

Index

- Adjusted R^2 , 162, 220, 236, 239, 272, 310, 523
- adjustment parameters, 367
- arbitrage, 64, 146, 205, 272, 277, 359, 364, 472, 475, 574
- arithmetic progression, 67
- autocorrelation, 189, 190, 193, 205, 207, 233, 248, 270, 359, 386, 395, 450, 507, 547, 555
- coefficients, 248, 249, 254
- function (acf), 248, 254, 257, 262, 263, 265, 343, 380
- in cross-sectional data, 208
- in volatility, 393
- autocovariances, 248, 252, 260, 334
- autoregressive (AR) model, 254, 262, 267, 278, 283, 288, 337, 346, 448, 473, 476
- autoregressive conditional duration (ACD), 4
- autoregressive conditional heteroscedasticity (ARCH) models, 185, 213, 386, 392, 399, 429
- autoregressive distributed lag (ADL) models, 204
- autoregressive integrated moving average (ARIMA) models, 246, 272, 288
- autoregressive moving average (ARMA) models, 263, 269, 270, 272, 276, 288, 327, 361, 379
- autoregressive volatility (ARV) models, 391, 564

- backshift operator, *see* lag operator
- balanced panel
- banking competition, 496
- Bayes theorem, 47
- BDS test, 386, 562
- BEKK model, 430, 433, 436
- Bera–Jarque test, 209, 403
- best linear unbiased estimators (BLUE), 107, 186

- beta distribution, 597
- between estimator, 494
- BHHH algorithm, 402
- biased estimator, 111
- bicorrelation test, 387, 562
- bid–ask spread, 273, 307, 448, 458, 530
- bispectrum test, 387
- bivariate regression, 146, 149, 212, 219, 400, 440
- block maxima approach, 602
- block maximum approach, 594
- block significance tests, 319
- bootstrapping, 172, 552, 561
- Box–Jenkins approach, 269, 276, 391
- Box–Pierce Q-statistic, 250, 562
- Breusch–Godfrey test, 198
- broken trend, 347
- buy-and-hold abnormal return (BHAR), 580

- calendar effects, 449
- capital asset pricing model (CAPM), 146, 585
- capital market line, 85
- Carhart model, 592
- causality tests, 319
- censored dependent variable, 539
- central limit theorem, 46
- central tendency, 49
- chain rule, 23
- chaos theory, 387
- characteristic equation, 35, 263
- chi-squared distribution, 46, 411, 639
- Chow test, 222, 223, 227, 228, 272
- classical linear regression model (CLRM), 173, 182
- assumptions, 106, 139, 293
- violations of, 272
- Cochrane–Orcutt procedure, 200

