

Index

- accounting standards (adoption of) 106
- actuarial approach to credit rating quantification 380
 - annualized default rate 383–5
 - cumulative default rate 382–3
 - marginal default rate 380–2
 - migration rates 386–8
 - “mortality rate” approach 386
 - transition matrices 380
 - add-on factor 476–7
 - adjusted RAROC 743–4
- AEE (average expected exposure) 489–93
- allocated capital and total capital relationship
 - diversified capital calculation 703
 - diversified capital calculation/correlation method 706–10
 - diversified capital calculation/marginal EC method 704–6
 - diversified capital calculation/proportional apportionment method 703–4
 - diversified capital (concept) 702–3
 - diversified capital correlations (calculations) 710–11
 - diversified capital correlations (calculations)/historical data 711–12
 - diversified capital correlations (calculations)/Monte Carlo simulations, 712
 - diversified capital correlations (calculations)/subjective assumptions, 711
- Altman, Edward
 - Altman’s Z-scores (discriminant score applied to credit risk) 294–5
 - default forecasting research using discriminant analysis 287
 - “mortality rate” approach 386
 - amortization effect 484–9
- analytical approach *see* variance-covariance approach
- annualized default rate 383–5
- applications of VaR models
 - aggregating risks connected with different positions 256
 - comparisons among different risks 253–6
 - construction of risk-adjusted performance (RAP) measures 258–60
 - determination of risk taking limits 257–8
 - risk profiles of two positions (example) 254–6
- AR (Accuracy Ratio/Gini ratio) 393
- arbitrage 93
- arbitrage pricing theory (APT) 142, 155
- ARCH (autoregressive conditional variance) model 172
 - main limitation of 174
- asset correlation vs. default correlation 449
- asset-normal approach 132
- asymmetry
 - of distribution of loss rate 405
 - of future values of credit portfolio 422
 - of information 370
- AUROC (“area under ROC curve”) 390–1
 - CoC (coefficient of concordance) 390
 - sample dependency 395
 - average expected exposure (AEE) 489–93
- backtesting techniques 113
- backtesting techniques for evaluating VaR models 225, 600
- alternative techniques 232–3
 - Basel Committee standard rules for 246–50
 - conditional coverage test 238–41
 - empirical study (Hendricks) 228–31
 - Lopez test based upon a loss function 241–3
 - null hypothesis 232–3
 - stock portfolio VaR example 225
 - stock portfolio VaR example/historical simulation model 227–8
 - stock portfolio VaR example/variance-covariance approach 225–6
 - stock portfolio VaR example/variance-covariance approach with exponential volatility estimates 227
 - test based upon entire distribution 243–4
 - types I and II errors 233
 - unconditional coverage test 233–8
 - bankers blanket bond 534, 644, 685
 - Bankers Trust 259, 738
- banking book 4
- Bank of England 594, 547
- Barings Bank, example of OR losses 511–12
- Barra 59
- Basel Capital Accord, and reduction of “point-in-time” evaluations 371
- Basel Capital Accord (1988) 559
 - adoption by EU and other government banking regulators 547
 - capital ratio requirement 548
 - general provisions and general loan loss reserves 552–3
 - hybrid capital instrument (requirements for) 553
 - “innovative capital instruments” (inclusion of) 552

- Basel Capital Accord (1988) (*continued*)
 micro- and macroeconomic effects of 545–6
 reason for uniform international requirements 547–8
see also capital ratio; capital ratio calculation; limitations of capital adequacy framework (1988); New Basel Capital Accord (2004)
- Basel Capital Accord (1996) additions
 amendment to extend capital requirements to market risks 556
 tier 3 conditions 553–4, 568
- Basel Committee (1999) Task Force
 recommendations 345
- Basel Committee (2000), Principles for the Assessment of Banks' Management of Credit Risk 283–5
- Basel Committee on Banking Supervision 563
 12 fundamental principles (1997) 4
 OR definition (2001) 512
 10 principles for management of OR 536–7
 requirements for backtesting VaR models 225, 231, 235, 246–50
- Basel Committee proposals (1993), criticism of 578–9
- Basel Committee proposals (1995) revised draft 579–81
- Basel Committee proposals (1996) final amendment 581–2
- Basel II *see* New Basel Capital Accord (2004)
- basis point value 253, 256, 258
- basis risk 46
- basis swaps*, 97
 “Benchmark capital” approach 6
 beta distribution 257, 397, 421
- beta duration gap 46, 49
- betas *see* stockmarket betas
- Bank for International Settlements (BIS) 563
- Black & Scholes' option pricing formula 179
- Bollaserv formulations 172
- bootstrapping 58
- bootstrapping and path generation 201–2
- Brownian motion (geometric) examples 147, 322–3, 343, 364
- business risk 328, 330, 333, 687, 738
- analysis 373–4
- CAP (cumulative accuracy profile/Gini) curve 392–5
 sample dependency 395
- capital
 book-value capital (BVC) 658
 contingent capital 687–91
 core capital 658
 definition 658–61
 determinants of capitalization 674–5
 economic capital and available capital relationship 661–3
 economic capital and regulatory capital relationship 667–70
 economic capital calculation for a bank 663–6
 economic capital calculation for a bank/hypothetical example 666–7
 economic capital (EC) or CaR 659
 fair-value capital (FVC) 658
 main types/relationship between 659–61
 market capitalization (MC) 658–9
 regulatory capital constraints 671–4
 regulatory capital (RC) 658
 Tier 1(T1) 3, 658
 Tier 2(T2)/supplementary capital 658
 Tier 3(T3) 658
- capital allocation 693
 capital allocated and capital absorbed calculations 712–15
 correlational approach 730
 organizational aspects of process 726–8
 policy considerations 693–4
see also allocated capital and total capital relationship; measuring capital for individual business units; risk-adjusted performance calculation (capital allocation)
 virtual nature of 731–4
- capital allocation optimization 722
 generalized six-stage framework 724–5
 portfolio theory (Markowitz) reference as model 722–4
- capital management 657, 757
 functions 657
 “physical” management of bank's capital base 657, 693
 process 653–4
see also capital/definition; instruments not included within regulatory capital; regulatory capital optimization
- capital management and value creation 653–6
 measuring value 719–22
see also capital allocation; capital management; cost of capital and value creation
- capital-market data based models 283, 313
 fair spread on a loan (calculation) 342
 real and risk-neutral probabilities of default 343–4
see also capital market models based on corporate bond spreads; structural models based on stock prices
- capital market models based on corporate bond spreads 313
 continuously compounded interest rates 314
 estimating one-year probability of default 314–15
 input data needed 313
 limitations 320–1

