Index

σ-algebra, 731
Markov property, 164
complement rule, 733

absence of arbitrage, 25, 559
abstract Bayes formula, 517
accreting swap, 597
adapted process, 149
adjusted close price, 202, 679
admissible portfolio strategy, 181
affine model, 553
affine PDE, 305, 553, 1024
American
  binary option
    finite expiration, 508
    perpetual, 508
  forward contract, 510
option
  call, 479, 489
  dividend, 503, 506
  finite expiration, 493
  perpetual, 479
  put, 479
amortizing swap, 597
annuity
  measure, 632
  numéraire, 631, 648
annuity numéraire, 596
approximation
  gamma, 573
  lognormal, 438
arbitrage, 21
  absence of, 25
  continuous time, 181
  discrete time, 56
  opportunity, 22
  price, 14, 39, 68, 78, 254
  triangular, 21
arithmetic average, 427
Asian option, 427, 429
  basket, 444
  call, 427
  dividends, 457
  hedging, 457
asset pricing
  first theorem, 27
    continuous time, 183, 601
    discrete time, 67
  second theorem, 33
    continuous time, 186
    discrete time, 68
at the money, 57, 268
attainable, 31, 37, 77, 186
Bachelier model, 191, 230, 236, 269
backward
  induction, 86, 89
  stochastic differential equation, 274
Bank for International Settlements, 9
Barone-Adesi & Whaley approximation, 500, 502, 983
barrier
  level, 371
barrier forward contract, 396
  down-and-in
    long, 397, 941
  down-and-out
    long, 397, 942
  up-and-in
    long, 397, 937
  up-and-out
    long, 397, 939
barrier option, 58, 367, 371
  down-and-in
call, 372, 385
put, 372, 387
down-and-out
  call, 372, 381, 395
  put, 372, 383
in-out parity, 372
up-and-in
  call, 372, 387
  put, 372, 388
up-and-out
  call, 372, 373
  put, 372, 378
basis point, 640
basket option, 443
BDT model, 582
bear spread option, 267, 874
Bermudan swaption, 639
Bernoulli distribution, 744
Bessel function, 551, 573
BGM model, 613, 628
binary
tree, 69
binary option, 57, 117, 236, 271, 544, 792
American
  finite expiration, 508
  perpetual, 508
binomial
distribution, 744
BIS, 9
bisection method, 234, 321
bizdays (R package), 222
Black
  (1976) formula, 630
caplet formula, 628
Black-Derman-Toy model, 582
Black-Scholes
calibration, 324
formula, 228, 233, 256, 530, 614
call options, 207, 629
put options, 214, 215, 630
PDE, 205, 227, 234, 392, 395, 722
  with jumps, 706
bond
convertible, 578
convexity, 583
corporate, 578
duration, 579, 583
immunization, 1027
ladder, 632
option, 542, 625, 1012
pricing
  PDE, 561, 611
  yield, 570
zero-coupon, 557
Borel-Cantelli Lemma, 175, 734
boundary condition, 723
break-even
  rate, 596, 598
  strike price, 46
  underlying asset price, 86, 221
Brent, 10
Bretton Woods, 514
bridge model, 616
Brownian
  bridge, 170, 575
  extrema, 358
  motion, 131
  geometric, 244
  Lévy’s construction, 138, 173, 851
  series construction, 136, 139
BSDE, 274
bull spread option, 267, 874
business time, 222
butterfly option, 267, 876
buy back guarantee, 7, 532
buy limit, 463
calendar time, 222
call
  level, 371
  option, 8
  price, 372, 378
  spread collar option, 119
  swaption, 636
call-put parity, 216, 258, 273, 333, 530, 948
callable
  bear contract, 59, 371–373
  bull contract, 372, 378
Cantor function, 343
cap pricing, 631
Capital Asset Pricing Model (CAPM), 276, 898
caplet pricing, 627
cash settlement, 8, 56, 214
cash-or-nothing option, 57, 544
cattle futures, 206
Cauchy
distribution, 741
sequence, 835
CBBC, 59, 371–373, 378
rebate, 396
residual, 396
Type N, 372
Type R, 372, 396
CBOE, 550
Volatility Index®, 334