- coefficient estimators, 100, 110, 117, 139, 149, 173
 standard errors of, 120
 coefficient of variation, 55
 cointegrating regressions, 34, 351, 355, 356, 360, 373, 375, 379, 510, 511, 513, 644
 Durbin–Watson (CRDW) statistic, 355, 373, 643
 cointegrating vector, 645
 cointegration, 351, 358, 360, 371
 tests, 365, 379, 504
 commodity prices, 288, 435
 common difference, 67
 common factor restrictions, 202
 common ratio, 67
 compounding, 70
 conditional covariance, 424, 428, 431, 435, 436
 conditional expectations, 280, 281
 conditional kurtosis, 422
 conditional skewness, 422
 conditional variance, 399, 422, 424, 428, 431, 433–435, 440, 546, 563
 conditional variance-in-mean, 435
 confirmatory data analysis, 347
 consistency, 108
 constant term, 147
 contemporaneous terms, 318
 continuously compounded returns, 77
 convergence criterion, 402
 copulas, 58
 correlation, 57, 159, 262, 431
 implied, 424, 426
 matrix, 429
 positive definite matrix, 426, 429, 430
 correlation coefficient, 159, 248, 249
 correlogram, *see* autocorrelation function (acf)
 cost of carry (coc) model, 353, 359, 361
 covariance, 57
 covariance stationary process, *see* weakly stationary process
 covered interest parity (CIP), 272
 credit rating, 64, 530, 532
 critical values, 45, 118, 125, 197, 344, 347, 350, 355, 367, 472, 558
 cross-equation restrictions, 316
 cross-sectional regression, 208, 231, 236, 490, 577, 588, 590, 592
 cross-sectional variability, 208, 230, 238, 490, 509, 578
 cumulative abnormal return (CAR), 576, 579, 580, 584
 cumulative normal distribution, 522, 529
 CUSUM and CUSUMSQ tests, 229
 daily range estimators, 391
 daily volatility estimate, 391
 damped sine wave, 267
 data, 4, 235, 450, 623, 632
 cross-sectional, 64
 macroeconomic, 238
 panel, 65, 490
 qualitative/quantitative, 63, 66
 time-series, 63
 transformed, 189
 data frequencies, 358
 data generating process (DGP), 103, 221, 342, 346, 366, 386, 548, 556, 561
 data mining, 157, 234
 data revisions, 3
 data snooping, *see* data mining
 day-of-the-week effect, 450, 458
 degree of uncertainty, 110
 degrees of freedom, 46, 54, 118, 122, 149, 151, 163, 183, 270, 317, 345, 423, 433, 494, 633, 639
 degrees of persistence, 564
 dependent/independent variable, 516
 inertia of, 204
 deterministic trend, 339, 347, 507, 510
 Dickey–Fuller (DF) test, 343, 346, 351, 504
 augmented (ADF), 346, 513
 critical values, 346, 351, 558, 643
 differencing, 315, 338, 342, 351
 differential calculus, 19
 differentiation, 19, 23
 discount rate, 72
 discrete choice, *see* multiple choice
 distributed lag models, 203
 disturbance term, 104, 106, 110, 189
 domain, 7
 double logarithmic form, 102
 dummy variables, 163, 210, 224, 240, 351, 450, 454, 495, 500, 517, 532
 dummy variable trap, 451, 516
 Durbin–Watson test, 193, 355, 371, 641

- dynamic conditional correlation (DCC) model, 431
- dynamic models, 203, 208
- econometric model, 2, 277
 construction, 4, 231
 evaluation, 423
- efficient estimator, 108
- efficient frontier, 85
- efficient market hypothesis, 476
- eigenvalues, 34, 175, 365, 377, 379
- eigenvectors, 34, 366, 369
- elasticities, 104, 496
- empirical research project, 617
 choice of software, 625
 choice of topic, 618
 data for, 623
 forms of, 620
 originality, 620
 outline, 622, 626
 purpose, 617
 results, 623
 structure, 572, 625, 630
- encompassing principle, 167, 233
- encompassing regressions, 163, 415
- Engle–Granger test, 355, 356, 358, 371, 510, 644
- Engle–Ng test, 406
- equilibrium correction model, *see* error correction model
- error correction model, 353, 355, 358, 364, 474
- error term, 110, 117, 167, 189, 230, 306, 419, 491, 500
 variance of, 392, 408
- errors-in-variables, *see* measurement error
- estimation techniques, 304, 306, 399, 457, 470, 522
 full information maximum likelihood (FIML), 307
 indirect least squares (ILS), 304
 instrumental variable (IV), 306
 two-stage least squares (SLS), 304
- estimators, 107
- event study, 571, 578
 biased/unbiased, 583
 standard error, 582
- exceedence, 606
- exchange rate, 272, 277, 349, 352, 370, 461, 472, 561
- exogeneity, 293, 300, 329
- expectations hypothesis, 377, 379
- explained sum of squares (ESS), 160
- exponent, 13
- exponential distribution, 597
- exponential function, 13
- exponential growth model, 219
- exponential regression model, 105
- exponential smoothing, 274
- exponential weighting, 275
- exponentially weighted moving average (EWMA) models, 390, 426
- extreme value theory, 423, 592, 606
- F-test, 151, 166, 316, 322, 327, 411
- factor loadings, 176, 178, 591
- Fama–French approach, 590, 625
- Fama–MacBeth procedure, 588, 592
- financial data, 450, 490, 623
- financial modelling, 386, 490
 returns in, 77
- financial options, 390, 408, 558
- fitted value, 98, 104, 160, 504, 517, 523, 525, 542
- fixed effects, 492, 493, 496, 502, 504
- forcing variable, 246, 462
- forecast accuracy, 284, 358, 388, 413, 477
- forecast encompassing, 167, 413
- forecast error, 284, 288, 325, 472
- forecasting, 277, 320, 362, 408, 413, 423, 424
 ARMA models, 281, 288
 autoregressive process, 283
 in-sample/out-of-sample, 278
 moving average process, 281
 one-step-ahead/multi-step-ahead, 278
 structural, 280
 time series, 280
- forward rate unbiasedness (FRU), 273
- fractionally integrated models, 379
- Fréchet distribution, 594
- functional form, misspecification of, *see* RESET test
- functions, 7
- future value, 68

