Index

σ-algebra, 623
Markov property, 141
complement rule, 625

absence of arbitrage, 23, 463
abstract Bayes formula, 427
accreting swap, 490
adapted process, 124
admissible portfolio strategy, 163
affine model, 458
American
   binary option, 418
   forward contract, 420
   option
      finite expiration, 402
      perpetual, 390
   amortizing swap, 490
annuity numéraire, 489, 528, 543
approximation
   gamma, 476
   lognormal, 357
arbitrage, 19
   absence of, 23
   continuous time, 163
   discrete time, 49
   opportunity, 21
   price, 11, 35, 61, 70, 206
   triangular, 19
arithmetic average, 348
Asian
   basket option, 362
   call option, 351
   option, 347, 348, 350
asset pricing
   first theorem, 25
      continuous time, 165, 493
      discrete time, 60
   second theorem, 30
      continuous time, 165
      discrete time, 61
   at the money, 50, 218
   attainable, 29, 34, 69, 165
backward induction, 78, 79
backward stochastic differential equation, 224
Barone-Adesi & Whaley model, 413
barrier forward contract, 314
   down-and-in
      long, 314, 766
   down-and-out
      long, 314, 768
   up-and-in
      long, 314, 763
   up-and-out
      long, 314, 765
barrier level, 278
barrier option, 51, 277, 293
   down-and-in
      call, 294
      put, 294
   down-and-out
      call, 294, 303, 312
      put, 294, 305
   parity relation, 294
   up-and-in
      call, 294
      put, 294
   up-and-out
      call, 294, 295
      put, 294, 300
basis point, 536
basket option, 361
BDT model, 515
bear spread option, 217, 730
Bermudan swaption, 535
Bernoulli distribution, 636
Bessel function, 456, 475
BGM model, 505, 525
binary option, 50, 100, 190, 220, 670
  barrier, 315
  binomial distribution, 636
  bisection method, 189, 235
bizdays (R package), 175
Black (1976) formula, 527
caplet formula, 525
Black-Derman-Toy model, 515
Black-Scholes
  calibration, 238
  formula, 185, 188, 207, 439, 506
  call option, 170, 526
  put option, 176, 527
PDE, 167, 184, 189, 308, 312, 614
  with jumps, 598
bond
  convertible, 510
  ladder, 528
  option, 449, 523, 814
  pricing PDE, 465, 503
  zero coupon, 462
  zero-coupon, 462
bond convexity, 516
bond duration, 516
bond yield, 472
Borel-Cantelli, 152
boundary condition, 615
break-even
  rate, 489, 490
  strike price, 40
  underlying price, 77, 169
Bretton Woods, 436
bridge model, 512
Brownian
  bridge, 147, 478
  extrema, 317
  motion, 109
  geometric, 198
  Lévy’s construction, 115, 725
  series construction, 113, 116
BSDE, 223, 224
bull spread option, 217, 730
business time, 175
buy back guarantee, 7
calendar time, 175
call level, 278
call option, 5
call-put parity, 177, 223, 247, 439
callable
  Bear contract, 52
  Bull contract, 279
cap pricing, 527
caplet pricing, 525
cash settlement, 11, 49, 179
cash-or-nothing option, 50
cattle futures, 170
Cauchy distribution, 633
sequence, 704
CBBC, 52, 279
CBOE, 455
  Volatility Index®, 247
CEV model, 457
change of measure, 203
change of numéraire, 426, 439
characteristic function, 651
Chasles relation, 129
Chi square distribution, 456
Chicago Board Options Exchange, 455
chooser option, 222, 743
CIR model, 148, 187, 456, 509
Clark-Ocone formula, 88, 342
collar option, 8
  put spread, 100
  complete market, 30, 34, 205
  complete space, 122, 128
completeness
  continuous time, 165
  discrete time, 60
compound Poisson
  martingale, 584
  process, 558, 587, 595
compounded yield to maturity, 515
conditional
  expectation, 641, 648
  probability, 626, 627
conditional expectation, 53
conditioning, 626
contingent claim, 27, 49, 60, 69
  attainable, 29, 34, 165
  continuous-time limit, 97
  continuous-time model, 157
conversion rate, 510
convertible bond, 510
convexity, 516
corporate bond, 510
correlation
  perfect, 502
  problem, 501
Notes on Stochastic Finance

