Note: Page numbers followed by "n" indicate notes.

Adaptive Lasso, 116–117	Bayesian MIDAS quantile regression, 3
Advanced Central bank interventions,	methodology, 112
368–369	Bayesian model averaging (BMA), 261
Aggregate, 121	Bayesian model fit, 332
uncertainty, 90	Bayesian quantile regression (BQR),
Agnostic shocks, 330, 336–338	112, 114–115
Agnostic structural disturbances	Bayesian MIDAS quantile
(ASDs), 336	regression, 113
Agriculture, 10	density nowcasts, 120
Alternative frequentist model	estimation, 119
averaging approaches, 264	global-local shrinkage priors,
American Statistical Association	117–119
(ASA), 101	likelihood and conditional
Approximate Bayesian Computation	posteriors, 115
approach, 348n4	methods, 3
Approximate bias, 185	MIDAS quantile regression, 113–114
Asymmetric Laplace densities (ALD),	mixture normal prior, 119
114	nowcasting Euro area GDP
Augmentation strategy, 340	growth, 122–129
Autoregressive density (AR density),	parameter-specific shrinkage priors,
123	116–117
Autoregressive distributed lag model	real-time data, 121–122
(ARDL model), 391	shrinkage priors, 115–116
Autoregressive processes, 226	Bayesian VAR (BVAR), 3, 134, 139–140
Average daily temperature (AVG), 10	Behavioral model weight statistic, 265
Average forecast accuracy, 144–148,	Bias, 228–230
152–154	conditional, 239–248
Average-type test, 180	Big data, 112, 129
	Block matrix, 311–312
Bank of England, 354	Blue Chip forecasts, 103–104
Bank of Japan, 354	Break points estimation, 180
Bates-Granger approach, 91	Business cycle synchronization, 278
Bayes factor, 332	
Bayesian approach, 94	Caixa Economica Federal, 1
Bayesian estimation, 332	Ceteris paribus, 90
for VAR models, 134–135	Chicago Marchantila Evolungo
	Chicago Merchantile Exchange
Bayesian framework, 348 <i>n</i> 4 Bayesian Lasso, 116	(CME), 16 China, 304

C1: T 1 .: 1 D 1 .: : (CTD) 215	0 11 1 1
China Industrial Productivity (CIP), 315	financial market impact
Cholesky decomposition, 284–285	of COVID-19 QE
Classic ANOVA method, 98	announcements, 364
Classic theory, 388	other advanced Central bank
Climate change, 10	interventions, 368–369
CMR model, 333–334, 339	pandemic, 127–129, 387
Cobb-Douglas panel production	QE, 360
function, 307	robustness, 371–373
Combined estimator, structural breaks	Cross-section dependence, 391
model and, 181–184	CSS model with time-varying fixed
Common factors, 281–282	effects (CSSW), 316
Conditional bias, 226, 239–248	CSS model with time-varying random
Conditional forecast(ing), 171, 228	effects (CSSG), 316
bias and MSE, 228–230	Cumulative ranked probability score
forecast error decomposition,	(CRPS), 123
230–231	(= 1-7)
simulation-based estimators,	Data generating process (DGP),
231–232	162–163, 205, 259
unknown break dates, 232–233	Debt-management, 387
Conditional MSE, 235–239	Debt-GDP
Congressional Budget Office (CBO),	ratio, 388–389, 396
103	threshold, 388
Constant parameters, 227	Decomposition method, 306
Consumer Confidence Indicator	Dense data environments, 116
(CONS), 121	Density forecasting, 141–143 (see also
Cornwell, Schmidt, and Sickles model	Conditional forecast(ing))
(CSS model), 314	Density forecasts, 152. (see also Point
Country-specific QE effectiveness,	forecasts)
373	average forecast accuracy, 152–154
Dollar factor, 377–378	forecast accuracy for individual
GVAR model, 373–375	series, 154
QE interventions contains real	tests for equal predictive accuracy,
effects, 378–380	154–156
spillover effects from country-	Density nowcasts, 120
specific long-term interest rate changes, 375–377	Diagonal blocks, 312
world interest rate factor and	Dimension reduction techniques, 134,
	137
loadings, 375	BVAR, 139–140
COVID-19, 354	factor augmented VAR, 137
announcements, 354, 356–357	LASSO, 139
bond yield and exchange rate	partial least squares, 137–138
impacts, 365–366	random compression, 138
crisis, 377	random projection, 138
emerging market interventions,	random subset regression, 139
369–371	Direct forecasts, 140
Fed interventions 367_368	Dirichlet-Laplace (DL) 116