- Gaussian distribution, 43
 general-to-specific methodology, 231, 396
 generalised autoregressive conditional
 heteroscedasticity (GARCH) models, 396,
 399, 413, 440, 560
 exponential (EGARCH), 413, 562
 factor, 429
 in-mean (GARCH-M), 408
 integrated (IGARCH), 398, 426
 orthogonal, 429
 generalised error distribution (GED), 406
 generalised extreme value distribution, 594
 generalised least squares (GLS), 117, 189, 491,
 500, 582
 generalised method of moments (GMM), 607
 generalised Pareto distribution, 595
 generalised unrestricted model (GUM), 233
 geometric mean, 50
 geometric progression, 67
 gilt–equity yield ratio (GEYR), 464
 GJR model, 404, 406
 Goldfeld–Quandt test for heteroscedasticity,
 185
 goodness of fit, 159, 523
 gradient, 7
 Granger representation theorem, 319, 327, 331,
 355
 Gumbel distribution, 594
- Hadamard product, 432
 Hamilton’s filter, 459
 Hausman test, 301, 502, 503
 Heckman procedure, 542
 hedge ratios, 424, 435
 hedonic pricing models, 163
 heteroscedasticity, 15, 184, 392
 conditional, 400
 higher moments, 55
 higher order derivatives, 22
 Hill estimator, 599
 Hill plot, 599
 historical covariance, 426
 homoscedasticity, 184, 392, 400, 440
 hyperparameters, 482
 hypothesis testing, 116, 129
 confidence interval, 123
 error classification, 127
 Lagrange multiplier (LM) test, 183, 187, 411
 likelihood ratio (LR) test, 316, 412
 significance level, 120, 127, 138, 327, 643
 test of significance approach, 120
 under maximum likelihood, 307, 399, 403,
 411, 440, 542
 Wald test, 139, 156, 183, 411
- identification, 269, 271
 order condition, 297
 rank condition, 297
 implied covariance, 426
 implied volatility models, 390, 413
 impulse responses, 322, 329, 331, 375
 independence of irrelevant alternatives, 528
 information criteria, 167, 317
 adjusted R^2 , 272
 Akaike’s (AIC), 271
 Hannan–Quinn (HQIC), 271
 Schwartz’s Bayesian (SBIC), 271
 integration, 28
 intercept, 7, 141, 147, 452, 459, 492, 493, 495,
 500, 510, 581, 586, 589
 interest rates, 177, 272, 326, 349
 term structure of, 205, 377
 internal rate of return, 75
 inverse function, 15
 inverse of a matrix, 32
 invertibility, 263
- J-test, 610
 Jensen’s alpha, 131, 586
 Johansen test, 34, 357, 365, 369, 373, 378,
 379, 510, 513, 645
 jumps, 415, 558
- Kalman filter, 477, 482, 483
 Kalman gain, 482
 Kalman smoother, 482
 KPSS test, 347, 509
 kurtosis, 55, 209, 210, 422
- lag lengths, 203, 256, 315–317, 327, 345, 361,
 365, 470, 564
 lag operator, 251, 256, 342
 lagged regressors, 207
 lagged value, 189, 204, 207, 275, 313, 327, 415
 Lagrange multiplier (LM) test, 183, 187, 411,
 430

