
Author Index

A

Abramovitz, M., 53, 89, 168, 187, 206, 212
 Akerlof, G.A., 41
 Aldous, D.J., 172, 174
 Amaral, L.A., 120
 Amemiya, T., 57
 Anderson, S.P., 53, 56
 Andrews, G., 14, 223, 226
 Aoki, M., 19, 22, 22n3, 25, 32n3, 39, 41, 44, 45, 47, 48, 53, 54, 56, 60, 80, 89, 90n1, 93n3, 94, 97, 99, 99n4, 102, 103, 128n3, 133, 134, 135, 136, 137, 138, 140, 141, 143, 143n4, 145, 149, 164, xiii
 Arratia, R., 141, 143, 159n8, 160, 165, 184, 214, 215, 217, 218, 220

B

Balakrishnan, N., 184, 231
 Barbour, A.D., 214, 215, 219
 Barton, D.E., 206
 Becker, G.S., 41
 Bellman, R., 9n1
 Bingham, N.H., 62, 214, 242
 Blank, A., 191, 191n5
 Bollobas, B., 146
 Brandt, A., 191, 192
 Breiman, 203
 Bremaud, P., 21
 Buldyrev, S.V., 120

C

Chamayou, J.-F., 242
 Chen, L.H.Y., 214
 Chen, W., 244

Cinlar, E., 29n1, 103n5
 Clower, R., 100
 Constantini, D., 25, 32n2, 33, 102, 143, 143n4, 145, 147, 158, 163, 166, 184, 200, 201
 Cont, R., 191
 Cox, D.R., 21, 48, 66, 68, 70, 71n1, 118, 119

D

Darling, D.A., 62, 242
 David, F.N., 206
 Davis, S.J., 100, 115
 Day, R., 181, 188
 De Finetti, B., 12, 220
 De Haan, L., 191, 192, 241, 244
 De Palma, A., 53, 57
 De Vries, C., 191, 192, 241, 244
 Derrida, B., 122, 172, 174, 178
 Dewynne, J., 121
 Diamond, P., 3, 7, 60, 86, 134
 Dixit, A., 32
 Donnelly, P.J., 15, 124, 125, 172, 236, 237, 240n10
 Doyle, 55
 Dreze, 100
 Dupuis, P.A., 51
 Durrett, D., 197

E

Ellis, R.S., 51
 Engen, 235
 Ewens, W.J., 28, 102, 102n4, 122, 124, 126, 158, 162, 172, 178, 184, 225, 235, 236

254 **Author Index****F**

Feller, W., 13, 40, 68, 197, 222, 242
 Feshback, H., 123
 Flyvberg, H., 172, 174, 178
 Fudenberg, D., 134

G

Gabaix, X., 244
 Galambos, J., 59, 214
 Gardiner, C.W., 19
 Garibaldi, U., 25, 32n2, 33, 102, 143,
 143n4, 145, 147, 158, 163, 166,
 184, 200, 201
 Goldie, C.M., 62, 191, 192, 214, 242, 244
 Good, I.J., 13, 222n5
 Greene, D.H., 209
 Grimmett, G.R., 48
 Guess, H.A., 8, 168, 172, 178, 186,
 187, 189, 241

H

Halmos, P., 235, 236
 Haltiwanger, R., 100, 115
 Hansen, J.C., 15
 Harris, B., 211
 Havlin, S., 120
 Hildebrand, F.B., 70, 195
 Hill, B.M., 244
 Hirsch, M.W., 76
 Hoppe, F.M., 89, 124, 125, 163, 184, 185,
 197, 198, 199, 225, 238
 Howison, S., 121
 Huang, W., 181, 188

I

Ignatov, T., 240
 Ingber, L., 48, 62
 Iwai, K., 77, 86

J

Johnson, N.L., 184, 231
 Jones, C.I., 88
 Jordan, C., 206, 210, 212
 Jovanovic, B., 128n3
 Joyce, P., 15, 236, 237, 240n10