- probabilities of default beyond one year 315–17
- capital multiplier 530
- capital ratio 548
- capital ratio calculation (Basel Accord 1988 requirements) 549
 - assets included in the capital ratio 555
 - regulatory capital (RC)/Tier 1 and Tier 2 capital 549–54
 - risk weights 554–5
- capital requirement on debt securities 568
 - requirement for generic risk 569–75
 - requirement for specific risk 568–9
- capital requirements for market risks
 - “building blocks” approach 567–8
 - commodity positions requirement 578
 - concentration risk 589
 - counterparty risk 589
 - positions in equity securities/specific and generic requirements 575–6
 - positions in foreign currencies 576–8
 - see also* capital requirement on debt securities; regulatory capital requirements
 - settlement risk 588
- capital requirements for market risks/use of internal models
 - advantages 583
 - criticism of Basel Committee proposals, 1993 578–9
 - empirical study 583
 - final amendment, 1996, 581–2
 - limitations 583
 - pre-commitment approach 583–5
- capital requirements on operational risk 633–4, 647
 - advanced measurement approaches 638–9
 - advanced measurement approaches requirements 639–44
 - basic indicator approach 634–5
 - insurance coverage role 644–5
 - Second and Third Pillar roles 644
 - standardized approach 635–8
 - standardized approach requirements 638
 - weaknesses of New Basel Capital Accord (2004) 645–7
- CAPM (Capital Asset Pricing Model) 154–5
- CaR (capital at risk) 110, 659
 - see also* value at risk (VaR)
- cash bucketing *see* clumping
- cash-flow mapping models 8, 68–9
 - objectives 57–8
 - see also* clumping; discrete intervals methods; “modified residual life” methods
 - zero-coupon/term-structure* rate curves 57
- CDS (credit default swap) 467
- Cholesky decomposition 211
- Christoffersen test 238–41
- classification trees 287
- clearinghouse 473, 500
- close out netting agreements 496
- clumping 57, 58, 68
 - example 65–7
 - J.P. Morgan version 57
 - methodology structure 64–5
 - price volatility basis variation 67–8
- CoC (coefficient of concordance) 390
- collateralized bond obligation (CBO) 517
- collateralized loan obligation (CLO) 517
- commodity risk 106
- component VaR 706
- conditional coverage test (of VaR model) 238–41
- confidence intervals 120
 - confidence level selection 121–4
 - for validation of credit rating quantification step 396–7
- contestable markets (theory of) 653
- contingency table 389–90
- contingent capital 687–91
- contingent claim approach 313, 321, 324, 340
- convexity 50–4
 - properties and economic meaning 54
- convexity gap 54–5
- corporate responsibility centers 654–6
- correlational approach 730
- cost of capital and value creation 735
 - capital budgeting in banks/non-financial enterprises 736–9
 - risk management and capital budgeting link 735–6
 - see also* estimating cost of capital value creation and EVA 753–6
 - value creation and Raroc 750–3
- counterparty risk on OTC derivatives 473
 - pre-settlement (substitution) risk 474
 - see also* estimating pre-settlement risk; risk-adjusted performance measurement; risk-mitigation tools for pre-settlement risk
 - settlement (Herstatt) risk 474
- country risk (type of credit risk) 282
- covariance and correlation estimation 181–2
- credit derivatives 464–9
 - credit default note 467–8
 - credit default swap (CDS) 467
 - credit events 464–5
 - credit spread forwards 466
 - “reference obligation,” 465
 - total rate of return (TROR) swap 467
 - “underlying asset,” 464
 - uses of 468–9
- credit exposure (component of credit risk definition) 278
 - problems 278–9
 - “special risk,” 278