cost of carry, 437
counterparty risk, 80
counting process, 551, 553
coupon
  bond, 463
  rate, 471
Courtadon model, 457, 509
Cox process, 556
Cox-Ingersoll-Ross model, 148
Cox-Ross-Rubinstein model, 61, 171
credit exposure, 80
critical price, 413
CRR model, 61, 171
cumulative distribution function, 632
  joint, 634
cup & handle, 1
date
  of payment, 187
  of record, 187
deflated price, 425
Delta, 81, 167, 172–174, 188, 192, 214
  hedging, 212, 445–447
density
  function, 631
  marginal, 634
derivatives market, 14
differential inequalities, 396
differential interest rate, 225
diffusion
  elasticity, 457
digital option, 50, 100, 190, 220, 670
disc of payment, 187
discounting, 48
discrete distribution, 636
distribution
  Bernoulli, 636
  binomial, 636
  Cauchy, 633
  discrete, 636
  exponential, 632
  gamma, 633
  Gaussian, 632
  geometric, 636
  Hartman-Watson, 355
  invariant, 262, 270, 454, 457
  lognormal, 95, 141, 357, 475, 633, 729
  marginal, 644
  negative binomial, 637
  Pascal, 637
  Poisson, 637
  stationary, 262, 270, 454, 457
  uniform, 632
dividend, 187, 217, 413, 416
  date of payment, 187
date of record, 187
ex-date, 187
  payable date, 187
dollar value, 515
dominated convergence theorem, 393, 400
Doob-Meyer decomposition, 411
Dothan model, 458, 473
drawdown option, 346
drawdown process, 323
drift estimation, 231
drifted Brownian motion, 200
Dupire PDE, 243
duration, 516
effective gearing, 82, 168
efficient market hypothesis, 1, 59
elasticity of diffusion, 457
elasticity, 168
enewal processes, 558
entitlement ratio, 7, 178, 179, 240, 242
equivalent probability measure, 25, 31,
  60, 165, 203
Euclidean path integral, 477
Euler discretization, 618
EURIBOR, 487
event, 623
ex-dividend, 187
exchange option, 416, 442
exercise price, 6
exotic option, 51, 52, 74, 211, 277
  Asian, 347
  continuous time, 277, 317, 347
  discrete time, 86
  lookback option, 317
expectation, 638
  conditional, 641, 648
exponential
  model, 601
  distribution, 557, 632
  Gaussian, 632
  Vasicek model, 147, 457, 695, 696
extrinsic value, 77, 168
face value, 462, 515
Fano factor, 476
Fatou’s lemma, 197, 385, 626
Feller condition, 456
filtration, 54, 111, 377
finite differences
  explicit scheme, 612, 614
  implicit scheme, 613, 616
first theorem of asset pricing, 25, 60, 165,
  493
fixed income, 453
derivatives, 519
fixed leg, 488
fixed rate, 525
floating
   leg, 488
   rate, 525
   strike, 52
floorlet, 527, 538
foreign exchange, 435
   option, 438
foreign exchange option, 194
formula
   Lévy-Khintchine, 563
   smoothing, 563
   Tanaka, 149, 700
   Taylor, 720
forward
   contract, 101, 169, 189, 448, 478, 715, 813
      American, 420, 806
      non-deliverable, 170
      measure, 511, 520
      price, 425
      rate, 478
      agreement, 478
      spot, 478–480, 525
      swap, 488
      start option, 218
      swap rate, 488
four-way zero-collar option, 8
Fourier synthesis, 116
FRA, 478
Fubini theorem, 566
fugazi (the), 234
future contract, 170, 673
FX option, 194
gains process, 74
galton board, 94
gamma
   approximation, 476
   Greek, 174
   process, 570
gamma distribution, 633
gamma function, 633
gap, 591
Garman-Kohlagen formula, 438
Gaussian
   cumulative distribution function, 97, 524
   distribution, 171, 632