K

Kaplan, 214
 Karlin, S., 35, 42
 Katz, L., 177

Kelly, F., 17, 18, 18n4, 34, 46, 55, 143n4, 145,
 148, 154, 157, 158, 159, 163, 164, 202,
 218
 Kendall, D.G., 17, 18, 18n4, 35, 40, 73, 91,
 158, 218
 Kesten, H., 191, 241, 244
 Keynes, J.M., 201
 Kimura, M., 122
 Kingman, J.F.C., 6, 10, 13, 17, 33, 146, 166,
 174, 184, 219, 225, 229, 231, 233, 234,
 235, 237
 Kirman, A., 47n4, 230
 Kiyotaki, N., 3, 139, 164
 Knuth, D.E., 209
 Kotz, S., 184, 231
 Kullback, S., 51
 Kuznets, 85, 87
 Kydland, xiv

L

Lawler, G., 28, 103, 205
 Leadbetter, M.R., 59
 Leibler, R.A., 51
 Leijonhufvud, A., 99n4, 100
 Letac, G., 191, 192, 242
 Lindgren, G., 59
 Lloyd, S.P., 164, 217

M

Maas, P., 120
 Malinvaud, 100
 Matsuyama, K., 86
 McCloskey, J.W., 236
 McFadden, D., 53, 57
 Mekjian, A.Z., 187
 Milbourne, R.D., 41
 Miller, H.D., 21, 48, 68, 70, 71n1, 118, 119
 Miyahara, Y., 41
 Morse, P.M., 123
 Murphy, K., 86

N

Norris, J.R., 7, 203

P

Padmadasastra, S., 172
 Peliti, L., 122
 Pitman, J., 234, 238, 238n8, 239
 Pollett, P.K., 147
 Prescott, xiv
 Pruitt, W., 242

Author Index

255

R

Resnick, S.I., 191, 192, 241, 244
 Riordan, J., 206, 209
 Risken, H., 19
 Rootzen, H., 59, 191, 192, 241,
 244

S

Sachkov, V., 10, 206, 212, 223n6
 Salinger, A., 120
 Sato, A., 191
 Scherer, F.M., 173
 Schleifer, A., 86
 Schmookler, J., 28
 Schuh, S., 100, 115
 Segerstrom, P.S., 88
 Shepp, L.A., 164, 217
 Shirai, Y., 60, 133, 134, 135, 138
 Shwartz, 217
 Slutsky, xiv
 Smale, S., 76
 Snell, 55
 Soize, C., 118, 119
 Solomon, S., 191, 191n5
 Solow, R.M., 90
 Sommerfield, A., 121
 Sornette, D., 191
 Stanley, H.E., 120
 Stanley, M.H.R., 120
 Stanley, R.P., 210
 Steele, J.M., 214
 Stegun, I.A., 53, 89, 168, 187, 206,
 212
 Stirzaker, D.R., 48
 Sutton, J., 34, 142, 150

T

Takayasu, H., 191
 Tavaré, S., 124, 125, 141, 143, 159n8, 160,
 165, 184, 214, 217, 218, 220
 Taylor, H., 35, 42
 Teugels, J.L., 62, 215, 242
 Thisse, J.-F., 53, 56
 Tiago de Oliveira, J., 65

V

Van Kampen, N.G., 3, 4, 4n1, 9, 19, 25, 136
 Van Lint, J., 151, 206, 210, 227
 Vervaat, W., 191, 192, 242, 244
 Vishny, R.W., 86

W

Watson, G.N., 73
 Watterson, G.A., 6, 8, 124, 154, 158, 168, 170,
 172, 184, 185, 186, 187, 189, 241
 Weiss, A., 217
 Williams, J.C., 88
 Wilks, S., 235
 Willmot, P., 121
 Wilson, R.M., 151, 206, 210, 227
 Woodroffe, M., 244
 Wright, R., 3, 139, 164