1090

This version: September 6, 2020
https://www.ntu.edu.sg/home/nprivault/index.html
CEV model, 552
change of measure, 250
change of numéraire, 516, 530
characteristic
function, 756
Chasles relation, 155
Chi square distribution, 270, 550, 885
Chicago Board Options Exchange, 550
chooser option, 273, 890
CIR model, 171, 230, 270, 550, 577
CKLS model, 576
Clark-Ocone formula, 100, 419
collar option, 10
call spread, 119
costless, 12
put spread, 118
complete market, 33, 38, 253
complete space, 146, 153
completeness
continuous time, 186
discrete time, 68
compound Poisson
martingale, 690
process, 662, 694, 703
compounded yield to maturity, 583
compounding
linear, 594
conditional
expectation, 60, 749, 758
probability, 735
conditioning, 735
constant repayment, 48
contingent claim, 30, 56, 68, 77
attainable, 31, 37, 186
continuous-time
limit, 110
conversion rate, 578
convertible bond, 578
convexity, 583
corporate bond, 578
correlation
perfect, 610, 619
problem, 609
cost of carry, 527
costless collar option, 12
counterparty risk, 89
counting process, 655, 657
coupon
bond, 559
rate, 568
Courtadon model, 552, 577
Cox process, 659
Cox-Ingersoll-Ross model, 171
Cox-Ross-Rubinstein model, 69, 208
credit exposure, 89
critical price, 502
CRR model, 69, 208
cumulant, 668
cumulative distribution function, 740
joint, 368, 742
cup & handle, 1
date
of payment, 231
of record, 231
deflated price, 516
Delta, 90, 92, 204, 209, 211, 217, 219, 233, 237, 263, 876
hedging, 262, 537, 539
density
function, 739
marginal, 369, 743
derivatives
fixed income, 621
interest rate, 621
market, 9
differential inequalities, 486
differential interest rate, 276
diffusion
elasticity, 552, 577
digital option, 57, 117, 236, 271, 544, 792
discounting, 55, 179
lemma, 189, 253
discrete distribution, 744
dispersion index, 573, 658
distribution
Bernoulli, 744
binomial, 744
Cauchy, 741
discrete, 744
exponential, 741
gamma, 741
Gaussian, 740
geometric, 745
Hartman-Watson, 435
invariant, 303, 311, 549, 552
lognormal, 108, 196, 438, 572, 741, 872
marginal, 752
negative binomial, 745
Pascal, 745
Poisson, 745
stable, 703
stationary, 303, 311, 549, 552
uniform, 740
dividend, 115, 123, 231, 268, 457, 503, 506
date of payment, 231
date of record, 231
ex-date, 231

This version: September 6, 2020
https://www.ntu.edu.sg/home/nprivault/index.html
payable date, 231
dollar value, 583
dominated convergence theorem, 482, 491
Doob-Meyer decomposition, 477
Dothan model, 552, 570
drawdown option, 426
drawdown process, 399
drift estimation, 317
drifting Brownian motion, 247
Dupire PDE, 330
duration, 579, 583
early exercise premium, 487
ECB, 592
effective gearing, 92, 220
efficient market hypothesis, 1, 66
elasticity of diffusion, 552, 577
elasticity, 221
enewal processes, 662
entitlement ratio, 9, 212, 217, 326–328
equivalent probability measure, 27, 34, 67, 183, 252
Esscher transform, 718
ETF, 277
Euclidean path integral, 575
Euler discretization, 726
EURIBOR, 594
European option
  knock-in, 398
  knock-out, 398
event, 731
ex-dividend, 231, 457
exchange option, 506, 533
exchange-traded fund, 277
exercise price, 6
exotic option, 58, 83, 260, 367
  Asian, 427
    continuous time, 367, 399, 427
discrete time, 98
  lookback option, 399
expectation, 746
  conditional, 749, 758
exponential
  Vasicek model, 552
  exponential distribution, 660, 741
  exponential Lévy model, 709
  exponential Vasicek model, 171, 823
extrinsic value, 85, 220