   random variable, 652
gearing, 77, 168
   effective, 82, 168
Geman-Yor method, 356
generating function, 148, 651
geometric
   Brownian motion, 198
   distribution, 636
   average, 350, 373
   Brownian motion, 137
   Girsanov theorem, 203, 204, 225, 431
   jump processes, 578, 596
Greeks
   Delta, 192, 214
   Gamma, 174
   Theta, 192, 222, 742
   Vega, 315, 770
Gross World Product (GWP), 14
guarantee
   buy back, 7
   price lock, 8
Hartman-Watson distribution, 355
Hawaiian option, 349
heat
   equation, 180, 611
   map, 287
hedge and forget, 169
hedge ratio, 82, 168
hedging, 29, 79, 80, 86, 210
   change of numéraire, 444
   strategy, 211
      static, 169, 673, 814, 870
      with jumps, 604
Heston model, 255, 273
HIBOR, 487
historical
   probability measure, 201
   volatility, 231, 256
hitting
   probability, 386
   time, 381
HJM
   condition, 493
   model, 492
Ho-Lee model, 458
Hull-White model, 458, 493
implied
   probability, 13
   volatility, 234
in the money, 50, 240, 668
independence, 626, 628, 631, 635, 637, 642, 650–652
independent increments, 196, 580, 581
indicator function, 629
infimum, 637
infinitesimal, 130
information flow, 55
instantaneous forward rate, 481
interest rate
differential, 225
model
 affine, 458
 Constant Elasticity of Variance, 457
 Courtadon, 457
 Cox-Ingersoll-Ross, 456
 Dothan, 458, 473
 exponential Vasicek, 147, 457, 695, 696
 Ho-Lee, 458
 Hull-White, 458
 Marsh-Rosenfeld, 457
 Vasicek, 453, 458
interest rate model
 Courtadon, 509
 Cox-Ingersoll-Ross, 187
intrinisc value, 37, 77, 168
invariant distribution, 262, 270, 454, 457
inverse Gaussian process, 571
IPython notebook, 62, 75, 78, 81, 107, 115, 116, 171, 189, 235, 412, 682
Itô
 formula, 132, 219
 pathwise, 568
 with jumps, 569
isometry, 118, 122, 126, 565
process, 132, 134, 166, 718
stochastic integral, 118, 126, 195
 table, 135
 with jumps, 573
Jamshidian’s trick, 538
Jensen inequality, 101, 730
joint
cumulative distribution function, 634
probability density function, 634
jump-diffusion process, 591
knock-out option, 51, 294
Kullback-Leibler entropy, 597
Lévy
 construction of Brownian motion, 115, 725
 process, 570
Lévy-Khintchine formula, 563
Lagrangian, 477
law
 of total expectation, 644
 of total probability, 625, 628, 644
least square regression, 459
leg
 fixed, 488
 floating, 488
Leibniz integral rule, 494
leverage, 145, 193, 721
LIBOR
 model, 486
 rate, 486
 swap rate, 490, 532–534
Lipschitz function, 442
local
time, 150
volatility, 242, 614
log
 contract, 190, 218, 275
 option, 225
 return, 232
dynamics, 138, 601
variance, 95, 141, 253
lognormal
approximation, 357
distribution, 95, 141, 475, 633, 729
long forward contract, 607, 609
lookback option, 322
call, 331
put, 317, 322, 325
Macaulay duration, 516
marginal
density, 634
distribution, 644
Margrabe formula, 442
mark to market, 36, 61, 70, 170, 206, 673
market
completeness, 30, 34, 60
making, 36
price of risk, 200, 204, 465
market terms and data, 77, 168
Markov property, 442, 445
Marsh-Rosenfeld model, 457, 509
martingale, 53, 111, 195, 378
compound Poisson, 584
continuous time, 164
discrete time, 56
method, 205
Poisson, 580, 581
submartingale, 378
supermartingale, 378
transform, 57, 196
maturity, 6
transformation, 479
maximum of Brownian motion, 279
mean