- credit rating agencies 369, 372
 business model 372
 “creditwatch” status 373
 future outlook in rating 372–3
 inclusion of recovery rates on credit exposures 371–2
 main stages of credit assignment process 374–6
 “notching down,” 371
see also rating assignment step (credit system)
through-the cycle perspective 371
- credit risk
 Basel Committee Principles for the Assessment of Banks’ Management of Credit Risk
credit exposure (component of credit risk definition) 278–9
default risk and *migration risk* concepts (component of credit risk definition) 277–8
 definition 277–9
see also capital-market data based models; credit-scoring models; expected loss (EL); LGD and recovery risk, rating systems for creditworthiness, credit risk measurement models’ applications, estimating exposure at default of OTC derivatives; portfolio models (credit risk); recovery risk; unexpected loss (UL)
 underlying drivers 282
- credit risk measurement models’ applications 283, 451
see also credit risk transfer tools; limits on risk-taking units; loan portfolio optimization; loan pricing; risk-adjusted performance measurement (credit risk measurement models)
- credit risk transfer tools 464
see also credit derivatives; loan sales; securitization schemes
- credit risk types
 country risk 282
 default risk 281
 migration risk 281
 pre-settlement or substitution risk 282
 recovery risk 281
 spread risk 281
- credit-scoring models 282–3, 287
 classification trees 287
 history of 287
 problems 308
see also inductive models; linear discriminant analysis; regression models
 trait recognition analysis 287
 uses 307–8
- credit swap 466
- credit triggers 473, 496, 501–4
- CreditMetrics™, 401
 advantages 422
 estimating asset correlation 418–20
 estimating risk of a two-exposure portfolio 412–18
 estimating risk on a single credit 407–12
 limitations 422–3
 portfolio of N positions (using Monte Carlo simulations) 420–2
 CreditPortfolioView™, 401, 426
 benefits 428
 estimating conditional default probabilities 426–7
 estimating conditional transition matrix 427–8
 limitations 428
 CreditRisk+™, 402, 428–9
 actuarial approach 428
 average default rate and correlations (uncertainty about) 434–8
 benefits 438
 distribution of losses of entire portfolio 432–4
 limitations 438–9
 probability distribution of defaults estimation 429–30
 probability distribution of losses 430–2
 cumulative default rate 382–3
 cumulative gaps 15
 “cut-off” technique 187
- decay factor 168, 170–1, 175
 default correlation vs. asset correlation 449
default (definitions) 385
 default-mode (binomial) model 439
 default point (DP) 335–7, 425, 449, 604
 default rate (“mortality”) data 380
 default risk (component of credit risk definition and credit risk type) 277–8, 281
 and recovery risk (link) 358–62
 “delegated monitoring” (of rating agencies) 370
 delta coefficient 158–9
 delta/gamma approach and linear payoff hypothesis 148–51, 185
 delta-normal approach 132
delta value $01/dv01$, 108
 derivative contracts on interest rates 96–101
 forward rate agreements (FRAs) 96
 interest rate caps 98–9
 interest rate collars 100–1
 interest rate floors 99–100
 interest rate swaps (IRs) 97–8
 derivative instruments, option contracts 157
 Derivative Policy Group (DPG), stress test guidelines(1995) 219
 diffusion effect 484–9
 discrete intervals methods 58
 Basel Committee Method 61–4
 duration intervals method 59–60
 modified residual life method 60–1
 discriminant function 287–9