face value, 558, 583
Fano factor, 573
Fatou’s lemma, 243, 467, 735
FED, 594
Feller condition, 551
filtration, 61, 133, 459
finite differences
  explicit scheme, 720, 722
  implicit scheme, 721, 724
first theorem of asset pricing, 27, 67, 183, 601
fixed
  income, 547
    derivatives, 621
  leg, 596
  rate, 627
floating
  leg, 596
  rate, 627
  strike, 59
floorlet, 630, 641
fOptions (R package), 500, 931, 983
foreign exchange, 525
  option, 528
foreign exchange option, 199
formula
  Lévy-Khintchine, 668
    smoothing, 669
  Tanaka, 172, 200, 831, 850
  Taylor, 868
forward
  contract, 120, 205, 234, 256, 542, 585, 862, 1009
    American, 510, 1000
    non-deliverable, 206
  measure, 579, 622
  price, 516
  rate, 585
    agreement, 585
    spot, 585–587, 627
  swap, 595
    start option, 268
    swap rate, 595
forward swap
  measure, 632
four-way zero-collar option, 10
Fourier
  synthesis, 139
  transform, 305
    inversion, 305
FRA, 585
Fubini theorem, 671
fugazi (the), 320
future contract, 206, 797
FX option, 199
gains process, 82
Galton board, 107
Gamma, 219
Notes on Stochastic Finance

gamma
  approximation, 573
  distribution, 741
  function, 741
  Greek, 211
  process, 677
gap, 699
Garman-Kohlagen formula, 528
Gaussian
  cumulative distribution function, 112, 626
  distribution, 207, 740
  random variable, 757
gearing, 86, 220
  effective, 92, 220
Geman-Yor method, 437
generating function, 171, 756
geometric
  average, 429, 455
  Brownian motion, 192, 244
  distribution, 745
Girsanov Theorem, 250, 276, 522
  jump processes, 685, 704
Greeks, 219
  Delta, 204, 209, 211, 217, 219, 233, 237, 263, 876
  Gamma, 211, 219
  Rho, 219
  Theta, 219, 237, 273, 890
  Vega, 219, 237, 398, 945
gross market value, 9
gross world product, 5, 9
guarantee
  buy back, 7, 532
  price lock, 9
GWP, 5
Hartman-Watson distribution, 435
Hawaiian option, 428
heat
  equation, 222, 719
  map, 350
hedge and forget, 205, 797, 1010, 1080
hedge ratio, 93, 221
hedging, 32, 88, 90, 98, 259
  change of numéraire, 536
  mean-variance, 712
  quantile, 279
  static, 205, 797, 1010, 1080
  strategy, 261
  with jumps, 712
Heston model, 290, 314
hexanomial model, 813
HIBOR, 594
historical
  probability measure, 248
  volatility, 291, 317
hitting
  time, 463
HJM
  condition, 601
  model, 599
Ho-Lee model, 553
Hull-White model, 553, 600
immunization, 1027
implied
  probability, 16
  volatility, 320
in the money, 57, 327, 785
in-out parity, 372, 948
independence, 735, 737, 739, 743, 745, 750, 757, 761
independent increments, 242, 687
indicator function, 738
infimum, 745
infinitesimal, 157
information flow, 62
instantaneous forward rate, 588
interest rate
  derivatives, 621
  differential, 276
  model
    affine, 553
    Constant Elasticity of Variance, 552
    Courtadon, 552, 577
    Cox-Ingersoll-Ross, 230, 270, 550
    Dothan, 552, 570
    exponential Vasicek, 171, 552, 823
    Ho-Lee, 553
    Hull-White, 553, 600
    Marsh-Rosenfeld, 552, 577
    Vasicek, 548, 553
intrinsic value, 40, 85, 220
invariant distribution, 303, 311, 549, 552
inverse Gaussian process, 678
IPython notebook, 14, 69, 84, 87, 90, 95, 97, 128, 138, 139, 208, 234, 321, 502, 606, 812
Itô
  formula, 159, 270
  pathwise, 673
  with jumps, 674
isometry, 141, 145, 151, 670
process, 158, 160, 203, 864
stochastic integral, 141, 150, 151, 241
table, 162, 403
  with jumps, 675
Notes on Stochastic Finance

