Index

aluminium prices, 95–6, 278–9, 284, 285
Amemiya, T., 198
Anderson, T.W., 170
Ando, A., xvii, 35, 111, 169, 171
asymptotic standard errors, 143, 202
automobile changes, see costs of automobile changes

Brundy, J.M., 98
cartels, 262
causal orders, 161
causation, 60–9
individual decision-makers, 60–1
markets and equilibrium, 61–2
simultaneous equations, normalization rules, 62–5
simultaneous models, 65–6
Chow, G.C., xx, 68, 169, 210, 257
Christ, C.F., 98
completely decomposable model, definition, 102
Conrad, A., 123, 125
convex set, 125
Cooper, J.P., 306
Cootner, P.H., xv
copper,
Canada, supply, 269 Table, 271–2
Chile, production and prices predictions, 297, 298 Table, 299, 300–1
Table, supply, 269 Table, 271,
world copper market, 262
demand, data sources, 302–3
equations, 277–85
forecasts, 295 Table, 300 Table
effects of aluminium price, 95–6, 278–9,
284, 285
Europe demand, 278 Table, 283
exports, forecasts, 295 Table, 301 Table
indices of copper-using industrial activity, 279–80
Japan, demand, 278 Table, 283, 284
copper—contd.
LME price, 263, 264, 286–8, 289, 290, 291, 293–4
forecasts, 294, 295 Table, 296, 297, 300 Table
model, world, 94, 95
price elasticities of demand and supply, 265
prices, 285–8
data sources, 301
primary supply, 263, 269–73
data sources, 301–2
forecasts, 295 Table, 300 Table
scrap, forecasts, 295 Table, 300 Table
secondary supply, 263, 273–7
data sources, 302
stocks, data sources, 303–4
US consumption compared with supply, 264
US demand, 278 Table, 280–1, 283, 292
US market price, 263, 264, 265–6
US primary supply, 269 Table, 270, 271
US producer price, 285–6, 291
US secondary supply, 273 Table, 274–7
Zambia, supply, 269 Table, 272, 293
copper industry
econometric model, xx, 261–311
conclusions, 291–2
data used, 299–304
distributed lags and estimation methods, 266–9
equation explaining net exports, 288, 289–91
forecasts and predictions, 292–306,
Chilean production and prices, 297, 298 Table, 299, 300–1
Table, LME price, 294, 295, 296 Table, 297, 300 Table
forecasts used in simulation, 304–6,
price indexes and exchange rates, 304, production indexes, 304–5
general form, 263–4
identities accounting for changes in stocks, 288–9
why two market system works, 264–6
correspondence principle for simultaneous equations estimation, 37–59
costs of automobile changes, xx–xxi, 342–67
advertising, 345, 346 Table, 347
aims of study, 342–3
automatic transmission, 345, 346 Table, 363
changes, definition, 342–3
costs, definitions, 342
direct, 342, 343–5, 346–8 Tables, 349
secondary, 342, 361
total and conclusions, 361–4
customer’s utility function, 343
gasoline consumption, 351–60
costs of model changes, 357, 358
Table, 359, 360 Table
data sources, 351
gine size and fuel economy, 351–3,
354 Table
gine size and horsepower, 353–4,
355 Table, 356 Fig, 357
Fuel Economy Factor, 352
power brakes, 345, 346 Table, 363
power steering, 345, 346 Table, 363
research and development, 349
retooling expenditure, 349–50, 351
Table
size and horsepower, 344, 346 Table, 363