This version: June 23, 2018
http://www.ntu.edu.sg/home/nprivault/index.html
hitting time, 389
reversion, 453
mean square distance, 649
measurability, 124
Merton model, 602
method
  bisection, 235
  Newton-Raphson, 235
Milevsky, M.A., 362
Milstein discretization, 619
Minkowski inequality, 122
model
  trinomial, 105
modified
    Bessel function, 456, 475
duration, 516
moment
  generating function, 651, 864
moneyness, 50
moving average, 348
MPoR, 200, 204, 465
Musiela notation, 492

natural logarithm, 43, 170
negative
  binomial distribution, 637
  inverse Gaussian process, 571
  premium, 25
  risk premium, 163
Nelson-Siegel, 497, 500
Newton-Raphson method, 235
nominal value, 515
non-deliverable forward contract, 170
noncentral Chi square, 456
nonlocal operator, 600
notional, 490
  principal, 537, 839, 840
numéraire, 164, 423
  annuity, 489, 528
  invariance, 444
numéraire invariance, 445

OLS, 459
opening jump, 591
optimal stopping, 403
option
  Asian, 347
    basket, 362
    call, 351
  at the money, 218
  barrier, 51, 277
  basket, 361
  bear spread, 217, 730
  binary, 50, 100, 670
  bull spread, 217, 730
cash-or-nothing, 50
chooser, 222, 743
digital, 50, 100, 670
drawdown, 346
effective gearing, 82, 168
exotic, 51, 52, 74, 86, 211, 277, 317, 347
extrinsic value, 77, 168
foreign exchange, 194
forward start, 218
gearing, 77, 168
Hawaiian, 349
intrinsic value, 77, 168
issuer, 11
knock-out, 51, 294
lookback, 317
on average, 347
on extrema, 278
out of the money, 221
path-dependent, 86, 211
premium, 77, 169
straddle, 746
variance call, 257
writer, 11, 29
zero-collor, 8
optional
  sampling, 382
  stopping, 382
order book, 727
Ornstein-Uhlenbeck process, 453
out of the money, 50, 221

Paley-Wiener series, 116
par value, 462, 515
Partial integro-differential equation, 600
partition, 628
Pascal distribution, 637
path freezing technique, 538
path integral, 76, 277, 428, 476
  Euclidean, 477
path-dependent option, 86, 211
pathwise Itô formula, 568
payable date, 187
payer swap, 488
payoff function, 6, 7, 277
PDE
  Black-Scholes, 167, 184
  integro-differential, 600
  variational, 405
perfect
  correlation, 502
physical delivery, 11, 49, 179
PIDE, 599, 600
Planck constant, 477

This version: June 23, 2018
http://www.ntu.edu.sg/home/nprivault/index.html
Notes on Stochastic Finance