CKLS, 576
Courtadon, 552, 577
Dothan, 552, 570
exponential Vasicek model, 552
Ho-Lee, 553
Hull-White, 553, 600
Marsh-Rosenfeld, 552, 577
pentanomial, 813
Vasicek, 548, 553
modified
Bessel function, 551, 573
duration, 583
moment
generating function, 756, 1074
moneyness, 57
moving average, 428
MPoR, 246, 252, 309, 561
Musiela notation, 599
natural logarithm, 207
negative
binomial distribution, 745
inverse Gaussian process, 678
premium, 27
risk premium, 182
Nelson-Siegel, 605, 608
Newton-Raphson method, 321
nominal value, 583
non-deliverable forward contract, 206
nominal amount, 270, 550, 885
notional, 597
principal, 640, 1046, 1047
notional amount, 9
numéraire, 182, 513
annuity, 596, 631
invariance, 536
numéraire invariance, 537
noncentral Chi square, 270, 550, 885
nonlocal operator, 709
OLS, 554
opening jump, 699
optimal stopping, 494
option
Asian, 427
basket, 444
call, 427
at the money, 268
barrier, 58, 367
basket, 443
bear spread, 267, 874
binary, 57, 117, 544, 792
bull spread, 267, 874
butterfly, 267, 876
cash-or-nothing, 57, 544
chooser, 273, 890
digital, 57, 117, 544, 792
drawdown, 426
effective gearing, 92, 220
exotic, 58, 83, 98, 260, 367, 399, 427
extrinsic value, 85, 220
foreign exchange, 199
forward start, 268
gearing, 86, 220
Hawaiian, 428
intrinsic value, 85, 220
issuer, 14, 32
knock-out, 58, 372
lookback, 399
on average, 58, 266, 427, 456
on extrema, 368
out of the money, 272
path-dependent, 98, 260
power, 120, 191, 232, 269, 798
premium, 32, 86, 221
straddle, 894
tunnel, 112, 114
vanilla, 204
variance call, 295
variance swap, 292
volatility swap, 297
writer, 14, 32
zero-collar, 10
optional
sampling, 464
stopping, 464
order book, 853
Ornstein-Uhlenbeck process, 548
out of the money, 57, 272
Paley-Wiener series, 139
par value, 558, 583
parity
call-put, 216, 258, 273, 333, 530, 948
in-out, 372, 948
Partial integro-differential equation, 707
partition, 736, 758
Pascal distribution, 745
path
freezing, 643
integral, 85, 368, 519, 573
Euclidean, 575
path-dependent option, 98, 260
pathwise Itô formula, 673
payable date, 231
payer

This version: September 6, 2020
https://www.ntu.edu.sg/home/nprivault/indext.html