crucial disturbance correlations, 191

Dantzig, G., 33
De Leeuw, F., 58
Debreu, G., 68
decomposable model, definition, 102
Desai, M., 210
determinate system, 115
determinate view, 116–17
disequilibrium price formation, theory, 62, 64
disturbances, 203
seriously correlated, 82–3
simulation and forecasting, 92–4
Dollett, L., 365
Doob, J.L., 124, 125
Dorfman, Prof, 125
Drèze, J., 206, 241
Duesenberry, J.S., 56
Durbin–Watson statistic, 192
dynamic model, stability, 154
economy-wide models, 129–73
block-recursive assumptions, 147–8
lagged endogenous models, 136, 138
stability, 155
see also individual estimators
Eisenpress, H., 168, 209
equilibrium analysis, xvi–xvii
equilibrium prices, 61
estimators,
choice of predetermined instrumental variables, 144–57
disturbances, 147, 148–52
see also lagged endogenous variables classification, 130
full-information estimators, 130, 139–40, 186–8, 199
instrumental variables, causal criterion, 157–8
choice of, xix, 174–83, different instruments for different variables, 175, 178–81, identities, 174, 175–7, computational aspects, 181–2, preference ordering, tied variables, 175, 177–8, see also SOIV estimator rules for the use of, 160–7 limited-information estimators, 130, 140–4, 154, 186, 188–9 multicollinearity, elimination, 159–60, 164 ordinary least squares, 130, 131–9, 143, 186, 203 see also individual estimators

Fair, R. C., 98, 210, 307, 309
Faulkner, H. U., 315
Faxér, P., 34, 168, 210, 338
Federal Reserve Board index of industrial production, 279–80, 284 feedback effects, 72–7 determining size, 85–6 lagged versus simultaneous, 74–5 simulation and forecasting, 88–94 feedback loops, 204 block recursiveness, 79, 82 within-sector, 76 firemen, effect of removal, xxi–xxii, 369–400 background, 369–70 changes of crew, effect on collisions, 388, 390 Table Class I railroads, 394–5 Table, 396 collisions, 371–2 conclusions, 393–5 derailments, 371, 372 fireman to engineer ratio, 375, 379, 380 Table, 381–2, 384 measure of activity, 375, 380 Table, 383 methods of analysis, 372–3 ratio model, 374–5 support crew hours to engineer hours, 388, 389 Table support crew variable, 375, 376–7, 382, 383, 384, 385 Table, 386 train accidents, collisions, 375–88, results-principal, 379, 380 Table, 381–4, 385 Table, 386, results-subsidiary, 386, 388, variables, 375–9 definition, 370 derailments, 388, 390–1, 392 Table, 393 train length, 390–1, 392 Table, 393 train-service accidents, 371 definition, 370 types of accidents analyzed, 370–2 Fisher, F.M., 98, 111, 168, 169, 210, 225, 241, 242, 309 Fishlow, A., 312–14, 315, 340 Fogel, R.W., 314, 315 forecasting see simulation and forecasting Forrester, J., 96 full-information estimators, 130, 139–40, 186–8, 199 full-information maximum likelihood, 130, 139–40, 186


income redistribution, governmental regulation, economic activity, 261–2 index of construction materials, 279, 280, 284 instrumental variables, xviii, 193, 194–9 good, 196–7 selection, using prior structural information, 198–9 investment decisions, 64
Jacobs, W., 33
Johnston, J., 168, 169, 338
Jorgenson, D., 198
Jureen, L., 33, 56, 58, 168

\textit{k-class estimators}, xix, 142, 144, 188
choice of and approximate
specification, xix–xx, 217–18, 228–42
estimators and inconsistencies, 231–2, discussion, 236–7, signs of
differences, between LIML and 2SLS, 232–6
examples, 237–40
implications of theorem, 224–5
notation: model and errors, 230–1
preliminary lemmas, 218–23
principal result, 224
specification error, xix, 213–27
statement of the problem, 214–16
double, 141
probability limit of \( k \), 216–17
Kadane, J.B., 188
Kaysen, C., xx, xxi
Kempthorne, O., 257
Klein, K., 139, 143–4, 171, 210, 225, 312–14, 327, 337
Klein–Goldberger model, 50
Kloek, T., 159, 170, 197
Koopmans, T.C., xxiii, 32, 33, 68, 225, 241
Koyck, L.M., 266, 279, 306, 337
Kraft, G., xxi, xxii
Kuh, E., 257
Kullback, S., 257