Poisson
  compound martingale, 558, 595
  distribution, 637
  process, 551
  compound, 587
portfolio, 18
  process, 74
  replicating, 81, 84
  strategy, 29, 45, 69, 159
  admissible, 163, 165
  update, 159
  value, 70
power option, 102, 187, 218, 219, 673
predictable process, 57, 73, 564
premium, 77, 169
price
  critical, 413
price graph, 8, 100, 671
price lock guarantee, 8
pricing, 69, 74
  with jumps, 597
principal amount, 536
probability
  conditional, 626, 627
  density function, 631
  joint, 634
  distribution, 630
  measure, 625
  equivalent, 25, 31, 60, 165, 203
  space, 621
process
  counting, 551
  Cox, 556
drawdown, 323
gamma, 570
inverse Gaussian, 570
predictable, 57, 73, 564
stable, 570
stopped, 382
variance gamma, 570
put option, 5, 6
put spread collar option, 100
Python code, 62, 75, 78, 81, 107, 115, 116, 171, 189, 235, 412, 682
R code, 113, 115, 117, 121, 140, 158, 171, 173, 175, 177, 187, 189, 202, 235, 236, 251, 252, 261, 279, 303, 485, 536, 552, 557, 560, 572, 639, 642
R package
  bizdays, 175
quantmod, 158, 232, 461, 485, 572, 591
RQuantLib, 536
YieldCurve, 485
random
  variable, 629
random sum, 645
rate
  forward, 478
  forward swap, 488
  instantaneous forward, 481
LIBOR, 486
  swap, 490
  LIBOR swap, 532–534
realized variance swap, 257
reflection principle, 277
relative entropy, 597
replicating portfolio, 81, 84
replication, 29
return
  log, 232
Riccati equation, 470, 718, 830
risk
  counterparty, 80
  market price, 200, 204, 465
  premium, 25, 163
  risk premium, 199
  risk-free asset, 98, 157
  risk-neutral measure, 12, 24, 595
  continuous time, 163, 199
  discrete time, 59
  riskless asset, 98, 157
RQuantLib, 536
running maximum, 279, 280
SABR model, 273
second theorem of asset pricing, 30, 61, 165
self-financing portfolio, 444, 446
  continuous time, 159, 160, 604
  discrete time, 46
seller swap, 488
share right, 23
Sharpe ratio, 204
SHIBOR, 487
short selling, 34, 82, 178
  ratio, 19
SIBOR, 487
smoothing formula, 563
spline function, 246
spot forward rate, 478–480, 525
square-integrable
  functions, 120
  random variables, 120
St. Petersburg paradox, 640


This version: June 23, 2018
http://www.ntu.edu.sg/home/nprivault/index.html
stability warrant, 315
stable process, 572
static hedging strategy, 169, 673, 814, 870
stationary distribution, 262, 270, 454, 457
stochastic
  calculus, 130
differential equations, 141
  integral, 71, 117, 124
  with jumps, 563
  integral decomposition, 88, 144, 210, 213
process, 44
stop-loss start-gain strategy, 194
stopped process, 382
stopping time, 380
  theorem, 382
straddle option, 746
Stratonovich integral, 708
strike price, 6, 28
  floating, 52
string model, 516
strong Markov property, 557
submartingale, 378
super-hedging, 29, 61
supermartingale, 378
Svensson parametrization, 498
swap, 488
  amortizing, 490
  measure, 426, 529, 544, 546
  payer, 488
  seller, 488
  variance, 257
swaption, 530
  Bermudan, 535
Tanaka formula, 149, 700
Taylor’s formula, 130, 720
tele-scoping sum, 491
tenor structure, 425, 488, 519
terms and data, 77, 168
ternary tree, 105
theorem
  asset pricing, 25, 30, 60, 61, 165, 493
dominated convergence, 393, 400
  Fubini, 566
Girsanov, 203, 204, 225, 431, 578, 596
  stopping time, 382
Theta, 192, 222, 742
time
  business, 175
time splitting, 149, 220, 697
tower property, 56, 58, 73, 74, 78, 128,
  195, 197, 213, 214, 427, 465, 643,
  647, 649, 662, 682
treasury note, 455
trend estimation, 231
triangle inequality, 122
triangular arbitrage, 19
trinomial model, 105
two-factor model, 503
uniform distribution, 632
vanilla option, 52, 74
variable rate, 525
variance, 645
  log, 141
variance call option, 257
variance gamma process, 571
variance swap, 257
variational PDE, 396, 405
Vasicek model, 453, 458
Vega, 315, 770
  notional, 257
VIX®, 247
volatility
  historical, 231, 256
  implied, 234
  local, 242, 614
  smile, 238
  surface, 237
  variance call option, 257
warrant, 7, 178
  stability, 315
terms and data, 175
West Texas Intermediate (WTI), 5
Wiener space, 2
yield, 478, 480, 525
  bond, 472
  compounded to maturity, 515
  curve, 479
data, 485
YieldCurve (R package), 485
zero-coll ar option, 8
zero-coupon bond, 462
Author index