Disaggregate, 121	Error correction model (ECM), 391
Disagreement, 92–94	Estimated posterior probability, 258
Discrepancy measures, 320, 333	European Central Bank (ECB), 1,
general and specific, 333–334	354, 360
system wide, 334–338	European Commission (EC), 121
Distributed lag functions, 113–114	European sovereign debt crisis, 278
Distributional temperature variation, 10	European Union, 279
Diurnal asymmetry, 11	Event set, 363–364
Diurnal temperature range (DTR), 2,	Event study methodology, 361–363
10–11	EViews code, 20n3
Dollar factor, 377–378	Ex ante real rate, 393
Downward DTR, 12–13	Ex post real rate, 393
Duration statistic, 265	Exchange rate, 5, 258
Dynamic stochastic general	adjustment, 281
equilibrium models (DSGE	characterizing exchange rate
models), 5, 286, 330–332	determination for five
general and specific discrepancy	currencies, 265
measures, 333	comparison with alternative
measure of fit, 332	frequentist model averages,
modifying straitjacket, 340-342	269–271
moments matter, 333–334	determination, 258
purpose of straitjacket, 342–347	disconnect puzzle, 258
specific measures, 334	exchange rate fundamentals and
Staitjacket fit for purpose, 339–340	structural uncertainty, 259
system wide discrepancy measures,	meta modeling, 261–265
334–338	meta-NNT models, 267–269
	meta-NNT models forecasting
Econometrics, 1	performance, 271–272
analysis, 2	model averaging techniques, 258–259
GVAR, 1–2	modeling structural uncertainty,
of heterogeneous dynamic panels, 1	261
macro modeling and policy	PPP, 260
analysis, 5–6	Exponential-type test, 180
model instability and breaks, 4	
prediction, 2–3	Factor augmented VAR (FAVAR), 3,
specifications, 204	134, 137
Economic Sentiment Indicator (ESI),	Factor-augmented classical quantile
121	regressions, 123
Elastic Net, 117	Factor-augmented quantile
prior distributions, 117	regressions, 113
Endogenous priors, 334	Financial crisis, 148
Equal predictive accuracy, tests for	Financial institutions, 1
density forecasts, 154–156	Financial market impact of COVID-19
point forecasts, 151–152	QE announcements,
Equal Weights (EW), 123	364–373
Equilibrium-correction models, 210	Financial time series, 180

Financial Times, 2	dimension reduction techniques,
Finite sample	137–140
application, 248	exercise, 143–144
conditional forecasting, 228–233	expected gains from switching
constant parameters, 227	between forecasts, 161–162
forecast error decomposition,	gains from switching between
226–227	models, 162–166
forecast properties, 227	iterated and direct forecasts, 140
model, 2229	models, 3, 160
parameter instability, 227–228	performance, 160, 169
properties, 185–187	persistent regressors, 167–168
replication of Hansen and	sources of specification error,
Johansen, 248–250	168–170
sample extension, 250–251	structural break, 187
window length selection, 233-248	switching rule, 160–161
First-order autoregressive model, 4	time varying parameter forecasts,
Flash estimates of quarterly GDP	140–141
growth, 112	Forecasts, 112, 204
Forecast error, 92	combination, 90
decomposition, 226, 230-231	uncertainty and asymptotic
Forecaster heterogeneity, 91–92	properties, 95–96
aggregate uncertainty, 90	Foreign and International Monetary
measures of forecast uncertainty	Authorities (FIMA), 382n2
and asymptotic properties,	FRED-MD database, 3
95–96	Free capital mobility, 279
measures of historical uncertainty and tests for, 95	Frequentist quantile regressions, 114
Monte Carlo simulation, 99–100	Gaussian nowcast density using
tests for forecaster homogeneity	principal components (Gau
and asymptotic	PCA), 125
distribution, 97–99	Gaussianity, 123, 125
uncertainty and disagreement,	Generality, 227
92–94	Generalized impulse responses
underestimation of uncertainty	functions (GIRFs),
in US GDP and inflation	294–296, 378
forecasts, 100–105	Gibbs sampler, 119
Forecasters, 3, 90	Global financial crisis (2008), 125,
homogeneity and asymptotic	217, 278
distribution, 97–99	Global Historical Climate Network
Forecasting	database (GHCN), 11
approaches, 136	Global interest rates, 394
after break with misspecified	Global QE, 354
model, 205–206	Global value chain (GVC), 304
choice of instruments, 170	network, 306
conditional, 228–233	US-Sino Decoupling simulation in,
density forecasting, 141-143	322–324

