

Index

- ($a, b, 0$) class, 14
absolute-error loss function, 204
accelerated failure-time model, 335
acceptance–rejection method, 378
accident year, 422
adjusted exposure, 460
adjustment coefficient, 139
age at death, 60
age-at-death random variable, 39
aggregate loss, 78
Ahrens method, 385
Akaike information criterion, 362
alternative hypothesis, 360
Anderson–Darling test, 358
antithetic variable method, 390

Bühlmann credibility, 169
Bühlmann credibility factor, 183
Bühlmann credibility parameter, 183
Bühlmann premium, 183
Bühlmann–Straub credibility model, 185
bandwidth, 279
Basel Accord, 107
baseline hazard function, 329
baseline pdf, 330
baseline survival function, 328
Bayes estimator, 204
Bayesian information criterion, 362
Bayesian premium, 206
beta distribution, 201
binomial distribution, 6
bootstrap approximations, 413
bootstrap method, 406
Bornhuetter–Ferguson method, 429
box kernel, 280
Box–Muller method, 384

bulk reserve, 423
calendar year, 422
case reserve, 423
Cauchy distribution, 312
Cauchy–Schwarz inequality, 309
censored distribution, 60
censoring, 262
chain-ladder method, 426
chi-square distribution, 359
chi-square goodness-of-fit, 358
Choleski decomposition, 382
claim frequency, 4
claim severity, 4
claim size, 4
classical credibility approach, 150
Clayton’s copula, 338
closure method, 434
coefficient of variation, 157
coherent risk measure, 109
coinsurance, 65
collective risk model, 78
compound distribution, 19
compound Poisson distribution, 20
concave down, 123
conditional expectation, 51
conditional tail expectation, 56, 113
conditional VaR, 113
confidence interval, 257
confidence parameter, 152
conjugate pair, 209
conjugate prior distribution, 210
consistency, 258
continuous mixture, 31
continuous random variable, 4
control variable, 392

- convergence in probability, 258
- convolution, 20, 80
- copula, 336
- copula density, 338
- cost per loss, 59
- cost per payment, 59
- covariates, 328
- coverage probability, 152
- Cox's proportional hazards model, 328
- Cramér–Rao inequality, 317
- Cramér–Rao lower bound, 317
- credibility
 - full, 151
 - partial, 151
- credibility factor, 150
- credit risk, 106
- critical region, 355
- crude Monte Carlo, 390
- cumulative hazard function, 39
- data
 - age-at-death data, 260
 - complete individual data, 261
 - duration data, 260
 - failure-time data, 260
 - length-of-time data, 260
 - life-contingent data, 260
 - loss data, 261
 - survival-time data, 260
- De Pril Recursion, 83
- decumulative distribution function, 38
- deductible, 59
- deficit per period, 140
- development year, 424
- diagnostic checks, 355
- discrete mixture, 30
- discrete random variable, 4
- distortion function, 122
- distribution function (df), 4
- earned premium, 422
- economic capital, 106
- effective loss ratio, 450
- empirical Bayes method, 229
- empirical distribution
 - mean of the empirical distribution, 275
 - variance of the empirical distribution, 275
- empirical distribution function, 276
- empirical survival function, 276
- Erlang distribution, 45
- Esscher transform, 121
- estimation-function method, 312
- exact credibility, 216
- excess-loss variable, 60
- expected future lifetime, 60
- expected loss ratio, 424
- expected value, 478
- expected value of the process variance, 172
- expected-value principle premium, 107
- expected waiting time, 44
- exponential distribution, 44
- failure rate, 38
- Fisher information, 316
- Fisher information matrix, 318
- force of mortality, 38
- Fréchet bounds, 337
- franchise deductible, 60
- Frank's copula, 338
- gamma distribution, 45
- gamma function, 45
- Gaussian copula, 339
- Gaussian kernel, 280
- generalized linear model, 334
- generalized method of moments, 312
- geometric distribution, 7
- greatest accuracy approach, 179
- Greenwood approximation, 288
- gross IBNR reserve, 423
- ground-up loss, 59
- group differential, 457
- hazard function (hf), 38
- hazard rate, 38
- hit-or-miss estimator, 398
- hyperparameter, 200
- hypothetical mean, 172
- importance sampling, 394
- incomplete gamma function, 388
- incurred but not reported, 423
- individual risk model, 78
- initial surplus, 132
- inter-arrival time, 44
- interval estimator, 256
- invariance principle, 319
- inversion method, 375
- Kaplan–Meier (product-limit) estimator, 283
- kernel density estimation method, 279
- kernel estimate, 280
- kernel function, 280
- Kolmogorov–Smirnov statistic, 356