Achdou, Y. 246
Albanese, C. 456
Applebaum, D. 570
Aristotle 5

Bachelier, L. 2, 117
Barone-Adesi, G. 413
Barrieu, P. 355
Benth, F.E. 362
Bermín, H. 342
Björk, T. 38, 499
Black, F. 165, 515, 525, 527
Bosq, D. 553
Boulding, K.E. 157, 424
Brace, A. 4, 505
Breeden, D.T. 245
Brémaud, P. 563
Brigo, D. 468, 504, 824
Brown, R. 1
Burdzy, K. 280

Carr, P. 259, 274, 356
Chan, C.M. 52
Charpentier, A. 485
Cont, R. 563, 570, 577, 583, 591
Cox, J.C. 61, 187, 456
Crepey, S. 349
Curran, M. 360

Da Fonseca, J. 272
Dahl, L. O. 362
Dana, R.A. 333
Dash, J. 428
Deelstra, G. 362
Demeterfi, K. 275
Derman, E. 244, 275, 515
Devore, J.L. 621
Di Nunno, G. 86, 213
Diallo, I. 362

Doob, J.L. 378, 382, 411
Dothan, L.U. 458, 473
Dudley, R.M. 122
Dufresne, D. 356
Dupire, B. 243
Dvoretzky, A. 280

Einstein, A. 2
El Karoui, N. 426, 445
El Khatib, Y. 342, 344
Erdos, P. 280
Eriksson, J. 52, 309
Ewald, C.-O. 375

Feller, W. 456
Folland, G.B. 113
Föllmer, H 17, 26, 30, 60, 61, 97
Fouque, J.-P. 268
Fouque, J.P. 255, 268
Friz, P. 249, 259

Galton, F. 95
Gao, M. 272
Garman, M.B. 438
Gatarek, D. 4, 505
Gatheral, J. 249, 259, 268, 272
Geman, H. 354, 356, 426, 445, 780
Gerber, H.U. 416
Glasserman, P. 618
Guirreri, S. 485

Hagan, P.S. 256, 274, 753
Han, J. 272
Harrison, J.M. 60, 61, 165
Heath, D. 4, 493
Heston, S.L. 255, 264
Hiriart-Urruty, J.-B. 27
Ho, S.Y. 458
Hull, J. 458

883

This version: June 23, 2018
http://www.ntu.edu.sg/home/nprivault/index.html
Ikeda, N. 128, 197
Ingersoll, J.E. 187, 456
Itô, K. 2

Jacka, S.D. 406
Jacod, J. 621
Jamshidian, F. 444, 445, 523, 538
Jarrow, R. 4, 493
Jeanblanc, M. 333, 607

Kakutani, S. 280
Kallenberg, O. 650
Kamal, M. 275
Kani, I. 244
Kenna, A.G.Z. 352
Kim, Y.-J. 525
Kloeden, P.E. 143
Kohlhagen, S.W. 438
Korn, E. 618
Korn, R. 618
Kreps, D.M. 60, 61
Kroisandt, G. 618
Kumar, D. 256, 274, 753

Kambhampati, H. 618
Kallenberg, O. 650
Kaminski, W. 618
Karatzas, I. 247, 255
Karatzas, S. 247
Kemna, A.G.Z. 352
Kenna, A.G.Z. 352
Kenna, K. 244
Kim, Y.-J. 525
Kloeden, P.E. 143
Kohlhagen, S.W. 438
Korn, E. 618
Korn, R. 618
Kreps, D.M. 60, 61
Kroisandt, G. 618
Kumar, D. 256, 274, 753