Global vector autoregressive modeling	Impulse response function (IRF), 279,
(GVAR), 1–2, 281	283–284
Global-local shrinkage priors, 117	Indicator saturation methods, 213
DL Priors, 117–118	Individual forecasts, 3
HS Prior, 118–119	Industrial Confidence Indicator
modeling, 358–359, 373–375	(INDU), 121
Government debt, deficits and interest	Industrial production (IP), 121
rates	Inflation puzzle, 279
advanced economies, 386	Information set as within-quarter data
background, 388–390	accrue, 121–122
baseline model, 395–396	Inter-temporal budget constraint,
data, 392–395	389–390
dependent variable, 399	Interest rates, 278, 386–387
empirical results, 395	parity fundamentals, 260
estimators, 391–392	International Association of Applied
lagged debt, 397–398	Econometrics (IAAE), 2
long-run effect of world interest	International Monetary Fund, 1
rate, 396–397	International spillovers
World real interest rates, 387–388	of economic growth, 305
Government deficits, 386	effects on productivity, 306
Graccident, 279	International trade, 304–305
Great Recession, 354	flows, 315
Grexit, 279	Iranian Economy, 1
Gross domestic product (GDP), 5,	Ireland's model, 336–337
279, 373, 386	IS-LM model, 331
GDP-at-Risk nowcasts, 113,	Iterated forecasts, 140
125–127	
Growth-at-risk estimates, 112	Joint probability distribution, 10
	Jorda-Schularick-Taylor macrohistory
Hausman-Wu statistic, 317	database (JST macrohistory
Heterogeneity, 305	database), 386, 391–392
Heterogeneous learning model, 102	
Heterogeneous technical progress in	Kalman filter, 331, 339, 347
Solow residual, 307–308	KLEMS database, 315
Heteroskedasticity, 98	,
Heteroskedasticity and	ℓ²-norm-based loss function, 279
autocorrelation consistent	LASSO, 116–117, 139
(HAC), 11	estimator, 134
Hicks-neutral technical change, 306,	shrinkage approaches, 3
310–311	Law of one price, 260
High-order VARs, 330	Learning-by-doing, 315
Homogeneous productivity growth, 305	Levene test, 98
Homoscedasticity, 98	Likelihood
Horseshoe (HS), 116	and conditional posteriors, 115
Hypothesis testing, 1	function, 314
Idiosyncratic error variances, 104	Linear mixed-effects model, 102

Linear Opinion Pool (LOP), 123	Model selection, 1
Location shifts, 204	Model uncertainty audit, 94
Logarithmic score (logS), 123	Model weights, 262
Long differencing, 204	Modeling structural uncertainty, 261
Low-order VARs, 330	Monetary policy, 278
,	empirical results, 288
Macro modeling, 5–6	free capital mobility, 279
Macro policy maker, 90	French independent, 293–294
Macroeconomic/macroeconomy, 180,	generalized IRFs, 294–296
278	impulse response functions, 283–284
aggregates, 280	literature review, 280–282
Marginal data density (MDD), 5, 330,	matching weights, 289–291
332	methodology, 282
Markov chain Monte Carlo	New Keynesian theory, 291
techniques (MCMC	procedure, 284–288
techniques), 102	procedure, 284–288 puzzle, 291–292
Markov Switching models, 331	synthetic control, 282–283
Maximum temperature (MAX), 10	Monte Carlo simulations, 4, 99–100,
Mean group estimator (MG	188–190
estimator), 391, 395	Monte Carlo study, 91
Mean square error (MSE), 181, 226,	Monthly indicators, 121
228–230	Moran tests, 325n8
conditional, 235–239	Moran's I test, 317
Mean squared forecast errors	Most recent best forecasts (MRB
(MSFE), 181, 206	forecasts), 264
Membership in monetary union, 278	Multi-step forecasting
Meta modeling, 5, 259, 261–262	Bayesian estimation for VAR
alternative frequentist model	models, 134–135
averaging approaches, 264	density forecasts, 152–156
meta approach, 263–264	forecasting approaches, 136–143
meta-NNT model, 265	forecasting exercise, 143–144
model averaging, 262	point forecasts, 144–152
model weights, 262	Multidimensional physical systems, 10
Meta-NNT models, 265, 267–269	Multiple imputations (MIs), 102
forecasting performance, 271–272	Multi-Sector model, 348n5
Michigan Survey of Consumers, 91, 185	Multivariate time series, 180
MIDAS quantile regression, 113–114	
Minimum temperature (MIN), 10	N-dimensional VEC model, 227
Missing at random (MAR), 107n9	Naïve forecasting methods, 4
Misspecified functional form, 168–169	Naive robust forecasts, 206. (see also
Mixture normal prior, 119	Robust forecasts)
Model averaging, 5, 258, 262	random walk, 206–207
Model checking, 330	robust predictor, 207–209
Model confidence set (MCS), 264	Naive time–series models, 204
Model instability, 258	National Bureau of Economic
Model misspecification, 135, 168	Research (NBER), 101