Y

Yoshikawa, H., 90n1, 93n3, 94, 111, 115
 Young, A., 88, 89

Z

Zabell, S.L., 6, 10, 12, 13, 102, 180, 219, 229,
 231n7

Subject Index

A

- Abundances, 10, 14, 223, **229**
- Aggregate dynamics, 7, 100
 - binary models, 41–43
 - business cycles, 116
 - combinatorics and, 49–51
 - critical points, 47–49
 - demands, 103–104
 - Diamond model, 130–131
 - feedback in, 41, 69
 - fluctuation and, 35–36, 41–51, 131–132
 - Fokker–Planck equations, 25, 97
 - hazard function, 47–49
 - logistic process models, 35–40
 - master equation. *See* Master equation
 - mean of fraction, 130–131
 - multiplicity and, 49–51, 134–136
 - outputs, 99–103
 - potentials, 45–47
 - production, 99–103
 - shocks, 128n3
 - state variables, 4, 43–45
 - See also* Clusters; *specific models*, *parameters*
- Alarm clock model, 205
- Alternatives, evaluation of, 52–65. *See also* *specific models*
- Anonymous interaction, 41
- Approximate evaluation, 60
- Ascending factorial, 207, 217
- Assemblies, 141, 143, 150–153
- Asymmetric interactions, 80
- Asymmetrical cycles, 128, 136–138
- Asymptotic relations, 210–212
- Asymptotic stability, 45

B

- Backward Chapman–Kolmogorov equations. *See* Master equation
- Bandwagon effects, 1
- Bankruptcy, 78–79
- Bare-bones models
 - business cycles, 86, 96–99
 - demand in, 90–94, 122–126
 - growth rate and, 99–117
 - Langevin equation, 118–122
 - nonlinear, 94–95
 - Poisson models, 87–88
 - Ramsey model, 93
 - sectoral, 95–96, 99–126
 - stochastic, 96–99, 117–120
 - urn models, 88–89, 197
 - See also* *specific models*, *parameters*
- Beta distribution, 187, 197, 230–231
- Binary models, 27, 63, 145
 - aggregate dynamics and, 41–43
 - closed, 30–32
 - dynamics of, 41–43
 - fluctuations and, 41–43
 - open, 32–35
 - See also* *specific types*
- Binomial coefficients, 46
- Binomial distribution, 35, 81, 148
- Binomial random variable, 143
- Birth-and-death process models, 78
 - bankruptcy and, 78
 - clustering and, 154
 - generating functions, 70–75
 - immigration and, 16, 32–34, 69–75, 148
 - nonstationary master equations, 69–75
 - stationary distribution, 70

Subject Index

257

- transition rates, 73–74, 144–150
See also specific models
 Black–Scholes equation, 121
 Block structures, 151, 227
 Bose–Einstein statistics, 149
 Boundary-condition equations, 60
 Brownian motion, 48
 Business-cycle models, 32, 86, 96–99, 111
- C**
 Capacity-limited processes, 150
 Categories, 9
See also types
 Cauchy formula, 151, 216, 218, 226
 Centering constant, 214
 Chapman–Kolmogorov equation. *See* Master equation
 Characteristic curves, 195–197
 Characteristics, method of, 70
 Chartists, 188
 Choice, 142
 set, 2
 Closed models, 16, 18, 27, 30–32
 Clusters
 assemblies and, 150–153
 capacity-limited processes and, 150
 diffusion equation and, 122–126
 discrete frequency spectrum, 177–178
 dynamics of, 157–165
 Ewens formula, and, 160–162, 184
 expected value of, 166–169
 frequency spectrum, 156–157, 172–178
 Herfindahl index, 173–174
 heuristic derivation, 174–176
 interaction patterns and, 141–179
 joint probability density, 169–171
 large, 165–171
 market share models, 184–185
 moment calculations, 171–172
 multisets, 146–150
 parameter estimation, 178–179
 partition vectors and, 153
 size distributions, 141–144
 social, 154
 transition rates, 144–153
 Coalescents model, 124
 Combinatorics, 8, 49–51, 141, 209–210
 Community preference, 57
 Component sizes, 141n1
 Conditional limit theorem, 58
- Configuration, 3
 Congestion effects, 76, 91
 Consistency, of partition, 229, 230
 Consumption models, 32, 93–94
 Continuous-time dynamics, 19–23
 Critical points, 47–49
 Cumulant generating functions, 68–69,
 73–75
 Cycles. *See* Business cycles; Permutation cycles
- D**
 Day–Huang model, 181
 de Finetti theorem, 12–13, 221
 Decision rules, 2
 Decomposable structures, 8, 142
 Defining events, 124
 Demand, 86, 90, 104–105
 Demography, 2, 5, 11, 143, 230
 Detailed-balance conditions
 defined, 18
 equilibrium distribution, 40, 157, 159, 161,
 165, 202
 Ewens formula and, 158
 stationary solutions and, 26, 34, 66–67, 81,
 91
 Deterministic dynamical equation, 117–118
 Deterministic process, 36, 40, 76–79
 Deterministic share dynamics, 77–78, 95–96,
 181
 Deterministic state variables, 60
 Developing economies, 142
 Developmental history, 124
 Deviation equation, 136–138
 Diamond model, 3, 7
 aggregate dynamics, 25, 130–131
 asymmetrical cycles, 136–138
 equilibrium selection, 138–139
 expected value functions, 133–134
 extensions of, 139–140
 fluctuations, dynamics for, 131–132
 mean of fraction, 130–131
 multiple equilibria and cycles, 134–138
 transition rates, 129–130
 value functions and, 60, 132–134
 Diffusion process, 23n3, 44, 55, 93, 122–123,
 244
 Dirichlet distributions, 122, 225, 230–236
 exchangeability and, 166
 generalized, 238