Lamberton, D. 86, 365
Lapeyre, B. 365
Lawi, S. 456
Lee, R. 259, 274
Lee, S.B. 458
Lemaréchal, C. 27
Lesniewski, A.S. 256, 274, 753
Leung, T. 192
Levy, E. 357
Li, Y. 272
Liinev, J. 362
Lipton, A. 194
Litzenberger, R.h. 245
Longstaff, F.A. 407, 410

Margrabe, W. 442
Martin, C. 272
Matsumoto, H. 351
Menkens, O. 375
Mercurio, F. 468, 504, 824
Merton, R. 4, 443
Meyer, P.A. 411

Mikosch, T. 708
Morton, A. 4, 493
Musiela, A. 4
Musiela, M. 492, 505

Neuberger, A. 275
Nguyen, H.T. 553
Norris, J.R. 557

Øksendal, B. 86, 213
Paley, R. 116
Papanicolaou, A. 247, 255
Papanicolaou, G. 255, 268
Peng, S. 746
Persson, J. 52, 309
Pintoux, C. 474, 475
Pironneau, O. 246
Pitman, J. 621
Platen, E. 143
Pliska, S.R. 165
Poisson, S.D. 551
Prayoga, A. 476
Profeta, C. 291
Prosko, F. 86, 213
Prutker, P. 133, 141, 204, 212, 214, 431, 442, 445, 465, 466, 621

Rebonato, R. 256
Revuz, D. 113
Rochet, J.-C. 426, 445
Rogers, C. 367
Ross, S.A. 61, 187, 456
Rouault, A. 355
Roynette, B. 291
Rubinstein, M. 61
Rudin, W. 120, 122
Ruiz de Chávez, J. 86

Samuelson, P. 3
Santa-Clara, P. 516
Sato, K. 584
Schied, A. 17, 26, 30, 60, 61, 86, 97
Schoenmakers, J. 535
Scholes, M. 4, 165
Schröder, M. 356

884
Notes on Stochastic Finance

Schwartz, E.S. 407, 410
She, Q.H. 272
Shi, Z. 367
Shiryaev, A.N. 165
Shiu, E.S.W. 416
Shreve, S. 290, 300, 322, 371, 394, 413, 451, 762
Sircar, K.R. 247, 255, 268
Sircar, R. 192, 268
Sølna, K. 255, 268
Sornette, D. 516
Steele, J.M. 404

Tankov, P. 563, 570, 577, 583, 591
Teng, T.-R. 444, 527, 535
Thales 5
Toy, B. 515
Turnbull, S.M. 357

Uy, W.I. 475

Vanmaele, M. 362
Vašiček, O. 453, 458, 468

Vorst, A.C.F. 352

Wakeman, L. 357
Watanabe, S. 128, 197
Wei, X. 535
Whaley, R.E. 413
White, A. 458
Widder, D.V. 181
Wiener, N. 2, 116
Williams, D. 86
Wilmott, P. 416
Wong, H.Y. 52
Woodward, D.E. 256, 274, 753
Wu, X. 516

Yang, Z. 375
Yor, M. 113, 255, 291, 350, 354–356, 474, 780
Yu, J.D. 359, 476

Zhang, Q. 272
Zou, J. 275
References


N. Privault


890
Notes on Stochastic Finance


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Notes on Stochastic Finance


This book is an introduction to the pricing and hedging of financial derivatives, including vanilla and exotic options, by stochastic calculus and partial differential equation methods. The presentation is done both in discrete and continuous-time financial models, with an emphasis on the complementarity between algebraic and probabilistic methods. In particular it covers the pricing of some interest rate derivatives, of American options, of exotic options such as barrier, lookback and Asian options, and stochastic models with compound Poisson jumps. The text is accompanied with a number of figures and simulations, and includes 20 examples based on actual market data. The concepts presented are illustrated by examples and by 181 exercises and 10 problems with their complete solutions.