National daht 206	avama da famadast accuma av. 144-140
National debt, 386	average forecast accuracy, 144–148
Neoclassical growth paradigm, 305	forecast accuracy for individual
Nested case, 165–166	series, 148–151
New Keynesian models, 335, 347	tests for equal predictive accuracy,
New Keynesian theory, 291	151–152 B. I
New York Federal Reserve model, 330	Policy analysis, 5–6
Non-nested case, 163–165	Policy response equation, 297
Non-parametric approach, 287	Policy variable, 392
Non-nested hypothesis-testing method	Policymakers, 278
(NNT method), 5, 259	Pooled mean group estimator (PMG
Non-nested testing approach, 263–264	estimator), 391
Non-sovereign assets, 362	Posterior predictive tests, 333
Nonspatial model, 310	Pre-COVID-19, 354
Not elsewhere classified (NEC), 322	Price, 5
Nowcasting, 113	puzzle, 279–280
Nowcasting Euro area GDP growth,	Principal components, 3
122	Production functions, estimations of,
covid-19 pandemic, 127–129	316–319
evaluating nowcast densities,	Production model, 5
123–125	Production technology, 309
GDP-at-risk, 125–127	Productivity growth
Nowcasts, 112	of industries and spillovers,
NY Fed DSGE model set, 348n11	320–322
	sector-level analysis of, 306
Office of Budget Responsibility	Professional forecasters, survey of,
(OBR), 204	101–104
	Public debt, 387–388
Pair-wise comparisons of forecasts,	Purchasing power parity (PPP), 260
162–163	Puzzle, 291–292
Parameter instability, 227–228	
Parameter-specific shrinkage priors,	Quantile regressions, 112–113. (see
116–117	also Bayesian quantile
Parametric method, 287	regression (BQR))
Partial least squares (PLS), 3, 134,	Quantile-weighted probability score
137–138	(QWPS), 123
Partial spatial Durbin model, 325n4	Quantitative easing (QE), 6, 354
Persistent regressors, 167–168	adoption in emerging markets,
Philadelphia airport (PHL), 11	360–361
distributions, 11–12	advanced economies, 358-359
evolving seasonality, 15–16	country-specific QE effectiveness,
fixed seasonality, 13–14	373–380
sequential and joint regression results	impact of country-specific QE
for Philadelphia, 23–28	interventions, 354–355
trend, 12–13	COVID-19 QE Announcements,
Point forecasts, 144. (see also Density	356–357
forecasts)	event set, 363–364