258 **Subject Index**

- Dirichlet distributions (*cont.*)
 marginal distribution of, 172, 233
 Poisson–Dirichlet distribution, 233–234
 size-biased sampling, 234–235
- Disappearance, of goods, 90–93
- Discount rate, 95, 132
- Discrete choice theory, 53, 143
- Discrete frequency spectrum, 172, 177
- Discrete-time models, 25–26, 88
- Disequilibrium analysis, 100
- Dixit model, 32
- Double exponential distribution, 214
- Double-well potential, 99
- Dynamic models, 9–19. *See specific types*
- Dynamic programming, 132
- Dynamic search models, 52
- Dynamics, aggregate. *See* Aggregate dynamics
- E**
- Ecological problem, 10, 13–14, 173, 222
- Economy-wide effects, 34
- Ehrenfest model, 31, 145
- Emergence, of sectors, 110–111
- Empirical distributions, 11–12, 31, 225
- Entropy, 31, 46, 50, 51
- Entry/exit models, 60–61, 215
 Markov processes and, 141–152, 181
 probabilities for, 102, 200–205
 sectors and, 110–112
- Equilibrium cycles, 112
- Equilibrium distribution, 67
- Equilibrium models, 105–107, 127–128, 157
- Equilibrium selection, 138–139
- Ergodic assumption, 191
- Error functions, 48, 53, 62–65
- Euler’s constant, 169, 185, 212
- Ewens distribution
 cluster and, 184–185
 expected value functions, 185–186
 Hoppe model, 185
 market shares and, 181–183
 parameter estimation, 178
 partition vectors, 174
See also Ewens sampling formula
- Ewens sampling formula, 141, 153, 199, 216, 225
 ascending factorial, 216
 clustering and, 162, 184
 detailed-balance conditions, 158
 developmental history and, 125
 entry rate and, 102n4
 examples, 162–164
 partition vectors, 181
 Poisson variables and, 215–219
 sectors and, 110n6
 urn model and, 198
See also Ewens distribution
- Excess demands, 27–30, 104–105, 188–193
- Exchangeability, 200, **220**
 Dirichlet distributions and, 166
 partitions and, 15, 221–225
 sequences, **12–16**
- Exit rate, 37–38, 102, 147
- Expected
 fractions, 169–171, 185
 values, 166–169
 value functions, 133–134
- Exponential generating functions, 151, 215, 227
- Externality, 41
- Extreme value distributions, 53, 57–59
- F**
- Factor productivity models, 88
- Factorial, ascending, 207, 217
- Fashion, 1
- Feedback effects, 69
- Fermi–Dirac statistics, 150
- Field effects. *See* Aggregate dynamics
- Final goods, 93–95
- Finitary approach, 143
- Firms, 141
 growth rates of, 119–120
 stochastic model, 83–89
- Fish-market example, 230
- Fluctuations
 aggregate dynamics and, 35–51
 Diamond model, 131–132
 dynamics for, 131–132
 growth and, 85–126
 logistic process models, 35–40
 two-sector model, 27–30
 underutilized production factors, 99–117
- Fokker–Planck equations
 aggregate dynamics and, 25, 80, 97
 defined, 19, 24–25, 119
 equilibria and, 38–39
 Ito representation and, 120
 Langevin equations and, 142