- distance to default (DD) 335–7
 average DD 340
- distribution forecast method 243–4
- dividend discount model 702, 739–41, 745
- “double gearing,” 554
- duration gap model 8, 35
 assumptions 49
 “beta duration gap” model 46, 49
 duration (properties of) 42
 equity-based method 9, 35
 estimating duration gap 42–4
 problems/criticisms 45–6, 57
see also mark-to-market accounting
yield to maturity/yield curve foundation 57
- duration intervals method 59–60
- duration (limits of) 49–55
 assuming linear relationship between yield and price 50
 assuming parallel shifts across maturities 49
see also convexity
- duration of financial instruments 39–42
 duration as indicator of sensitivity to interest rates changes 40–2
 duration as weighted average of maturities 39–40
- EAD (exposure at default) 279, 279–80, 281
- Earnings-at-risk (EaR) approach 697–702
- echo effect 167
- EGARCH 177
- equity-based model (measuring/managing interest rate risk) 9
- equity risk 106
- estimating cost of capital 739
 considerations 744–5
 method based on Capital Asset Pricing Model (CAPM) 742–4
 method based on dividend discount model 739–41
 method based on price/earnings ratio 741–2
- estimating pre-settlement risk 474–5
 amortization and diffusion effect 484–9
 average expected exposure (AEE) criterion 489–93
 current exposure (mark-to-market) method for computing LEE 476–7
 estimating LEE on an interest rate swap 479–84
 LEE calculations (sophisticated internal approach) 477–9
 LEE computation based on option pricing models 493–4
 LEE computation based on the historical simulation approach 494
 LEE/market-risk VaR analogies and differences 494–5
- loan equivalent exposure (LEE) calculation 474–5
 original exposure method for computing LEE 475–6
 peak exposure (PE) criterion 489
- Euribor rate 86
- EVA (Economic Value Added), and value creation 753–6
- evaluating VaR models 225
 overview of models 251–3
 requirements for 225
see also backtesting techniques for evaluating VaR models; “false shortcomings” of VaR
- exchange rate risk 105
- expected loss (EL) 279–80
 parameters to be estimated 279
- expected positive exposure (EPE), 492–3
- expected shortfall 268–9
- exponentially weighted moving averages (EWMA) 163, 167–72, 181, 195, 199, 263, 583
- Extreme Value Theory (EVT) 272–4, 521
 and OR measurement 539–41
- facility ratings (issue ratings) 345, 369
 differences based on bank or agency perspective 371
- factor push analysis (FPA) techniques 219
- fair spread on a loan (calculation) 342
- “false shortcomings” of VaR 260
 measures “come too late,” 263
 models amplify market instability 262
 models based upon unrealistic assumptions 261
 models disregard customer relations 261
 models disregard exceptional events 260–1
 models generate diverging results 262
- fat tails phenomenon 145, 187
 in logit model 301
- fidelity bond 534, 644, 685
- financial derivatives market growth 106
- financial risk analysis 373
- FitchRatings 372
 use of qualitative methods for creditworthiness determination 369
- “flight to quality” phenomenon 281
- forward rate agreements (FRAs) 96
- forward rates 32–3
- from rating system to minimum capital requirements (New Basel Capital Accord) 603
 choosing parameters 606–10
 effect of maturity and the “scaling factor,” 610–12
 reference model 603–6
 summary example 612
- full valuation (shared feature of simulation models) 185–6
- gamma coefficient 159

- gap concept 9–12
 common indicators derived from 11–12
 marginal and cumulative gaps 15–19
 maturity-adjusted gap 12–15
 standardized gap 20–3
- gap ratio 12
- GARCH (generalized autoregressive conditional heteroskedasticity) models 163, 172–9
 benefits of, 1,1 176
 limitations of, 1,1 176–7
 problems for predictions 178–9
 underlying logic 172–4
 use in filtered historical simulations 204–5
- genetic algorithms 304–7
 applications to other fields 307
 Darwinian influence on 304–5
- Geske's model 331
- ghost features *see* echo effect
- Gini curve (cumulative accuracy profile/CAP) 392–5
 sample dependency 395
- Gini ratio (Accuracy Ratio/AR) 393
- “Greeks” *see* option sensitivity coefficients (“Greeks”)
- Haircuts 501, 596, 597
- Hendricks, Darryl, empirical study of VaR estimation approaches 228–31
- Herstat risk 474
- heteroschedastic discriminant analysis 299
- heteroskedasticity*, 172
- historical data models
 exponential moving averages 167–72
 GARCH models 172–9
 simple moving averages 163–7
- historical simulations 188
 assumptions 189
 bootstrapping and path generation method 201–2
 comparison with variance-covariance approach (example) 195–6
 filtered 202–5
 limitations 197–8
 main steps 189
 merits 196–7
 portfolio's VaR estimation (example) 193–4
 VaR of a single position (example) 189–93
- holding period 125, 149, 170, 402
- Holland, John, development of genetic algorithms 304
- hybrid approach 198–201
- IGARCH 177,178
- impact of Basel II
 dynamic impact/procyclicality 623
 first implementation/quantitative impact studies (QIS) 619–22
- procyclicality and design of capital requirements 623–5
 provisioning policies and accounting standards 625–8
 review 628–30
- implied volatility (volatility prediction) 179–81
 advantages and disadvantages 180
 conditions 180
- income-based model (measuring/managing interest rate risk) 9
see also repricing gap model
- inductive models 287
 genetic algorithms 304–7
 neural networks 301–4
- instruments not included within regulatory capital 685
 contingent capital (strengths and weaknesses) 690–1
 contingent capital (technical characteristics) 687–90
 insurance capital (underlying concept of) 685–6
 integrated risk insurance 686–7
- insurance capital 685–6
- interest rate caps 98–9
- interest rate collars 100–1
- interest rate floors 99–100
- interest rate risk 3
 “earnings approaches” to measuring 9
 guidelines (interest rate risk on the banking book) 5–7
 indirect effect 3
 measures 4
see also cash-flow mapping models; duration gap model; internal interest transfer rates (ITRs); repricing gap model
 as subcategory of market risk 105, 106
 interest rate swaps (IRs) 97–8
- interest rates (term structure of) 28
 liquidity preference theory 30
 market segmentation hypothesis 31
 theory of preferred habitats 30–1
 theory of unbiased expectations 28–30
zero-coupon curve 28
- internal audit 533, 536, 603, 618, 727
- internal interest transfer rates (ITRs) 8, 77
 fixed-rate transactions (setting for) 84–5
 floating-rate transactions (setting for) 85
 “non-market” rates transactions (setting for) 85–7
- internal ratings-based approach (New Basel Capital Accord) 591
 advanced approach 598, 601–3
 foundation approach 598, 601
 minimum requirements 600–3
 risk drivers 597–8, 599
 risk factors 597–600