lagged endogenous variables, x, xviii, 77, 82, 83, 145, 159, 161
autocorrelated disturbances, 191–4, 195, 206
implications for the use of, 152–7
properties of disturbances to equation, 147, 148–52
Leamer, E., 249
least squares, 175
regression theory, 23, 243–9
residuals, 191
see also \textit{k-class estimators}
Leenders, C.T., 139, 168, 209
Leipnik, R.B., xxiii, 32, 33
Leontief, W., 125
Lesnoy, S., 98, 168
Levi, M.D., 248
limited-information estimators, 130, 140–4, 154, 186, 188–9

limited-information maximum likelihood estimator, 141–2, 186, 187, 188–9, 199–200, 228–9, 232–4
see also \textit{k-class estimators}
linearized maximum likelihood estimator, 130
Lintner, J., 34
Liu, T.C., xi, xx, 3–6, 12, 15, 29, 30, 168, 210, 240
Livingston, F.R., xxii
Lytikens, E., 68

McGettigan, J.T., 59
McNicol, M.D., 306, 310
macromodels, xvii, 70–99
Madansky, A., 168, 209
Maddala, G.S., 198, 364
Malinvaud, E., 226
Mann, H.B., 170
Markov matrix, 114
Markov tensor, multiple, 114, 117
Markovian reduction, historical process, 121–2
Weltanschauung, 117
maximum likelihood estimators, 175, 206, 207
Mennes, L.B.M., 159, 170, 197
Merk, F., xx
Meyer, J.R., 123, 125
Monroe Carlo experiments, 142, 143, 199, 226
Moore, G., 337
multicollinearity, elimination, 159–60, 164

Nagar, A.L., 141, 143, 168, 169, 188
Nakamura, M., 139, 143–4, 210, 225
Narasimham, G.V.L., 49
nearly, completely decomposable, definition, 103, 110
nearly decomposable, definition, 103, 110
non-Markovian process, 115
nonlinearities, 19–201
normalization rules, xvi, 142, 208–9
Norman, M., 59
Nowshirvani, V.F., 337

observation interval, xiv, 38
omitted variables, Liu's opinion, 15
Orcutt, Prof G.H., 125
ordinary least squares, 130, 131–9, 143, 186, 203
assumptions and properties, 131
recursive systems, economy-wide models. 135–6
recursive systems and assumptions, 132–5
reduced-form estimation, 137–9
Wold's recursive model, 131, 132–9
see also Proximity Theorem

Parker, W.N., 312–14, 327, 337
Phillips, A.W., 210
policy variables,
independent use, xvii, 100–12
approximate conditions and results, 109–11
complete decomposability and welfare function, 104–6
decomposability and complete decomposability, 102–4
model, 101–2
revision of policy rules, 110
weaker conditions, decomposability, 106–9
predetermined variables, x, 205
preference ordering, tied variables, 175, 177–8
prices, 107
demand see supply and demand setting, 61–2
Proximity Theorem, 20–30, 23–4, 136–7, 154
purchase decisions of consumers, 64

Quandt, R.E., 201
quantity and price, 63
quasi-convexity, 118

Rao, C.R., 257
reaction interval, xiv, 38
recursive systems, 190–1
assumptions, 132–5
economy-wide models, 135–6
see also block recursive systems
reduced-form equations, ordinary least squares estimation, 137–9
regional specialization in wheat, xx, 312–41
acreage and yield data sources, 335–6
assessing role in growth, 312–14
data, 316
elasticity of supply, 314, 315
model, 316–21
adaptive expectations version, 318, 320

application of results, 326–8, 329–31
Tables, 332, 333–4 Figs
basic equations, 317–19
estimation methods, 321–2
results, 322, 323–5 Table, 326
stock-adjustment, 318, 320
price data sources, 336
regression coefficients,
test of equality of sets of, xx, 250–8
inadequate degrees of freedom, 256–7
lemmas, 250–2
positive degrees of freedom, 252–5
test of equality of subsets of, 254–5
Resnick, S.A., 365
Rie, D., 56
Rogowski, A.R., 366
Rosenblatt, H.M., 257
Rothenberg, T.J., 33, 139, 168, 209, 226, 241
Rubin, H., xxiii, 32, 33

