| Market portfolio, 80–81 | Minimum-variance portfolios, 85 |
| Market risk: | Minsky, Hyman, 577 |
| beta and, 76–82 | financial instability hypothesis, 577 |
| vs. credit risk, 204 | hedge finance, 577 |

| speculative finance, 577 | mitigating, 640-642 |
|---------------------------------------|--|
| Ponzi finance, 577 | and time consistency, 642-643 |
| Model risk, 393–407 | Morgan Stanley, 259-260, 261 |
| and 2005 credit correlation episode, | Mortgage-backed securities (MBSs), 8, |
| 399–405 | 299, 431–432, 545 |
| consequences of, 394 | Mortgage bond position, 8 |
| defined, 393–395 | Mortgage pass-through securities, 298 |
| mapping issues, 397–399 | Mortgage securitization, 7 |
| valuation risk, 395 | Multilateral netting. See Netting |
| variability of VaR estimates, 393-397 | Multiple equilibria, 581. See also |
| Modern finance theory, 44 | Bubbles, Rational expectations |
| Modified duration, 149–150 | Multiple risk factors: |
| Monetary policy and operations, | covariance and correlation matrices, |
| 26–30, 570–572, 626–628 | 160–161 |
| credit channel, 577 | delta-normal approach, 163–174 |
| open-market operations, 626 | mapping and, 162–163 |
| risk-taking channel, 573 | overview, 159–160 |
| Monetary Control Act of 1980, 15 | Municipal bonds, 192 |
| Money and maturity transformation, | Mutual funds, 5–6. See also Money |
| 423–425 | market mutual funds (MMMFs) |
| Money market mutual funds | |
| (MMMFs), 6, 10, 424–425, | National Association of Securities |
| 433–434, 525, 529–530 | Dealers (NASD), 604 |
| Money market spreads, 533–534, | Nationally Recognized Statistical |
| 585 | Rating Organization (NRSRO), |
| Money rate of interest, 570 | 205 |
| Monitoring, delegated, 197 | Natural rate of interest, 570 |
| Monoline insurers, 17, 211, 308. | Negative amortization, 599 |
| See also Wrap | Negative convexity. See Convexity |
| Monotone increasing/decreasing, | Nelson-Siegel, 143–144 |
| 124–126, 136 | Net asset value (NAV), 6, 478 |
| Monotonic function. See Monotone | Net interest margin, 423 |
| increasing/decreasing | Net leverage, 456 |
| Monte Carlo simulation, 109–111, | Net present value (NPV), 120, 457 |
| 111–113, 662–664 | Netting, 209–210 |
| and expected shortfall, 116 | Net worth, 449 |
| with full repricing, 126–127 | No-arbitrage, 142 |
| non-uniform random variate | Noise traders and information traders, |
| generation, 664 | 462, 576, 582 |
| portfolio VaR, 174–175 | Nonlinearity, 119–120, 123–126 |
| random variable generation, 663–664 | Nonlinear risk management, 121 |
| Moody's, 394 | Nonuniqueness. See Multiple equilibria |
| Moral hazard, 198, 620. See also | Normal copula. See Copulas |
| Too-big-too-fail | Northern Rock, 528 |
| examples of, 636–640 | Novation, 212 |