- lags number of, 204, 207, 275, 313, 415
 large sample property, 108, 200
 laws of logs, 15, 105
 lead–lag relationships, 331, 358, 474
 least squares dummy variables (LSDV), 493, 495
 leptokurtosis, 385, 403, 404, 422, 423
 leverage effects, 385, 404
 likelihood function, 307, 400, 411, 433, 441, 444
 likelihood ratio (LR) test, 316, 412
 linear models, 94, 105, 106, 146
 linear probability model, 517, 522
 linearity, 105
 Ljung–Box test, 249
 location parameter, 596
 log-likelihood function, 598
 log-likelihood function (LLF), 399, 411, 430, 441, 522, 525, 545
 log–return formulation, 78
 logarithms, 14
 logit model, 519, 520, 530
 comparison with probit, 522
 estimation of, 529, 545
 measuring goodness of fit, 523
 parameter interpretation, 524
 logs, 14
 long-memory models, 379
 long-run static solution, 34, 206
 loss function, *see* residual sum of squares (RSS)
 Lyapunov exponent, 388
- macroeconomic indicators, 3, 175, 235, 238, 325, 387, 503
 marginal distribution, 58
 marginal effects, 524
 market microstructure, 4, 204, 299, 307, 448
 market reaction, 582
 market returns, 326, 418, 424, 591
 market risk premium, 95, 101, 136, 450, 586, 589
 market timing, 361
 Markov switching regime, 449, 459, 471, 477
 Marquardt algorithm, 403
 matrices, 28
 eigenvalues of, 34
 matrix notation, 84
- maximum likelihood, 307, 400, 403, 411, 440, 482, 542, 545, 598
 measurement equation, 480
 measurement error, 3, 230, 588
 median, 49, 53, 55, 169
 method of moments, 607
 minimum capital risk requirement, 600
 minimum capital risk requirement (MCRR), *see* value-at-risk
 misspecification error, 206, 217, 427
 misspecification tests, 183
 misspecified dynamics, 203
 mode, 49, 55
 model construction, 4, 272
 model interpretation, 318
 moment condition, 607
 moving average process, 251, 257, 263, 265, 281, 390
 multicollinearity, 213, 216, 491
 perfect, 213, 451, 493
 multimodalities, 400
 multinomial logit, 525, 528–530
 multinomial probit, 527, 528, 530
 multiple choice, 526, 529
 multiple linear regression, 146
 multivariate GARCH models, 427, 433, 434, 437
- Naperian, 15
 near, 214
 neural network models, 388
 Newey–West estimator, 203
 Newey–West procedure, 203
 news impact curves, 406
 Newton–Raphson procedure, 390, 414
 nominal series, 79
 non-linear least squares (NLS) procedure, 470, 524
 non-linear models, 219, 386, 411
 non-linear restrictions, 411
 non-negativity, 394, 396, 404
 non-nested models, 167
 non-normality, 210, 403, 582
 non-parametric, 599
 non-stationarity, 336, 353, 398
 deterministic, 336
 random walk with drift, 336
 stochastic, 339

- testing for, 334, 355, 373
- trend-stationary process, 336, 337
- unit root, 344, 509

- observation frequencies, 64, 205, 246
- observations
 - daily closing, 373
 - number of, 3, 16, 48, 65, 100, 147, 157, 224, 229, 504
- optimal portfolio, 84, 85
- options price, 308, 408, 561
- order of integration, 351, 378
- ordered response variable, 530
 - ordered logit, 530
 - ordered probit, 532
- ordinal scale, 66
- ordinary least squares (OLS), 26, 97, 107, 108, 186, 188
 - coefficient estimator, 97, 102, 139
 - intercept, 141
 - multiple regression, 141
 - slope, 7
 - standard error estimator, 141
 - time series regression, 131
- out-of-sample, 84, 158, 278, 284, 362, 413, 436, 468, 477
- outliers, 210, 233, 285, 555, 582
- overfitting, 270
- overreaction effect oversized tests, 134, 205

- p-value, *see* hypothesis testing: significance level
- panel cointegration, 510
- panel data analysis, 65, 490, 509
- panel unit root test, 504
- parameter, 7
- parameters, 149, 524
 - estimations, 356, 440, 464
 - stability tests, 222
- Pareto distribution, 597
- parsimonious encompassing, 233
- parsimonious model, 233, 270, 397, 440
- partial autocorrelation function (pacf), 262, 264, 386
- partial differentiation, 26
- partial regression coefficient, 146
- peaks over threshold approach, 595
- pecking order hypothesis, 520, 529