Subject Index

259

- linear, 25, 80
 master equation and, 19, 24–25, 97, 128
 nonstationary, 142n3
 random deviations and, 128, 131
See also Master equations
- Forward Kolmogorov equation, 122
- Frequencies of frequencies, 10, 14, 223, 229
- Frequency spectrum, 172–178
 cluster size and, 156–157, 172–178
 definition of, **173**
 derivation of, 174–176
 discrete, 172, 177–178
 Herfindahl index, 173–174
 interaction patterns, 156–157, 172–178
 logarithmic distribution, 156–157
- Frequency vector, 221
- Fundamentalists, 188
- G**
- Gamma distribution, 232
- Gamma function, 32
- Gaussian distribution, 99, 138
- GDP. *See* Gross domestic product
- Gegenbauer function, 123
- GEM distribution. *See*
 Griffiths–Engen–McCloskey
 distribution
- Generalized extreme value (GEV) functions,
 65
- Generating functions, 123
 birth-death-with-immigration and, 70–75
 characteristic curves and, 195–197
 cumulant, 68–69, 74–75
 master equation and, 70–73
 methods of, 66–67, 75, 151
 nonstationary distributions, 7
 probabilities and, 67–68
 Stirling numbers, 208
- Generator matrix, 205
- Genetics literature, 124
- Geometric distribution, 35
- GEV. *See* Generalized extreme value functions
- Gibbs distribution, 47, 51, 57–59, 62–64
- Gibbs inequality, 23
- Goods, in markets, 87–93, 122–126
- Griffiths–Engen–McCloskey (GEM)
 distribution, 231, 235, 236–240
- Gronwall inequality, 93
- Gross domestic product (GDP), 99, 100, 107
- Growth, 85–126
 aggregate effects, 102–103
 demand conditions and, 104–105
 deterministic share dynamics, 95–96
 diffusion approximation, 121–123, 244
 emergence of new sectors, 110–117
 equilibrium and, 104–107
 exponential distribution of, 119–120
 of firms, 119–120
 fluctuations and, 85–126
 holding times, 102–103
 innovation and, 90
 invention and, 123–126
 Langevin equation and, 117–121
 of markets, 87–93, 122–126
 partition vectors, 157
 Poisson model, 87–88
 production factors and, 99–117
 random processes, 243
 rates of, 3, 32, 119–120
 sector size equilibrium, 104–105
 stability analysis, 92–93
 stationary distributions, 107–110,
 117–119
 stochastic business-cycle model, 96–99
 time-dependent density, 121–122
 transition rates, 101–102
 urn model for, 88–90
See also specific models, parameters
- H**
- Hamming distance, 72, 73
- Harzard functions, 47–49
- Heat equation, 121–123
- Herding effects, 128n3
- Herfindahl index, 142, 173–174
- Heterorelevance coefficient, 201
- Hicks-neutral progress factor, 90
- Holding times, 28, 29
 growth and, 102–103
 Markov chains and, 27–29, 106, 202–205
 production factors and, 102–103
 sojourn time models and, 205
- Homozygosity, 173
- Hoppe urn model, 185, 197–199
- Households model, 93–95, 141
- Hypergeometric
 distribution, 35
 function, 123
- I**
- Imitation process, 75–84
 stochastic model for, 80–84
- Immigration, 16, 32–34, 69–75, 148, 154