1095
swap, 596
swaption, 633
payoff function, 7, 9, 367
PDE
affine, 305, 553, 1024
Black-Scholes, 205, 227
Heston, 303
integro-differential, 707
variational, 497
pentanomial model, 813
perfect correlation, 610, 619
physical delivery, 8, 56, 214
PIDE, 707
Planck constant, 574
Poisson
compound martingale, 662, 703
distribution, 745
process, 655
compound, 694
portfolio, 20
process, 82
replicating, 90, 95
strategy, 31, 50, 77, 184, 187
admissible, 181, 186
update, 184, 187
value, 54, 78
power option, 120, 191, 232, 269, 798
predictable process, 64, 81, 669
premium
early exercise, 487
negative, 27
option, 86, 221
risk, 27, 182, 246
price
critical, 502
graph, 6, 8, 10, 118, 793, 795
price lock guarantee, 9
pricing, 77, 83
with jumps, 705
principal amount, 640
probability
conditional, 735
density function, 739
joint, 742
distribution, 739
measure, 733
equivalent, 27, 34, 67, 183, 252
sample space, 729
space, 734
process
counting, 655
Cox, 659
drawdown, 399
gamma, 677
inverse Gaussian, 677
predictable, 64, 81, 669
stable, 677
stopped, 464
variance gamma, 677
pushforward measure, 690
put
option, 6
spread collar option, 118
swaption, 638
Python code, 14, 69, 84, 87, 90, 95, 97,
128, 138, 139, 208, 234, 321, 502,
606, 812
Python package
yfinance, 324
quantile hedging, 279
Quantlib, 639
quantmod, 202, 318, 472, 556, 592, 679,
699
R code, 10, 137, 138, 140, 143, 149,
165–167, 189, 193, 196, 202, 208,
210, 215, 222, 231, 234, 249, 302,
321, 322, 333, 336, 337, 372, 378,
381, 383, 472, 549, 551, 567, 592,
639, 661, 662, 664, 677, 679, 688,
747, 750, 932, 983
R package
bizdays, 222
fOptions, 500, 931, 983
quantmod, 202, 318, 472, 556, 592, 679,
699
RQuantLib, 639
YieldCurve, 592
Radon-Nikodym, 250
random
product, 754
sum, 754
variable, 737
rate
forward, 585
forward swap, 595
instantaneous forward, 588
LIBOR, 594, 597
swap, 596
LIBOR swap, 634, 637
swap, 595
realized variance, 291, 318
swap, 292
rebate, 372, 373, 378
receiver swaption, 638
reflection principle, 367
relative entropy, 705

1096

This version: September 6, 2020
https://www.ntu.edu.sg/home/nprivault/index.html
martingale, 64, 82, 464

volatility
historical, 291, 317
implied, 320
level, 292
local, 328, 722
smile, 322
surface, 324
swap, 297
variance swap, 292

warrant, 9, 212
stability, 398
terms and data, 222
turbo, 59, 371–373, 378

West Texas Intermediate (WTI), 5, 10

Wiener space, 2

yfinance (Python package), 324

yield, 585, 587, 627
bond, 570
compounded to maturity, 583
curve, 586
data, 592
inversion, 593

YieldCurve (R package), 592

zero measure, 343
zero-collateral option, 10
coupon bond, 557

1098

This version: September 6, 2020
https://www.ntu.edu.sg/home/nprivault/index.html
Author index

Achdou, Y. 333
Albanese, C. 290, 551
Albrecher, H. 305
Allegretto, J. 500
Applebaum, D. 677
Aristotle 5
Attari, M. 305

Bachelier, L. 2, 140
Barone-Adesi, G. 500, 502
Barrieu, P. 435
Benth, F.E. 444
Bermín, H. 419
Björk, T. 41, 608
Black, F. 3, 186, 201, 582, 628, 630
Bosq, D. 657
Boulding, K.E. 187, 514
Brace, A. 4, 613
Breeden, D.T. 329
Brémaud, P. 669
Brigo, D. 564, 612, 1025
Brown, R. 1
Burdzy, K. 342

Carr, P. 294, 314, 436, 437
Chan, C.M. 59, 372
Chan, K.C. 576
Charpentier, A. 592
Činlar, E. 739
Cont, R. 667, 677, 684, 690, 699, 715
Courtadon, G. 552, 577
Cox, J.C. 69, 230, 270, 550
Crépey, S. 428
Curran, M. 442

Da Fonseca, J. 313
Dahl, L. O. 444
Dana, R.A. 411
Dash, J. 519
Dassios, A. 425
Deelstra, G. 444
Demeterfi, K. 315
Denson, N. 542
Derman, E. 315, 330, 582
Devore, J.L. 729
Di Nunno, G. 98, 260, 715
Diello, I. 444
Doob, J.L. 460, 464, 477
Dothan, L.U. 552, 570
Downes, A. 542
Dudley, R.M. 146
Dufresne, D. 434, 437
Dupire, B. 330
Dvoretzky, A. 342