- penalty term, 163, 271, 317
- percentile, 52
- period effects, *see* time fixed effects
- Phillips–Perron tests, 346, 355, 504
- pi notation, 18
- piecewise linear model, 457
- point of inflection, 23
- polynomial, 10
- pooled sample, 215, 494, 511, 532
- population, 48, 110
 - coefficient, 360
 - disturbances, 110, 189
- population regression function (PRF), 103, 160, 280
- population values, 115, 157
- portfolio theory, 82
- portmanteau tests, 250, 386
- position risk requirement, *see* value-at-risk (VaR)
- power, 13
- precision, 110
- prediction, *see* forecasting
- predictive failure test, 224, 227
- present value, 68, 72
- price deflator, 80
- principal components analysis (PCA), 175, 215
- probabilities, 41, 47, 440, 527
- probability, 42
- probability density function (pdf), 42, 460, 517
- probability distribution, 41, 42, 95, 117, 460, 548
- probability distribution function, 42
- probit model, 519, 520, 531
 - comparison with logit, 522
 - estimation of, 529, 545
 - measuring goodness of fit, 523
 - parameter interpretation, 524
- product, 21
- property returns, 325
- pseudo R^2 , 525
- pseudo-random numbers, 556
- purchasing power parity (PPP), 353, 370, 462, 506

- quadratic, 11
- qualitative variables, *see* dummy variables
- Quandt likelihood ratio test, 228
- quantile, 52, 170, 645

- quantile regression, 168
 quasi-demeaned data, *see* random effects
 quasi-maximum likelihood (QML), 403, 440
 quotient, 21
- R^2 , 159, 166, 167, 184, 200, 220, 413, 523
 $R\text{-bar}^2$, 162, 220, 236, 239, 272, 310, 523, *see*
 adjusted R^2
- random draws, 548, 557, 562
 random effects, 492, 500, 502, 504
 random number generation, 556
 random number re-usage, 551
 random walk, 284, 336, 342, 343, 462, 473,
 562
 range, 7, 53
 rank (of a matrix), 32
 ratings, 234, 525, 530, 532
 announcements, 234
 rational expectations, 342
 re-sampling
 from data, 554
 from residuals, 555
 real series, 79
 reality check test, 554
 recursive forecasting model, 279
 recursive least squares, 229
 regime switching, 447, 460, 471, 477
 regression analysis, 94, 120, 123
 rejection region, 120, 123, 157, 193
 relationship between variables, 57, 157, 277
 renormalisation, 351
 RESET test, 217, 220
 residual diagnostics, 270
 residual sum of squares (RSS), 287
 residual term, 104
 restricted/unrestricted model, 316, 361, 369,
 413
 restricted/unrestricted regressions, 151, 163,
 222, 412
 restrictions number of, 413
 restrictions, number of, 151, 183, 222,
 369
 returns on shares, 77
 risk management, 561
 risk measurement, *see* volatility
 risk premium, 90, 326, 377, 408, 586
 risk–return relationship, 224
 riskless arbitrage opportunities, 273
- rolling window, 279, 588, 591
 roots, 11
- sample, 48, 251, 265
 sample moment, 607
 sample regression function (SRF), 103, 159
 sample selection bias, 532
 sample size, 46, 108, 157, 183, 200, 208, 210
 sampling error, 157, 549
 scalar, 28
 scale parameter, 596
 scatter plot, 95
 seasonal unit root, 350
 seasonality, 205, 449, 450
 second moment models, 55, 422
 seemingly unrelated regression (SUR), 491
 self-selection bias, *see* sample selection bias
 semi-interquartile range, 53
 sensitive dependence on initial conditions
 (SDIC), 387
 sequence, 67
 shape parameter, 596
 Sharpe ratio, 89, 468
 shocks, 268, 323, 331, 335, 337, 374, 404, 406,
 434, 438
 short-selling, 475
 shuffle diagnostic, 553
 sigma notation, 15, 82, 176, 251
 sign and size bias tests, 406
 sign predictions, 287
 significance level, 120, 127, 138, 327, 643
 simple bivariate regression model, 146, 159,
 400
 simple returns, 77
 simulation experiments, 546
 disadvantages, 556
 simulation methods, 546
 Monte Carlo, 547
 simultaneous equations, 230, 258, 297, 299,
 304, 307
 size of test, *see* significance level
 skewness, 55, 209, 210, 422
 slippage time, 364
 slope, 141, 147, 452, 457, 459, 491, 493, 495,
 500, 510, 581, 586, 588
 small sample problems, 3, 108, 183, 249, 346,
 582
 sovereign credit ratings, 234, 532