NRSROs (Nationally Recognized Option vega risk. See Vega risk Statistical Rating Organizations), Order-driven systems, 463 205, 621 Orderly Liquidation Authority (OLA). Null hypothesis, 408-409, 661 See Dodd-Frank Act Order statistics, 359 Originate-to-distribute business model, Obligor, 193 Off-balance-sheet vehicles, 10, 431–432 On- and off-the-run issues, 141, Overcollateralization, 303, 305 556-557 Overcollateralization triggers, 305 Operational risk, 611 Overnight interest rate swaps, 533-534 Optimal portfolio selection, 54–56 Over-the-counter (OTC) markets, 8–9 Optimization, 507-508 Panics. See Runs and panics Option-adjusted spread, 232 Option ARM (adjustable rate Parallel shift, 148 mortgage), 599 Parametric VaR, 108-109 Option-based risk-neutral distributions. Par amount, 138 See Options Par bond, 146 Pass-through certificates, 7–8 Option pricing: and implied correlation, 387–390 Payment in Kind (PIK) bonds, 195 risk-neutral distributions and, Payments systems, 518. See also 374-376 Financial market Options, 189. See also Derivatives, infrastructures/utilities Hedging, Implied volatility, Vega Peak over threshold, 369 risk Percentile, 655 barrier options, 7, 545 Peso problem, 355 butterfly spread, 377-380 Pfandbriefbanken, 7 delta/delta-gamma approach to VaR, Phillips Curve, 22 127 - 134Physical probabilities, 61. See also embedded, 141-142 Options full repricing approach to VaR, Point hypothesis, 661 126 - 127Points upfront, 210 Poisson distribution, 237, 363 gamma trading, 491 induced price dynamics, 545 Poisson process, 237, 363–364 and leverage, 460-464 Ponzi finance. See Minsky, Hyman nonlinearity of, 120, 461 Portfolio credit products, 297 option combinations and spread, Portfolio credit risk, 265-295. See also Structured credit 183, 382 pricing elementary claims from, default correlation, 266-270 377-380 estimating with simulation and risk-neutral asset price probability copulas, 284–295 distributions, 380-386 measuring, 270-274 risk reversals, 183, 189, 381 portfolio credit VaR, 270-274 strangles, 183, 189, 381 and single-factor model, 275-284 VaR of, 121–136, 175–190 Portfolio efficiency, 85–88 and vega risk (see Vega risk) Portfolio insurance, 545

Portfolio strategies, 510–512 Quantitative strategies, risk capital Portfolio return volatility, 83-88, 481, measurement for, 490-499 Quanto risk, 515 Position data, 396 Quote-driven systems, 462–463 Positive convexity, 327. See Convexity Positive semi-definite matrix, 161 Random seed, 663 Power laws, 368 Random walk, 64-71, 364, 653-654 Predictive stress testing, 506 Rating agencies, 204–207, 307–308, Preferences, 49 663-664 Preferred stock, 194 Rating migration, 204 Prepayment risk, 8, 304 Ratings curves, 407 Price controls, 15 Ratings shopping, 646 Price of risk, 60 Rational expectation models, 578–579 Pricing kernel. See Stochastic discount Real estate, 436, 526–527 Real Fed funds rate, 27 Primary credit facility, 629 Rebates, 440 Primary Dealer Credit Facility (PDCF), Recourse, 196 Recovery, 201-202, 203-204, 243 Prime brokers, 444–445 recovery of face, 202 Principal, principal amount, 138, 144, recovery of market, 202 304 recovery of Treasury, 202 Principal-agent problems, 197 Recovery swap, 249 Principal components, 138 Reduced-form models, 207, 235–241 Priority, 194 Reference entity, 248 Private equity funds, 19–20 Reference portfolio, 301 Private sector deleveraging, 584 Refinancing risk, 304 Probability of default. See Default Regime-switching models, 355. See also probabilities Peso problem Procyclicality, 540, 574-577, 617-618 Regulation, 597-647. See also procyclicality of capital requirements, Macroprudential supervision, Microprudential supervision, Regulation, Safety and soundness Prompt corrective action, 620 Prudential supervision. See Safety and supervision soundness supervision bank examinations and resolution, Pseudo-random number, 663 619 - 621Pull-to-par, 137 capital standards, 608-619 Pure contagion, 540 for consumer protection, 598–600 Pure diffusion, 364 deposit insurance, 606-608 Put skew, 373 for efficiency and growth, 600-601 for financial stability, 600, 621-628 QQ plot, 359-363, 367 of firms vs. securities or markets, Quantile function, 655 603-604 Quantiles, 654-655, 657. See also goals of, 598-601 Percentile historical background, 15–17 Quantile transformation, 655 lender of last resort, 628-635