Samuelson, P.A., 39, 68
Sargan, J.D., 35, 168, 169, 170, 209, 210, 242
savings and investment decisions, 63
Schultz, H., 210
sector,
definition, 72–3
diagrammatic representation, 73, 74 Fig
sectoral estimation, ignoring feedbacks, 84–8
sectoral models,
definition, 70
feedback effects see feedback effects relationship with macromodels, xvii, 70–99
see also simulation and forecasting, sectoral models
self-contained equation, definition, 14
Shapiro, D., 365
Simon, H.A., xviii, 14, 68, 111, 169, 170, 210
Simon–Ando theorem, 31
simple specification error, determination of sign and magnitude, 243–9
simulation and forecasting, large models, see submodels
simulation and forecasting, sectoral models,
ignoring feedbacks, 94–7
no feedbacks ignored, 88–94
correlated disturbances, 92–4
exogenous models, 89–92
object of experiments, 96
simultaneous equations, normalization rules, 62–5, 75–6
simultaneous equations estimation.
  applied theory, 184, 189–203,
  asymptotic variance-covariance matrix, 201–2,
  instrumental variables, 193,
  194–9, lagged endogenous variables and autocorrelated disturbances, 191–4
  nonlinearities, 199–201
  recursive systems, 190–1
  as approximations, 66–8
  block recursive, see block recursiveness conditions which must be satisfied, 37–59
  general case, 44–5
  linear model, 41–3
  normalization rules, 46–7
  small time lag, 38–41
  solution by iteration in general case, 45–6
  solution by iteration in linear case, 43–4
submodels, 47–51
  costs of approximate specification, block recursive systems, omitted variables, 12–20, misspecification in the a priori restrictions, 6–12, Proximity Theorem, first generalization, 20–4, second generalization, 24–30
see also k-class estimators, choice of and approximate specifications
  metatheory, 184–5, 204–9
  pure theory, 184, 185–9
see also full-information estimators
see also limited-information estimators
see also Liu, T.C., Wold, H.
Skidmore, F., 365
SOIV estimator, 174, 198–9, 208
specification error, k-class estimators, see k-class estimators
Steurt, J., 59
Steward, D., 169
stochastic system, 115
stochastic view, 116
Strauss, F., 337
Strotz, R.H., xv, 14, 32, 56, 69, 168, 206
structural equations, inconsistency in estimation, xi, 3–35
  measuring fit, 202
  structurally ordered instrumental variables estimator, see SOIV estimator
submodels, xvi, xvii, 47–51
  experience with actual model, 50–5
  failure, 49–50
  supply and demand, 63
  supply and demand curves, 209
Taylor, L.D., 170
Temin, P., xx
Theil, H., 9, 11, 35, 98, 139, 141, 168, 169, 183, 188, 210, 225, 241
three-stage least squares, 130, 186, 187, 208
Thucydides, 121, 122
time intervals, xiv
time lags, xv–xvi
Toynbee, 121–2
Travis, C.M., 365
triangular coefficient matrices, 190, 191
triangular matrix, 12
Tucker, G., 339
two-stage least squares, 141, 144, 186, 187, 188–9, 199, 200, 202, 203, 208, 229, 232–4
unrestricted least squares estimation, reduced form, 4, 12
unweighted averages, 47
Uzawa, H., 32
variables,
  endogenous, description, x
  nonlinearities, 199–201
  treated as exogenous, 87–8
  exogenous, description, x
  simulation and forecasting, 89–92
predetermined, choice of, 144–57
Wald, A., 170
Wallis, K., 210, 338
Waugh, F., 168
wheat in US, see regional specialization in wheat
Williams, H.A., 367
Wold, H., 6, 14, 23, 30, 33, 34, 56, 65, 68, 98, 131, 132–9, 168, 206, 210, 338
Zellner, A., 139, 168, 187, 210