260 **Subject Index**

- Industrial organization, 3, 116, 142, 173, 214
 Infinite-dimensional simplex, 239
 Information measure, 51, 53
 Innovation, 75–80
 deterministic process, 76–79
 growth and, 90
 imitation and, 77–78
 invention and, 123–126
 market shares by, 75–80
 nonstationary equations, 75–80
 stochastic dynamic model, 79–84
 Interaction patterns
 assemblies and, 141, 150–153
 asymmetric, 80
 capacity-limited processes, 150
 cluster distributions and, 141–179
 discrete, 177–178
 frequency spectrum, 156–157, 172–178
 Herfindahl index, 173–174
 heuristic derivation, 174–176
 joint probability density, 169–171
 large clusters and, 165–171
 logarithmic series distributions and,
 153–157
 moment calculations, 171–172
 multisets, 141, 146–150
 parameter estimation, 178–179
 partition vectors and, 153
 r fractions, 169–171
 selections, 141
 stochastic, 41
 symmetric, 84
 time profiles, 1
 transition rates, 144–153
 See also Aggregate dynamics; Clusters
 Interest rate, 61
 Invention, 28, 123–126. *See also* Innovation
 Ising model, 41
 Ito representation, 118, 120
- J**
 Jacobian matrix, 167, 240
 Jensen's inequality, 168
 Johnson's sufficientness postulate, 13, 102, 222
 Joint probability density, 169–171
 Jordan formula, 212
 Jump Markov processes, 6–7, 9, 55
 entry and exit rates, 141, 181
 skeletal Markov chain, 204
 time-homogeneous, 202
 transition rates, 9
- K**
 K-sector model, 27
 Kelly's theorems, 161
 Kendall–Kelly identity, 158, 165
 Kimura solution, 122
 Kingman representation theorem, 222, 225
 Kingman theory, 124, 146, 199
 Kirman model, 47n4
 Kiyotaki–Wright model, 3
 Kolmogorov
 criterion, 46
 cycle conditions, 18
 Kolmogorov forward equation, 21, 119, 122
 Kullback–Leibler measure, 30, 51, 53
- L**
 Labeling, 10, 143, 143n5
 Lagrange multiplier, 54
 Langevin equations, 117–121, 142
 Laplace
 method of, 61
 transform, 61, 167, 186
 Large-deviation theory, 218
 Lawler model, 205
 Lead and lag operators, 43, 98
 Lebesgue measure, 239, 241
 Levy–Khinchin formula, 167, 232
 Logarithmic
 distribution, 156–157
 series, 153–157
 Logistic process models, 35–40, 63, 214
 Lyapunov functions, 22
- M**
 Macrosignals, 54
 Market share models, 85, 153–154, 214
 Ewens distribution, 181–183
 excess demand, 104–105, 188–193
 expected value of fractions, 185–186
 fish-market example, 230
 groups of traders, 180–194
 growth rates, 142
 Herfindahl index, 3
 imitation process, 77–78
 innovation process, 76–77
 joint deterministic process, 78–79
 nonstationary equations, 75–80
 number of clusters, 184–185
 stochastic dynamic model, 79–80
 transition rates, 181–183
 volatility, 187–188