Einstein, A. 2
El Karoui, N. 516, 536
El Khatib, Y. 419, 422
Elliott, R.J. 487, 497, 500
Erdos, P. 342
Eriksson, J. 59, 372
Ewald, C.-O. 457

Faff, R. 1019
Feller, W. 290, 551, 885
Folland, G.B. 135
Föllmer, H. 98, 279
Fouque, J.-P. 290, 309
Friz, P. 334

Galton, F. 107
Gao, M. 313
Garman, M.B. 528
Gatarek, D. 4, 613
Gatheral, J. 309, 313, 334
Geman, H. 433, 437, 516, 536, 965
Gerber, H.U. 506, 718
Notes on Stochastic Finance

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paley, R.</td>
<td>139</td>
</tr>
<tr>
<td>Papanicolaou, A.</td>
<td>290, 334</td>
</tr>
<tr>
<td>Papanicolaou, G.</td>
<td>290, 309</td>
</tr>
<tr>
<td>Peng, S.</td>
<td>274</td>
</tr>
<tr>
<td>Peres, Y.</td>
<td>343</td>
</tr>
<tr>
<td>Persson, J.</td>
<td>59, 372</td>
</tr>
<tr>
<td>Pintoux, C.</td>
<td>571, 572</td>
</tr>
<tr>
<td>Pironneau, O.</td>
<td>333</td>
</tr>
<tr>
<td>Pitman, J.</td>
<td>729</td>
</tr>
<tr>
<td>Platen, E.</td>
<td>165</td>
</tr>
<tr>
<td>Pliska, S.R.</td>
<td>183, 186</td>
</tr>
<tr>
<td>Poisson, S.D.</td>
<td>655</td>
</tr>
<tr>
<td>Prayoga, A.</td>
<td>293, 573</td>
</tr>
<tr>
<td>Profeta, C.</td>
<td>353</td>
</tr>
<tr>
<td>Proske, F.</td>
<td>98, 260, 715</td>
</tr>
<tr>
<td>Trotter, P.</td>
<td>159, 164, 250, 262, 522, 533, 537, 561, 562, 729</td>
</tr>
<tr>
<td>Radon, J.</td>
<td>250</td>
</tr>
<tr>
<td>Rebonato, R.</td>
<td>291</td>
</tr>
<tr>
<td>Revuz, D.</td>
<td>135</td>
</tr>
<tr>
<td>Rochet, J.-C.</td>
<td>516, 536</td>
</tr>
<tr>
<td>Rogers, C.</td>
<td>449</td>
</tr>
<tr>
<td>Rosenfeld, E.R.</td>
<td>552, 577</td>
</tr>
<tr>
<td>Ross, S.A.</td>
<td>69, 230, 270, 550</td>
</tr>
<tr>
<td>Rouah, F.D.</td>
<td>305</td>
</tr>
<tr>
<td>Rouault, A.</td>
<td>435</td>
</tr>
<tr>
<td>Roynette, B.</td>
<td>353</td>
</tr>
<tr>
<td>Rubinstein, M.</td>
<td>69</td>
</tr>
<tr>
<td>Rudin, W.</td>
<td>143, 144</td>
</tr>
<tr>
<td>Ruiz de Chávez, J.</td>
<td>98</td>
</tr>
<tr>
<td>Samuelson, P.A.</td>
<td>3</td>
</tr>
<tr>
<td>Sanders, A.B.</td>
<td>576</td>
</tr>
<tr>
<td>Santa-Clara, P.</td>
<td>619</td>
</tr>
<tr>
<td>Sato, K.</td>
<td>691</td>
</tr>
<tr>
<td>Schied, A.</td>
<td>28, 33, 68, 98, 110</td>
</tr>
<tr>
<td>Schoenmakers, J.</td>
<td>638, 639</td>
</tr>
<tr>
<td>Scholes, M.</td>
<td>3, 4, 186, 201</td>
</tr>
<tr>
<td>Schoutens, W.</td>
<td>305</td>