- see also* from rating system to minimum capital requirements (New Basel Capital Accord)
- internal scoring models 283
- International Swaps and Derivatives Dealers Association (ISDA)
- Net-Gross Ratio (NGR) correction 498–9
- terminology standardization 464
- intrinsic value 158, 661
- issue ratings (facility ratings) 345, 369
- differences based on bank or agency perspectives 371
- issuer ratings (PD ratings) 369
- differences based on bank and agency perspectives 371
- ITR system
- criticism of single ITR systems 79–80
- ideal features of 93–4
- main aims 77
- net flow ITR system 79
- see also* multiple ITR system
- simplified example 77–9
- ITRs for transactions with embedded options 88
- floating rate loan subject to cap 89–90
- floating rate loan subject to floor 90–1
- floating rate loan subject to floor and cap 91
- option to convert from fixed to floating rate 88–9
- options for early repayment 91–3
- KMV model 332–4
- benefits 337–8
- calculation of PD 334–7
- dealing with issues with Merton's model 332
- limitations 338–40
- Kupiec, Paul, proportion of failures test 233–8
- Kurtosis 116, 196
- Lamfalussy report 497
- LEE (loan equivalent exposure)
- analogies and differences with market-risk VaR 494–5
- calculation 474–5
- safety margins basis 500
- see also* risk-adjusted performance measurement
- Leeson, Nick *see* Barings Bank
- leptokurtosis, 144–5
- leverage-adjusted duration gap 43
- LGD and recovery risk 283, 345
- empirical studies (results/evidence) 353–6
- estimation of recovery rates 347–51
- estimations of LGDs on potential future defaults 351–3
- recovery rates (driving factors) 346–7
- LGD (loss given default) 279, 281, 358
- emergence LGD*, 347
- implicit market LGD*, 347–8
- market LGD* approach for computing 347
- workout LGD*, 348–51
- Libor rate 86
- limitations of capital adequacy framework (1988) 555
- focus on credit risk only 556
- limited incentive for portfolio diversification 556
- maturity and credit risk link ignored 556
- poor differentiation of risk 556, 557–8
- “regulatory arbitrage,” 559
- risk mitigation tools (limited recognition of) 559
- limits on risk-taking units 459–61
- linear discriminant analysis 287
- Altman's Z-scores (discriminant score applied to credit risk) 294–5
- discriminant function 287–9
- error costs 296–7
- estimation of gamma coefficients 311–12
- estimation of probability of default 295–6
- example 289–92
- other (more sophisticated) versions 299
- selection of discriminant variables 297–9
- underlying hypotheses 299
- Wilk's Lambda (measurement of success of discriminant model) 292–4
- linear payoff hypothesis and delta/gamma approach 148–51
- linear probabilistic model 299–301
- stages 300
- liquidity preference theory 30
- liquidity risk 663, 727
- loan portfolio optimization 461–2
- loan pricing 451–2
- economic capital absorbed by unexpected losses (cost of) 453–7
- expected loss cost 452–3
- loan sales 470–1
- logit model 301
- Lopez test based upon loss function 241–3
- losses (size of), real problem with VaR model 263–364
- Macauley duration 39
- mapping approach to credit rating quantification 380
- marginal default rate 380–2
- marginal gaps 15
- applications 17–18
- marginal VaR 421–2
- mark-to-market accounting 35–9
- mark-to-market (multinomial) models 439
- market discipline (Pillar Three of New Basel Capital Accord) 591
- additional necessary conditions 615–16
- rationale underlying market discipline 614
- required reporting obligations 614–15