- least mean squared error, 180
- least squares approach, 179
- left truncated, 263
- level of significance, 355
- likelihood function, 200, 316
- likelihood ratio statistic, 360
- limited-fluctuation credibility, 150
- limited-loss variable, 65
- limiting ratio, 54
- linear confidence interval, 289
- linear exponential distribution, 216
- linear predictor, 179
- link function, 334
- link ratio, 426
- log-likelihood function, 316
- logarithmic transformation method, 290
- lognormal distribution, 48
- loss cost method, 450
- loss elimination ratio, 64
- loss event, 59
- loss function, 204
- loss ratio method, 450
- loss adjustment expenses, 449
- loss-amount variable, 59
- low-discrepancy sequences, 374
- Lundberg inequality, 139
- majorizing density, 379
- majorizing function, 379
- manual rate, 150
- market risk, 106
- Marsaglia–Bray method, 384
- maximum covered loss, 66
- maximum likelihood estimator (MLE), 316
- mean excess loss, 61
- mean residual lifetime, 60
- mean shortfall, 114
- mean squared error, 181, 258
- method-of-moments, 308
- method of percentile or quantile matching, 312
- minimum variance unbiased estimator, 257
- misspecification tests, 355
- mixed distribution, 40
- mixed-congruential method, 372
- mixing distribution, 29
- mixture distribution, 28, 29
- modulus, 372
- moment generating function (mgf), 5
- monotonicity, 109
- Monte Carlo method, 371
- moral hazard, 59
- multinomial distribution, 12
- multinomial MLE, 359
- multiplicative-congruential, 372
- multiplier, 372
- multivariate normal distribution, 318
- natural conjugate, 217
- negative binomial distribution, 8
- Nelson–Aalen Estimator, 291
- no ripoff, 109
- no unjustified loading, 109
- non-negative definite matrix, 318
- nonparametric bootstrap, 409
- null hypothesis, 355, 360
- numerical integration, 374
- ogive, 295
- operational risk, 106
- ordinary deductible, 60
- orthogonality condition, 312
- Panjer recursion, 88
- parallelogram method, 453
- parametric bootstrap, 410
- Pareto distribution, 47
- partial likelihood function, 331
- partial likelihood method, 330
- partial-credibility factor, 162
- payment event, 59
- payment-amount variable, 59
- penalized log-likelihood, 362
- period of the generator, 373
- period of the seed, 373
- permissible loss ratio, 424
- point estimator, 256
- Poisson distribution, 11
- policy limit, 65
- policy year, 422
- positive homogeneity, 109
- posterior pdf, 200
- precision parameter, 152
- premium, 448
- premium loading factor, 107
- premium principle, 107
- premium-based risk measures, 107
- primary distribution, 19
- principle of parsimony, 361
- prior distribution, 200
- prior pdf, 200
- probability density function (pdf), 4
- probability function (pf), 4
- probability generating function (pgf), 5
- probability integral transform, 375

- probability integral transform theorem, 375
process variance, 172
proportional hazard transform, 118
pseudo-random numbers, 372
pure IBNR, 423
pure premium, 107
p-value, 355
- quadratic loss function, 204
quantile function (qf), 55
quantile function theorem, 375
quasi-Monte Carlo methods, 374
quasi-random numbers, 374
quasi-random sequences, 374
- random numbers, 372
random sample, 317
RANDU, 373
rectangle inequality, 337
rectangular kernel, 280
regularity conditions, 316
reported but not recorded (RBNR), 423
right censored, 263
risk-adjusted premium, 121
risk management, 106
risk measures, 106
risk set, 261
risk-aversion index, 118
- Schwarz information criterion, 362
secondary distribution, 19
seed, 372
Semiparametric approach, 229
shortfall, 114
significance test, 355
Sklar Theorem, 337
splicing, 52
square-root rule, 163
squared-error loss function, 204
stable distribution family, 312
standard for full credibility, 151, 153
standard-deviation principle premium, 108
- statistical simulation, 371
Stieltjes integral, 40
stop-loss reinsurance, 94
subadditivity, 108
Super-Duper algorithm, 373
support, 4
surplus, 132
survival function (sf), 38
- table look-up method, 386
tail properties, 54
tail Value-at-Risk, 115
test statistic, 355
time of ruin, 133
tolerance probability, 56
translational invariance, 108
trapezoidal rule, 374
triangular kernel, 280
truncated distribution, 60
truncation, 262
- unbiasedness, 257
unconditional mean, 171
unconditional variance, 172
unearned premium, 422
- Value-at-Risk, 110
variance of the hypothetical means, 172
variance-principle premium, 108
variation
 between risk groups, 171
 within risk groups, 171
- Wang transform, 125
Weibull distribution, 46
weighting matrix, 312
window width, 279
written premium, 422
- zero-modified distribution, 16
zero-one loss function, 204
zero-truncated distribution, 16