| Regulation (Continued) | endogenous, 543 |
|--|--|
| methods of, 605-621 | exchange-rate, 89 |
| moral hazard and adverse selection, | financial, 34, 40 |
| 636–643 | financing, 114 |
| pitfalls in, 635–647 | idiosyncratic, 275, 281 |
| regulatory authorities, 601-605 | inflation, 89 |
| regulatory evasion, 643-644 | jump-to-default, 228-229 |
| scope and structure, 598-605 | liquidity (see Liquidity/liquidity risk) |
| unintended consequences, | market (see Market risk) |
| 628-630 | mark-to-market (MTM), 471 |
| Regulatory arbitrage, 345, 644 | operational, 611 |
| Regulatory authorities, 601–605 | prepayment, 8, 304 |
| Regulatory capture, 647 | quanto, 515 |
| Regulatory forbearance, 603 | refinancing, 304 |
| Rehypothecation, 437 | retention, 344 |
| Remargining. See Margin | rollover, 423 |
| Repledging. See Rehypothecation | specific, 616 |
| Replications, 663 | spread, 35, 261-264 |
| Repo rate. See Repurchase agreements, | systematic, 336–337 |
| Risk-free rate | systemic (see Systemic risk) |
| Representative agent model, 49 | types of, 35–39, 611–612 |
| Repurchase agreements, 8, 90, 440 | uncertainty vs., 34 |
| Reserve requirements, 618–619 | valuation, 395 |
| Residential mortgage-backed securities | vega (see Vega risk) |
| (RMBS), 398, 405–407, 546, 600, | warehousing, 307 |
| 626, 641 | yield curve (see Yield curve risk) |
| Resiliency, 463 | Risk aversion, 50, 52. See also |
| Resolution, 619–620. See also | Preferences, Risk Premium |
| Bankruptcy, Dodd-Frank Act | Arrow-Pratt measure of risk aversion |
| Reverse optimization. See Implied views | 52 |
| Reverse repo transactions, 442–443 | Risk budgeting, 478 |
| Revolving pool, 300–301 | Risk capital: |
| Riegle-Neal Interstate Banking and | defining, 478–480 |
| Branching Efficiency Act of 1994, | hedging and basis risk, 512-516 |
| 15 | measurement, for quantitative |
| Risk. See also Credit risk, Market risk, | strategies, 490-499 |
| Operational risk | risk contributions in long-only |
| appetites, 373 | strategies, 481–485 |
| balance sheet, 422 | risk contributions using delta |
| basis, 512–516 | equivalents, 485–490 |
| concentration, 337 | risk reporting, 509–512 |
| counterparty, 207–213 | and sizing positions, 506-508 |
| custodial, 211–212 | Risk contributions, 480–499 |
| defining, 50–54 | defined, 480 |
| double default, 210–211 | in long-only strategies, 481–485 |

risk capital measurement for Savings glut hypothesis, 573 quantitative strategies, 490-499 Savings and loan crisis, 42, 618–619, using delta equivalents, 485–490 Risk factors, 43, 509-510 Search/reach for yield, 436, 549, 572, Risk-free rate, 88 594, 646 definition in representative agent Sec-lending programs, 445 Secured obligations, 195-196. See also model, 58 government bond yields as, 88–90 Collateral money market rates as, 90 Securities and Exchange Commission repo rate as, 90 (SEC), 605 Risk management, defined, 40 Securities exchange, 8 Risk management alpha, 478 Securities firms, 432–433 Risk measure, coherence of, 414 Securities lending, 431, 440–441, 445 Risk measurement systems: Securities markets and securities firms, types of data, 396 Risk-neutral asset price probability Securities markets contraction, 525–528 Securitization, 7, 10. See also Structured distributions. See Options credit products Risk-neutral probabilities. See Default probabilities bond losses in, 304 Risk-neutral hazard rate, 242–245 capital structure/tranching in, Risk-neutral implied equity correlation, 301-304 387 collateralized mortgage obligations Risk-neutral probability measure, (CMOs), 8, 298–299, 299–300, 309 61 - 63Risk premium, 54, 59, 81, 548 covered bonds, 7 Risk reporting, 509-512 credit losses in, 301-304 Risk reversals. See Options credit scenario analysis of, 309-318 Risk set, 414 investor incentives, 344-345 Risk shifting, 197, 460 issuance process, 307–309 Risks in collateral markets, 445–448 issuer incentives, 342-344 Risk triggers, 543-546 material impairment vs. default, 304 Risk-weighted assets, 610 mortgage-backed securities (MBSs), Rollover risk, 423 8, 299, 431–432, 545 Root mean square (RMS), 103, 357 pass-through certificates, 7-8, 298 Runs and panics, 433–434, 439–440, repurchase agreement, 8 456, 476–477, 480, 481, 528–544, standard tranches, 337-340 590-592, 594, 628-640. See also waterfall, 305-307, 323 Deposit insurance, Financial crises Security master data, 396 Self-fulfilling crises, 581 Safe-haven buying, 548 Self-regulation, 603–604 Safety and soundness supervision, 600, Senior debt. See Seniority, debt 605-621 Seniority debt, 194, 308, 337 Sample path, 64 Sequential-pay structure, 8, 299 Savings and loan (S&L) crisis, 606–607, Servicers, 298, 308 Settlement date, 139 640, 648, 650