- market factor changes (modeling freedom in)/shared feature of simulation model 185, 187–8
- market risk measurement 251
- modern approaches 109–12
- see also* expected shortfall (ES); Extreme Value Theory (EVT); hybrid approach; nominal values approach to market risk measurement; simulation models; value at risk (VaR) models
- traditional approaches 107–9
- market-risk VaR, and LEE (analogies and differences) 494–5
- market risks 105, 566
- categories 105–6
- reasons for gaining importance 106
- see also* capital requirements for market risks
- market segmentation hypothesis 31
- Markov process 147
- Markowitz, Harry, portfolio theory 722
- maturities, transformation of 3
- maturity-adjusted gap 12–15
- mean reversion* phenomenon 59
- measuring capital for individual business units 694–5
- measuring OR 517
- common problems encountered 517–18
- estimating capital at risk against OR 529–532
- estimating expected loss (EL) 524–7
- estimating losses 522–4
- estimating probability of risky events 519–22
- estimating unexpected loss (UL) 527–9
- HFLI (high frequency–low impact) vs. LFHI (low frequency–high impact) events 521
- identifying risk factors 518, 519
- mapping business units/estimating risk exposure 518, 520
- mapping process requirements 517
- probability distribution for OR losses 520–1
- risk quantification shortcomings (and mitigation for) 521–2
- see also* Extreme Value Theory (EVT)
- median financial ratios 373–4
- Merton, Robert, structural model based on stock prices 321–2
- Merton's model
- benefits 330
- general structure 322–4
- limitations 330–2
- loan value and equilibrium spread 326–7
- PD and RR relationship 364–7
- probability of default 328
- role of contingent claims analysis 324–6
- term structure of credit spreads and default probabilities 328–30
- migration risk (component of credit risk definition and type of credit risk) 277–8, 281
- migrations/"rating migrations," 380
- in actuarial approach 386–8
- model-based approach 695–6
- model harmonization issue 696–7
- risk-aggregation criteria issue 696
- risks not covered by the models issue 697
- "modified residual life" method 58, 60–1
- Monte Carlo simulations 188, 205–6
- advantages 214, 217–18
- in CreditMetrics™ model 420–2
- disadvantages 218
- estimating portfolio VaR (example) 209–14
- estimating the VaR of a single position (example) 207–9
- joint simulation with independent returns (example) 214
- in PortfolioManager™, 424
- simulation with correlated returns (example) 215–17
- use calculating bank's total economic capital 712
- VaR of a portfolio of two positions (example) 217
- Moody's 372
- definition of *default*, 385
- use of qualitative methods for creditworthiness determination 369
- Morexchange (multinational Operational Risk Exchange)*, 508, 520
- "mortality" data 380
- "mortality rate" approach 386
- multiple ITR system
- advantages 79–80
- example of differences from single ITR 80–4
- "negative skewness," 145
- net flow ITR system 79
- netting agreements 496
- neural networks 301–2
- example 302–4
- New Basel Capital Accord (2004) 4, 591
- additional requirements for banks in EU 588–9
- advantages 616–18
- disadvantages and open issues 618–19, 645–7
- goals and content of reform 591–2
- inclusion of capital requirement for operational risk 568
- 15 principles (2004)/discussion 4–5
- see also* impact of Basel II; internal ratings-based approach (New Basel Capital Accord); market discipline (Pillar Three of New Basel Capital Accord); standard approach to credit risk (Pillar One of New Basel Capital Accord); supervisory authorities/new role (Pillar Two of New Basel Capital Accord)
- Newton-Raphson method 179
- NII (net interest income) 9
- at risk*, 14
- duration*, 16

- effects of gaps and rate changes 11
- immunization policy 19
- nominal values approach to market risk measurement 107
 - adding sensitivity measures 107–9
 - advantages and limitations 107
- non-monotonic portfolio example 150–1
- non-subadditivity, real problem of VaR models 265–8
- the normal distribution hypothesis 144–7, 187
- normit model 301

- OpCapital*, 508
- operational risk (OR)
 - common databases 508
 - data collection and reporting instruments 507–8
 - operational loss events scope 511
 - reasons for growth of importance 507
 - see also* capital requirements on operational risk; OR definition
 - standardizing definition of (issues) 507, 511–12
- OpRisk*, 507–8, 520
- option contracts 157
- option pricing formulas 179–81
 - variables 179
- option sensitivity coefficients (“Greeks”) 157
 - delta coefficient 158–9
 - gamma coefficient 159
 - problems with 161
 - rho coefficient 160–1
 - theta coefficient and time decay of an option 159–60
 - vega coefficient 160
- OpVantage 520
- OR definition 512
 - peculiarities of OR 514–17
 - see also* measuring OR; OR management system; OR risk factors
- OR management system
 - embryonic stage of development of 535–6
 - objectives 533
 - options per risk type (keep/insure/hedge) 533–5
 - 10 basic principles for management of OR (Basel committee) 536–7
- OR risk factors 512–14, 515
 - examples of operational risk 513
 - external events 514
 - people 512–13
 - processes 514
 - systems 514
- ORX (*Operational Risk Exchange*) 508
- OTC (over-the-counter) derivatives 279, 464–9
 - credit risk types 278, 282
 - see also* counterparty risk on OTC derivatives
- parametric approach *see* variance-covariance approach
- path generation and bootstrapping 201–2
- PD (probability default) 279, 358
- PD ratings (issuer ratings) 369
 - differences based on bank or agency perspectives 371
- PE (peak exposure) 489–93
- percentile logic (shared feature of simulation model) 186–7
- period gaps 15
- plain vanilla swaps*, 97
- portfolio models (credit risk) 401
 - actuarial approach 428
 - asset correlation vs. default correlation 449
 - confidence level choice 405–6
 - macroeconomic approach 426
 - measurement of unexpected loss on credit portfolio 283
 - migration approach 406
 - “Model Behaviour” review (*The Economist*) 445–6
 - risk horizon choice 402–4
 - see also* CreditMetricsTM; CreditPortfolioViewTM; CreditRisk+TM; PortfolioManagerTM
 - structural approach 423
- portfolio models (credit risk) comparisons 439
 - asset correlation vs. default correlation 442
 - conditional vs. unconditional 441
 - default-mode vs. multinomial models 439
 - future values vs. loss rate 439–41
 - Monte Carlo simulation vs. analytical solution 441–2
- portfolio models (credit risk) limitations 442–3
 - assumption of independence/credit risk and market risk 444
 - assumption of independence/exposure risk and default risk 443
 - backtesting impossibility 444
 - recovery risk (treatment of) 443
- Portfolio Risk Tracker 401
- portfolio theory 722
- portfolio VaR 128–32
- PortfolioManagerTM, 402, 423–5
 - differences from CreditManagerTM, 424–5
 - overlaps with CreditMetricsTM, 423–4
 - structural approach 423
 - use of Monte Carlo simulation 424
- pre-commitment approach 583–5
- preference shares 655
- preferred habitats (theory of) 30–1
- pre-settlement or substitution risk (type of credit risk) 282
- “price volatility” concept 57