Subject Index

261

- Markov processes
 conditional probabilities, 17
 entry and exit rates, 141, 181
 finite states, 20–21
 graph underlying, 22
 holding times, 27, 102–103, 202–205
 jump. *See* Jump Markov processes
 skeleton, 29, 103n5
 transition rates, 9
 urn models, 197–200
- Marshall quantity adjustment model, 99n3
- Martingale convergence theorem, 197
- Master equation, 6–7, 19–27
 aggregate dynamics. *See* Aggregate dynamics
 dynamics
 approximate solutions, 36–37
 continuous-time dynamics, 19–23
 discrete-time dynamics, 25–27
 generating functions, 70–73
 nonstationary, 66–75. *See* Nonstationary
 master equations
 power-series expansion, 19, 23–25, 66, 130
 probability distribution, 19
 size effects, 2
 stationary solutions, 7
 stochastic model, 36
 time evolution of, 7
 time-varying transition rates, 73
See also Fokker–Planck equations; *specific models*
- Maximum-likelihood, 47
- McFadden model, 58
- Mean field effects. *See* Aggregate dynamics
- Microshocks, 128n3
- Moment calculations, 171–172
- Money traders, 139, 140
- Monte Carlo experiments, 111–112
- Multi-sector model, 27, 111
- Multiagent models, 13–14, 222
- Multiple equilibria, 86, 127–128, 134–138
- Multisets, 141, 143, 146–150
- Mutator, 225
- N**
- Negative binomial distribution, 35, 148
- Neighborhood interactions, 41
- Networks, electrical, 55
- New goods, 87–90, 123
- Newton series expansion, 207, 208
- Niche effects, 34, 148
- Non-Walrasian analysis, 100
- Noninterference, 229–230
- Nonlinearity, 37–41, 127–128
- Nonstationary distributions, 7, 84
- Nonstationary master equations
 birth-death processes, 69–75
 cumulant generating functions, 68–69, 74–75
 deterministic process, 76–79
 equilibrium distribution, 67
 finite number of firms, 83–84
 generating functions, 67–68, 70–73
 imitation process, 77–78
 innovation process, 76–77
 market share models, 75–80
 open models, 66–69
 Polya model and, 38–40
 stationary probability distribution, 70
 stochastic dynamic model, 78–84
 time-inhomogeneous transition rates, 73–74
See also Master equations
- Normalizing constant, 45, 108, 160
- O**
- Occupancy problems, 5, 12, 143
- Old-age effect, 91
- Open models, 16, 27, 32–35, 66–69
- Operator notation, 98
- Optimality condition, 134
- Option-pricing equation, 121
- Order statistics, 15, 143, 213–214
- P**
- Pairwise interaction, 41
- Parabolic partial differential equations, 119, 121
- Parameter estimation, 178–179
- Partition vectors, 14, 143, 151
 cluster distributions and, 153
 detailed-balance conditions and, 165
 equilibrium distribution, 165
 Ewens formula, 162, 174, 181
 growth processes, 157
 interaction patterns and, 153
 partition process, 199
 state vectors, 5–6, 10
 transition rates and, 153
 urn models, 198–199
See also Partitions
- Partitions, **210**
 consistency and, 229–230

262 **Subject Index**Partitions (*cont.*)

- exchangeable, 14, 15, 220–224
 - finite sets, 210
 - noninterference of, 229–230
 - patterns of, 10, 164–165
 - permutations and, 225–229
 - random, 12–14, 166, 226–229
 - vectors. *See* Partition vectors
- Percolation models, 142n2
- Permutations
- consistency and, 230
 - cyclic products, 14, 16, 209–210, 223
 - noninterference and, 229–230
 - random partitions and, 226–229
- Poisson approximation, 35, 214
- Poisson–Dirichlet distribution, 8, 225, 233–234, 237–238
- Poisson distributions, 35, 81, 165, 218
- Poisson growth model, 87–88
- Poisson process, 129
- Poisson random variables, 215–220
- Polya distribution, 26, 31–32, 38–40, 148
- Polya model, 13, 88–89, 164, 197–198, 222–225
- Population genetics, 10, 14, 28, 172, 223
- Potential, definition of, 45–49
- Power laws, 190, 241, 244
- Power-series expansions, 19, 23–25
- Pricing theory, 190–194
- Probability-generating function method, 67–68
- Product developments, 123–126
- Production factors
- aggregate outputs, 102–103
 - emergence of new sectors, 110–111
 - employment and, 129
 - equilibrium and, 105–107
 - excess demand conditions and, 104–105
 - growth and fluctuations, 99–117
 - holding times, 102–103
 - sector size equilibrium, 104–105
 - stationary probability distribution, 107–110
 - transition rates, 101–102
 - underutilization of, 99–117
- Productivity across sectors, 86
- Q**
- Quantity adjustment model, 99n4, 100
- Quasilinear partial differential equations, 195

R

- Ramsey model, 93
- Random combinatorial structures, 49–51, 141, 144, 146, 150
- Random graphs, 146n6
- Random growth processes, 243
- Random partitions, 12–14, 166, 219, 226, 229
- Random walks, 112, 145
- Ranking function, 240n10
- Recursion, 176–177, 207–209
- Reversibility, 18
- Reservation cost, 61, 129, 134
- Residual allocation models, 235, 238
- Riccati equation, 73
- Risk, 128n3