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

Structural models, 207. See also Factor and shadow banking system, 9-14 models; Merton model; spread curves, 259-261 single-factor model and spread volatility, 262-263 Structured credit. See Structured credit subordinated debt and, 640-642 products and time consistency problems, Structured credit products, 192 642-643 basics of, 297-309 Subprime default models, 405–407 collateralized mortgage obligations Sunspots, 581. See also Bubbles (CMOs), 8, 298-299, 299-300, Survival time distribution, 239 309 Suspension of convertibility, 428 covered bonds, 7, 298 Swaps, 120, 457 default correlation summary, credit default swaps (CDS) (see 345-348 Credit default swaps) and implied correlation, 341–345 interest-rate, 7 leverage and, 460-461 total return swaps (TRS), 441 mortgage pass-through securities, Swap spreads, 550–551 7-8,298Swedish banking crisis of 1992, 530 overview, 297-299 Syndicated loans, 435 and off-balance sheet funding, Synthetic CDO, 11 429-432 Synthetic securitizations, 301 risk measurement, 318–337 Systematic funding liquidity risk, securitization analysis, 309–318 435-437 standard tranches, 337–340 Systematic risk, 336–337 time-tranching, 304 Systemic risk, 422, 518, 600 Structured investment vehicles (SIVs), funding liquidity and solvency, 431–432, 531–532 469-470 Subadditivity of VaR, 415–418 interconnectedness, 473 Subjective probabilities, 61 liquidity and, 469-473 Subordinated debt, 194, 613, 617, and "plumbing", 471-473 640-642 Systemic risk charges, 626-627 Subprime crisis, 1. See also Financial Systemic risk regulator, 626 crises and asset-price targeting, 622 Tail index, 368 bank lending and, 525-528 Tangible common equity (TCE), 613 and capital standards, 613-614 Target federal funds rate, 27 collateral markets and, 445-448 Taxes credit spreads and, 548-551 impact of tax-deductibility of interest default model errors, 405-407 costs, 631, 660 double default risk during, 210-211 in yield curve estimation, 142 and fixed income securities lending, Taylor approximation, 49, 134–136 Taylor rule, 570 liquidity impasses and hoarding, TED spread, 533 530-535 Temporary suspension of convertibility, and ratings triggers, 546 settlement fails during, 537-539 Tequila crisis of 1994–1995, 563

| Term Asset-Backed Securities Lending | Transformation principle, 664 |
|--|--|
| Facility, 646 | Transition matrices, 205, 206 |
| Terminal cash flows, 314–318 | Translation invariance, 414 |
| Test statistic, 661 | Transversality condition, 581 |
| Theta, 128, 134 | Treasury bond basis, 512–513 |
| Thin-tailed return model, 503 | Tri-party repo system, 472–473, 630. |
| Threads, 663 | See also Financial market |
| Tier I capital, 612–613 | infrastructures |
| Tier II capital, 612–613 | Trustee, 309 |
| Tightness, 463 | Trust preferred securities, 612 |
| Time inconsistency, 642–643. See also | Trusts, 299 |
| Credibility | Tulip mania, 578 |
| Time decay, 123 | Turkish lira crisis, 355, 365 |
| Time horizon, 97, 98, 100–103 | "Twin crises" literature, 564 |
| Timeline of financial mishaps, 30–33 | Two-sided test, 662 |
| Time preference, pure rate of, 51 | Type I error (false positive), 409–410, |
| Time scaling of default probabilities, | 662 |
| 245–246 | Type II error (false negative), 410, 662 |
| Time separable utility function, 51 | |
| Time-tranching. See Structured credit | UBS, 531 |
| products | Unconditional default probability, |
| Time value, 179, 457 | 282–284 |
| Time variation of asset return | Underlying asset, 7 |
| distributions, 102-103, 350 | Underwriters/underwriting, 2, 307, 522 |
| Time-varying volatility, 102–103 | Unexpected loss, 228-229. See also |
| Too-big-to-fail, 613, 636–637, 646 | Expected loss |
| Total return swaps (TRS), 441 | Unit banking, 15 |
| Total variation process. See Geometric | Unpledged assets, 465. See also |
| Brownian motion | Rehypothecation |
| Tower rule. See Law of iterated | Unsecured obligations, 195–196 |
| expectations | Uptick rule, 605 |
| Trade sizing, 447 | U.S. current-account, 573–574 |
| Trading securities, 615 | U.S. Financial Crisis Inquiry |
| "Tragedy of commons," 199 | Commission, 591 |
| Tranches/tranching, 8, 299, 300–304 | U.S. government bond auction, 443 |
| credit VaR of, 331–333 | Utility functions, <i>51–52</i> , <i>54–56</i> . |
| default sensitivities of liabilities, | See also Preferences, Risk aversion, |
| 333–337 | Time preference |
| thinness, 337 | 1 |
| Transaction costs, 196–199 | Valuation risk, 395 |
| Transactions liquidity/risk, 421, | Value-at-risk (VaR), 93-117. See also |
| 461–464 | Volatility, Volatility estimation |
| measurement of, 466-469 | accuracy of, 407-413 |
| transaction cost liquidity risk, | backtesting of, 407-413 |
| 466–467 | coherence of estimates, 414-419 |
| | |