- probit model 301
- procyclicality and design of capital requirements 623–5
- proportion of failures test 233–8
 limitation 238
- “pseudorandom” number usage 207
- quadratic discriminant analysis 299
- RAP (risk-adjusted performance) measures 258–60
- RAR (risk asset ratio) 548
- Raroc (risk-adjusted return on capital) 259–60, 459
 adjusted RAROC 743–4
 criticisms of Raroc measures 721
 ex-ante and ex-post 715–16
 indicator 36
 standalone Raroc measures 720–1
 and value creation 750–3
- rating assignment 369
 assignment of agency ratings 372–6
 “delegated monitoring,” 370
 incentive systems 370–1
 internal vs. external (agency) ratings 371–2
 main factors 370
 main stages of agency’s rating assignment process 374–6
 rating assessment in bank internal rating system 376–9
see also credit rating agencies; rating quantification
 “trend analysis,” 370
- “rating drift,” 382
- rating quantification step (credit system)
 possible approaches 379–80
see also actuarial approach to credit rating quantification; mapping approach to credit rating quantification; statistical approach to credit rating quantification
- rating systems for creditworthiness 369
 construction and management of (steps) 369
 growing importance of 369
see also rating assignment step (credit system); rating quantification step (credit system); rating validation step (credit system)
- rating validation step (credit system) 388
 qualitative criteria 388
 quantitative criteria for validating rating assignments 389–96
 validation of rating quantification step 396–7
- recouping 501
- recovery risk (type of credit risk) 281, 356–8
 and default risk (link) 358–62
see also LGD and recovery risk
- reduced-form models 406, 444
- refinancing risk 3
- regression models 287
 linear probabilistic model 299–301
 logit and probit models 301
- “regulatory arbitrage,” 559
- regulatory capital
ability to absorb losses aspects 677, 679
 capital instruments/technical features 676–7, 678
 constraints 671–4
degree of subordination in event of crises, 679
 instruments (use of) examples 680–4
maturity considerations 677, 679
remuneration and cumulation, 679
 regulatory capital arbitrage and optimization 675–6
- regulatory capital requirements
 Basel Committee requirements 1988 /micro- and macroeconomic effects of 545–6
see also Basel Capital Accord (1988); capital requirements for market risks; capital requirements on operational risk; New Basel Capital Accord (2004)
 2004 reform of requirements 545
- “regulatory capture,” 583
- reinvestment risk 3
- Repo rate 86
- repricing gap model 8, 9
 guidelines 11
 limitation solutions 21–5 effects on value of assets and liabilities 25 non-uniform rate changes/standardized gap 20–3 on-demand instruments (changes in rates of) 23–4 price and quantity interaction 24–5
 limitations of 19–20
 repricing gap concept 10
- rho coefficient 160–1
- risk
 basis risk 46
 refinancing risk 3
 reinvestment risk 3
 risk-measurement methods 4, 756–7
see also Basel Committee on Banking Supervision; business risk; capital management and value creation; credit risk; interest rate risk; market risks; operational risk (OR); regulatory capital requirements
- risk-adjusted performance calculation (capital allocation)
 additional Raroc measures 718
 denominator 717–18
 ex-ante and ex-post Raroc 715–16
 numerator 716–717
- risk-adjusted performance measurement
 counterparty risk of OTC derivatives 495–6
 credit risk measurement models 457–9