S

- S-shaped profile, 94
- Sampling-of-species problem, 6, 13, 14, 15, 180, 222–223, 229
- Savings rate, 95
- Scaling, 20, 43–44
- Schmookler study, 28
- Search model. *See* Diamond model
- Sector sizes, 28, 104–105, 110–111
- Selections, 141, 143, 144–146, 150
- Separation of variables, 131
- Series expansion, 23–25
- Shannon entropy, 30
- Simple models, 27–40, 87
- Simplex analysis, 143, 231, 239
- Singleton, **158**
- Size-biased distributions, 122–126, 141–144, 153, 231–240
- Size distributions, 122–126, 141–144, 153
- Skeletal Markov chains, 29, 103n5, 202–205
- Social influence. *See* Aggregate dynamics
- Sojourn time, 28, 102, **203**, 205
- Species sampling, 180
- Stability analysis, 92–93
- State-dependent models, 42
- State vectors, 3, 5–6, 9–11
- Stationary distributions, 70–73, 84, 107–110, 117–119
- Step function, 134
- Stirling numbers, 151, **206**
 - approximation, 164
 - asymptotics and, 210–214
 - combinatorics and, 209–210
 - cycle structures, 209

Subject Index

263

- explicit expressions, 210–212
 - finite-difference expressions, 207
 - first kind, 156, 176, 185
 - formula for, 30, 50, 156
 - generating function, 208
 - inverse relation between, 213
 - recursion and, 89, 207–209, 226
 - second kind, 207, 210, 226, 228
 - signless, 208
 - Taylor series and, 206
 - unsigned, 89
 - Stochastic difference equation, 241–243
 - Stochastic models
 - business cycles and, 96–99, 128n3
 - difference equations, 241–243
 - finite number of firms, 83–84
 - imitation or innovation, 79–84
 - market share models, 79–80
 - master equation, 36, 79–84
 - nonstationary equations, 79–80
 - power laws, 241
 - Stock markets, 13–15, 66, 75–80, 181–183
 - Strong Markov property, 203
 - Structure, 151
 - Sufficient statistics, 12
 - Sufficientness postulate, 13, 102, 222
 - Sums, approximate, 61–62
 - Symmetric interactions, 84
- T**
- Tail behavior, 241
 - Taylor series, 7, 66
 - Technical progress, 28, 85, 90
 - Tilted probability distributions, 144
 - Time-dependent density, 121–122
 - Time dynamics, continuous, 19–23
 - Time homogeneity, 73–74, 203
 - Transition rates, 129
 - assemblies and, 150–153
 - capacity-limited processes, 144–153
 - changes of type, 200–202
 - cluster size distributions and, 144–153
 - Diamond search model, 129–130
 - dynamic models, 16–17
 - entries/exits, 200–203
 - growth and fluctuations, 101–102
 - interaction patterns and, 144–153
 - jump Markov processes, 9
 - market shares and, 181–183
 - multisets, 146–150
 - partition vectors and, 153
 - production factors, 101–102
 - selections, 144–146, 150
 - simple, 33, 146
 - specifications of, 101–102
 - time-inhomogeneous, 73–74
 - types of, 144–153
 - Tree structure, 70, 145
 - Two-sector model, 105–111
 - Types *see* categories
- U**
- Unanticipated knowledge, 222
 - Uncertainty, 32, 45, 47
 - Unemployment, 60, 129–135
 - Urn models, 31, 87, 88, 163
 - emergence of goods, 88–90
 - Ewens formula and, 198
 - growth and, 88–90
 - Hoppe model, 197–199
 - interpretation of, 125
 - Markov chains and, 197–199
 - partition vectors, 198–199
 - Polya model. *See* Polya model
 - Possion approximation, 215
 - U.S. Patent Office, 28
 - Utilities, maximization of, 58
- V**
- Value functions, 54–57, 132–134
 - approximate, 60
 - Diamond model, 132–134
 - evaluations of, 60
 - number of alternatives, 60
 - Van Lint–Wilson theorem, 151, 153, 227–228
 - Volatility, 189–190
- W**
- Watterson equation, 124–125, 241
 - Wiener process, 118, 120
 - Wilks theorem, 235
- Y**
- Yoshikawa model, 111
- Z**
- Z-transforms, 98
 - Zero excess demand, 104, 188–189
 - Zipf distribution, 153, 244