| computation modes, 108–113 | Volatility, 84, 85–88. See also Volatility |
|---------------------------------------|---|
| confidence level, 97 | estimation |
| defined, 94–97 | asset-return, 74–75 |
| delta-normal approach (see | basis point, 150-152 |
| Delta-normal approach to VaR) | beta and, 80 |
| duration-convexity mapping, | black, 151 |
| 148–156 | bond price, 150-152 |
| duration-only, 152-154 | conditional, 103 (see also GARCH |
| estimating with extreme value theory | model) |
| (EVT), 370–371 | during crises, 547–548 |
| expected shortfall, 114-117 | estimation, 99–108 |
| historical simulation, 111–113, | excess, 103 |
| 411–413 | extreme realized, 551-553 |
| incremental, 480, 490, 509-512 | financial crises and, 551-555 |
| liquidity-adjusted, 467 | implied (see Implied volatility) |
| marginal, 474, 509-512 | interest-rate, 150–152 |
| model risk, 393-407 | leverage and, 460-461 |
| Monte Carlo simulation, 109-111, | marginal, 482 |
| 174–175 | portfolio return, 83-88, 481, 485 |
| nonlinearity and, 123-126 | spread, 261-263 |
| overview, 93–94 | time-varying, 102–103 |
| parametric, 108-109 | volatility clustering, 102-103 |
| and short positions, 113-114 | yield, 150–152 |
| steps in computing, 98 | Volatility estimation, 99–108 |
| time horizon, 97 | comparison of methods, 107 |
| user-defined parameters, 97–98 | criteria for successful, 99 |
| variability of estimates, 395–397 | EWMA model, 104–106 |
| VaR scenario, 95–96 | GARCH model, 106–108 |
| VaR shock, 96 | short-term conditional, 99-103 |
| Value-at-risk (VaR) limits, 416–417 | Volatility function. See Implied |
| Value-at-risk (VaR) shock, 501–503 | volatility |
| Value-at-risk (VaR) triggers, 543–544 | Volatility of volatility (vol of vol), 181, |
| VaR. See Value-at-risk (VaR) | 548, 554 |
| Variance swaps, 389 | Volatility smile. See Implied volatility |
| Variation margin, 196 | Volatility surface. See Implied volatility |
| Vega risk, 175–189 | Volcker Rule, 428 |
| and Black Scholes anomalies, | |
| 176–180 | Warehousing risk, 307 |
| implied volatility surface, 180–183 | Washington Mutual, 640-641 |
| measuring, 183–189 | Waterfall, 305-307, 323 |
| sticky delta approach, 188 | Weighted average life (WAL), 303-304 |
| sticky strike approach, 188 | When-issued, 442 |
| Velocity of money, 425 | Wicksell, Knut, 570. See also Money |
| VIX volatility index, 356–358, | rate of interest, Natural rate of |
| 553–554 | 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