- risk-adjusted performance (RAP) measures 258–60
 risk-adjusted return on capital (RAROC) 259–60
- risk analysis (business and financial) 373
 median financial ratios 373–4
- risk horizon 402
- risk management 654, 756
 integration in day-to-day bank management 5
 supervision by independent unit 5
- risk management systems, and involvement of senior management 4–5
- risk-mitigation tools for pre-settlement risk 496
 bilateral netting agreements 496–500
 credit triggers and early redemption options 501–4
 recouping and guarantees 501
 safety margins 500–1
- risk-neutral probability of default 343–4
- risk positions (mapping of)
 bonds 143
 foreign currency bonds 133–5
 forward currency positions 135–8
 forward rate agreements 139–40
 stock positions 140–3
- RiskMetrics model 57, 110
 VaR model 67
 and variance-covariance approach 115
- ROC (Receiver Operating Characteristic) curve 390
 sample dependency 395
see also AUROC (“area under ROC curve”)
- ROE (return on equity), use as a performance indicator 36
- SA (rate-sensitive assets) 9
- securitization process 106
- securitization schemes 469–70, 517, 559
- senior management, and risk management systems 4–5
- serial independence of returns hypothesis 126–7
- simple moving averages method (volatility estimation) 163–5
 problems 165–7
- simulation techniques approach/simulation models 185
 differences from variance-covariance approach 112
 problems and solutions 188
see also full valuation (shared feature of simulation models); historical simulations; market factor changes (modeling freedom in)/(shared feature of simulation models); Monte Carlo simulations; percentile logic (shared feature of simulation model); stress tests; value at risk (VaR) models
 shared features 185–8
- simulated distribution deviation from normal conditions 187
- SL (rate-sensitive liabilities) 9
- special purpose vehicle (SPV) 469–79
- spread risk, type of credit risk 281
- standard approach to credit risk (Pillar One of New Basel Capital Accord) 593
 collateral and guarantees 596–7
 risk weighting 593–6
- Standard & Poor’s 372
 definition of *default*, 385
 “Portfolio Risk Tracker,” 401
 use of qualitative methods for creditworthiness determination 369
 “standard shock,” 3
- statistical approach to credit rating quantification 379–80
- stockmarket betas 154
 and CAPM 154–5
 estimation of a stock’s beta 155–6
- straddle example *see* non-monotonic portfolio example
- stress tests 188, 218
 advantages 221
 extreme scenarios method 218–19
 factor push analysis (FPA) techniques 219
 guidelines from the Derivative Policy Group 219
 “multidimensional” approaches/*simple or predictive* scenarios 219–20
 requirements for 220
 simulating shocks 219
- strike rate*, 98
- structural models based on stock prices 321–2
see also KMV model; Merton’s model
- Student’s t-distribution 145–6
- substitution risk 474
- supervisory authorities/new role (Pillar Two of New Basel Capital Accord) 612–13, 612–14
 fundamental principles 613
- supplementary capital *see* Tier 2 and 3 capital swaption 88–9
- tangent method 179
- term structure 57
 bootstrapping 58
 objectives 57–8
 vertices (considerations for choosing) 58–9
- theta coefficient 159–60
- Tier 2 and 3 capital (supplementary) T2/T3, 549, 552–4, 568, 658
- Tier 1 capital (T1) 549, 549–52, 658
- time horizon selection (VaR models) 124
 factors for consideration 124–5
 volatility estimations (techniques for) 125–6
- trading book 4, 594, 567–8, 579
- trait recognition analysis 287

- transition matrices 380
- triangular matrix 211
- TROR (total rate of return) swap 467

- unbiased expectations (theory of) 28–30
- unexpected loss (UL) 280–1
- unexpected/unforeseen risk (component of credit risk definition) 278
- uniform distribution density function definition 207

- value at risk (VaR) models
 - confidence level selection 121–4
 - derivation (simplified example/normal return distribution) 115–21
 - history 110
 - key elements 110
 - limitations 113
 - non-subadditivity (real problem) 265–8
 - objectives 111
 - portfolio VaR 128–32
 - see also* applications of VaR models; evaluating VaR models; “false shortcomings” of VaR; simulation techniques approach; variance-covariance approach
 - size of losses (real problem with model) 263–4
 - time horizon selection 124–6
- variance-covariance approach 111–12, 143–4
 - assumptions 163
 - comparison with historical simulation approach (example) 195–6
 - delta-normal and asset-normal approaches 132–3
 - disadvantages (underlying hypotheses) 115
 - limitations and correctives 144–51
 - portfolio VaR 128–32
 - reason for spread of 115
 - see also* value at risk (VaR) models
 - sensitivity of portfolio positions to market factors 126–7
 - and serial independence and stability 147–8
 - vega coefficient 160
 - volatility estimation models 163
 - see also* covariance and correlation estimation; historical data models; implied volatility
 - volatility risk 106
 - “volatility smile,” 180
 - “volatility weighted” approach 203
- weighted average cost of capital (WACC), 736–7
- Wiener process 147
- Wilk’s Lambda (measurement of success of discriminant model) 292–4

- yield curve 11, 57–8, 64, 76, 572, 580

- z score 288–9
- zero-coupon curve 28, 58
 - estimating 71–6
 - example 57–8
 - nodes/vertices 58, 59