</tr>
<tr>
<td>Schröder, M.</td>
<td>436, 437</td>
</tr>
<tr>
<td>Schwartz, E.S.</td>
<td>499, 501</td>
</tr>
<tr>
<td>Scorsese, M.</td>
<td>320</td>
</tr>
<tr>
<td>She, Q.H.</td>
<td>313</td>
</tr>
<tr>
<td>Shi, Z.</td>
<td>449</td>
</tr>
<tr>
<td>Shiryaev, A.N.</td>
<td>183, 186</td>
</tr>
<tr>
<td>Shiu, E.S.W.</td>
<td>506, 718</td>
</tr>
<tr>
<td>Shreve, S.</td>
<td>353, 362, 378, 453, 483, 503, 545, 934</td>
</tr>
<tr>
<td>Sircar, K.R.</td>
<td>238, 290, 309, 334</td>
</tr>
<tr>
<td>Sōma, K.</td>
<td>290, 309</td>
</tr>
<tr>
<td>Sornette, D.</td>
<td>619</td>
</tr>
<tr>
<td>Steele, J.M.</td>
<td>495</td>
</tr>
<tr>
<td>Stroock, D.W.</td>
<td>760</td>
</tr>
<tr>
<td>Tankov, P.</td>
<td>667, 677, 684, 690, 699, 715</td>
</tr>
<tr>
<td>Teng, T.-R.</td>
<td>536, 630, 638</td>
</tr>
<tr>
<td>Thales</td>
<td>5</td>
</tr>
<tr>
<td>Tistaert, J.</td>
<td>305</td>
</tr>
<tr>
<td>Toy, B.</td>
<td>582</td>
</tr>
<tr>
<td>Turnbull, S.M.</td>
<td>438</td>
</tr>
<tr>
<td>Uy, W.I.</td>
<td>572</td>
</tr>
<tr>
<td>Vanmaele, M.</td>
<td>444</td>
</tr>
<tr>
<td>Vašíček, O.</td>
<td>4, 548, 564</td>
</tr>
<tr>
<td>Volkov, S.N.</td>
<td>279</td>
</tr>
<tr>
<td>Vorst, A.C.F.</td>
<td>430</td>
</tr>
<tr>
<td>Wakeman, L.</td>
<td>438</td>
</tr>
<tr>
<td>Watanabe, S.</td>
<td>151, 243</td>
</tr>
<tr>
<td>Wei, X.</td>
<td>639</td>
</tr>
<tr>
<td>Whaley, R.E.</td>
<td>500, 502</td>
</tr>
<tr>
<td>White, A.</td>
<td>553</td>
</tr>
<tr>
<td>Widder, D.V.</td>
<td>223</td>
</tr>
<tr>
<td>Wiener, N.</td>
<td>2, 139</td>
</tr>
<tr>
<td>Williams, D.</td>
<td>98</td>
</tr>
<tr>
<td>Wilmott, P.</td>
<td>506</td>
</tr>
<tr>
<td>Wong, H.Y.</td>
<td>59, 372</td>
</tr>
<tr>
<td>Woodward, D.E.</td>
<td>291, 339, 916</td>
</tr>
<tr>
<td>Wu, X.</td>
<td>584</td>
</tr>
<tr>
<td>Yang, Z.</td>
<td>457</td>
</tr>
<tr>
<td>Yor, M.</td>
<td>135, 290, 353, 433–435, 437, 571, 965</td>
</tr>
<tr>
<td>Yu, J.D.</td>
<td>441, 573</td>
</tr>
<tr>
<td>Zhang, Q.</td>
<td>313</td>
</tr>
<tr>
<td>Zou, J.</td>
<td>315</td>
</tr>
</tbody>
</table>
References


1106

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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 numerous examples based on actual market data. The concepts presented are also illustrated by 224 exercises and 13 problems with complete solutions.