- sovereign yield spreads, 238
 spatial lag, 208
 Spearman's rank correlation, 58
 specific-to-general modelling, 232
 spline techniques, 457
 spot return forecasts, 358, 361, 424
 spot/futures markets, 476
 spurious regressions, 335
 squared daily returns, 391, 418
 squared residuals, 98, 217
 stable distributions, 423
 standard deviations, 54
 standard errors, 110, 111
 state equation, 480
 state space models, 477, 483
 stationarity, 252, 379
 difference, 315, 338, 342, 351
 stochastic, 336
 testing for, 347
 weak, 335
 stationary point, 20
 statistical decision rule, 116
 statistical inference, 115
 stochastic regressors, 198, 208
 stochastic trend model, 336, 337, 342
 stochastic volatility (SV) model, 391, 419, 439
 stock index, 414, 435, 474, 573
 futures markets, 359, 424, 474
 log of, 414
 stock return, 414, 435
 predictability, 325, 450
 strictly stationary process, 247
 structural break, 228, 229, 462, 504
 structural change, 227, 346, 449
 structural equations, 295, 297, 306
 structural models, 246, 280
 Student's *t* distribution, 422, 423, 433, 633
 summary statistics, 58
 switching models, 447
 switching portfolio, 468
- t*-ratio, 129, 130, 524
t-test, 131
 tail index, 596
 tangent to a curve, 20
 threshold autoregressive (TAR) models, 447,
 468, 471, 474
 self-exciting (SETAR), 472
- smooth transition (STAR), 468
 tick size, 309
 limits, 458
 time fixed effects, 492, 495
 time-series models, 312, 408, 547
 univariate, 246
 time-series regressions, 208, 581, 586, 591
 time-varying beta, 482
 time-varying covariances, 434, 435, 588
 time-varying stock market risk premiums, 450
 tobit regression, 539, 541
 total sum of squares (TSS), 159, 523
 trace (of a matrix), 34
 trading rules, 362, 464, 553
 trading strategies, 362, 424
 transaction costs, 475
 transition probabilities, 461
 transpose (of a matrix), 32
 truncated dependent variable, 537, 541
 turning point, 20
- unbalanced panel, 493
 unbiasedness, 107, 108, 186, 273
 unconditional density model, 566
 uncovered interest parity (UIP), 272
 uniform distribution, 43, 556
 unit roots testing for, 334
 unparameterised seasonality, 205
 utility, 25
- value-at-risk (VaR), 561, 600, 606
 Monte Carlo approach, 561
 variable, 7
 variables
 dummy, 163, 210, 213, 222, 224, 240, 351,
 451, 454, 495, 500, 517, 532
 exogenous, 293, 301, 314, 322
 explanatory, 146, 157, 163, 168
 irrelevant, 221
 macroeconomic, 163, 210, 213, 222, 224,
 240, 350, 452, 454, 495, 500, 517, 532
 omission of, 204, 220
 ordering of, 322, 331, 373
 random, 41, 66, 111, 157, 209
 slope dummy, 454
 state-determining, 469
 variance decompositions, 329, 331
 variance forecasts, 398, 408

- variance operator, 62
- variance reduction techniques, 548
 - antithetic variate, 549
 - control variates, 550
 - quasi-random sequences, 550
- variance–covariance matrix, 82, 86
 - conditional, 427
- VECH model, 427
 - diagonal, 429
- vector, 28
- vector autoregressive (VAR) models, 312
- vector autoregressive moving average (VARMA) models, 312
- vector moving average (VMA) model, 323
- volatility, 384
 - asymmetries in, 406
 - clustering, 385, 392
- feedback hypothesis, 404
- forecasting, 408, 413
 - historical, 389
 - implied, 390
 - response to shocks, 438
 - Wald test, 139, 156, 183, 411
- weakly stationary process, 247
- Weibull distribution, 594
- weighted least squares (WLS), 188
- white noise process, 248, 336
 - error term, 491
- White’s test, 186
- within transformation, 494
- Wold’s decomposition theorem, 257
- yield curves, 457
- Yule–Walker equations, 258