event study methodology, 361–363 financial market impact	Sector-level analysis of productivity growth, 306
of COVID-19 QE	Semi-parametric approach, 287
announcements, 364–373	Semiparametric factor model, 325 <i>n</i> 8
global QE under COVID-19, 355	Sequential modeling approach, 17
Quasi-maximum likelihood estimation	Sequential regression results for
method (QMLE method),	Philadelphia, 23–28
314	Sequential tests, 180
	Shannon entropy statistic, 274 <i>n</i> 10
Random compression, 3, 138	Shrinkage priors, 115–116
Random number generator (RNG),	global-local shrinkage priors,
252 <i>n</i> 11	117–119
Random projection, 3, 138	parameter-specific shrinkage priors
Random subset regressions, 3, 139	116–117
Random subspace methods, 136	Simulation
Random walk, 206–207	design, 233–235
produce good out-of-sample	simulation-based estimators, 231–232
forecasts, 4	Single-equation time-varying
smooth, 210–211	parameter models, 258
Real Time Data Set for	Skew-t density, 120
Macroeconomists	Smets and Wouters model (SW
(RTDSM), 101	model), 340
Real-time data, 121–122	Smooth random walk, 210–211
Recursively weights (RW), 123	Smooth robust multi-horizon forecasts
Regime uncertainty, 258	additional simulation results, 222
Reinterpreting robust forecasts, 209–210	empirical examples, 217
Riksbank of Sweden, 354	forecasting after break with
Risk, 185	misspecified model, 205–206
Robust forecasts	historical data vintages of UK
reinterpreting, 209–210	Productivity, 223
smooth, 210–213	naive robust forecasts, 206-209
Robust optimal weighting, 141	reinterpreting robust forecasts,
Robust predictor, 207–209	209–210
smooth, 211–213	robustify forecasts, 204
Robustness, 371–373	simulation evidence, 213–217
Root mean square forecast errors	smooth random walk, 210–211
(RMSFE), 218	smooth robust forecasts, 210
Root mean squared error (RMSE),	smooth robust predictor, 211–213
95, 123	UK Productivity, 217–219
Root trace square error (RTSE), 249	US 10-year Treasury yields, 217–219
	Social insurance programs, 386
Schmidt and Sickles model (SS	Solow residual, heterogeneous technical
model), 314	progress in, 307–308
Seasonality, 19	Solow-type
evolving, 15–16	production model, 325n1
fixed 13_14	residual productivity 314

Sovereign debt, 390	rule, 160–161
crisis, 280	strategy, 3
Sparse data	Synthetic control, 282–283
environments, 116	System priors, 335
sparse data-generating-process, 113	System wide discrepancy measures,
Spatial Durbin model (SDM), 306	334
Spatial econometric techniques, 305	targeting component parts of
Spatial interdependence, 308–309	system, 334–335
Specification error, 168	targeting VAR covariance matrix,
misspecified functional form, 168–169	336–338
time-varying parameters, 169–170	targeting VAR dynamics, 335-336
Spillovers	
effects from country-specific long-	Targeted discrepancy measures, 330
term interest rate changes,	Targeting VAR
375–377	covariance matrix, 336–338
productivity growth of industries	dynamics, 335–336
and, 320–322	Taylor rule, 260
of technology through factor	models, 267
input and technical change,	regime, 281
309–311	Technology spillovers, 305, 308–309
Stochastic frontier analysis (SFA), 314	through factor input and technical
Stochastic Search Variable Selection	change, 309–311
(SSVS), 116, 119	Temperature
Structural breaks, 180, 204	dynamics, 16
empirical analysis, 190–194	extremes, 10
estimation of regression	variability, 10
parameters, 180–181	Theory of war finance, 390
finite sample properties, 185–187	Time-varying parameters (TVP),
model and combined estimator,	169–170, 341
181–184	forecasts, 140–141
Monte Carlo simulation, 188–190	Trade, 304–305
of vector error correction, 226	Two-block VAR model, 285
Structural model, 333	1 We 010411 W111 M0441, 200
Structural uncertainty, 259–261	U-MIDAS BQR application, 115
Structural VAR (SVAR), 279	UBS, 1
Supremum-type test, 180	UK Productivity forecasts, 217–219
Survey of Professional Forecasters	historical data vintages of, 223
(SPF), 91, 204, 217	Uncertainty, 92–94
Swiss National Bank, 354	survey of professional forecasters,
Switching	101–104
gains from switching between	underestimation in US GDP and
models, 162	inflation forecasts, 100
nested case, 165–166	Uncovered interest parity (UIP), 258,
non-nested case, 163–165	358
pair-wise comparisons of forecasts,	Uniform policy making, 90
162–163	Unknown break dates 232–233

Unrestricted mixed data sampling	sector-level analysis of productivity
(U-MIDAS), 113	growth, 306
US 10-year Treasury yields, 217–219	simulation in global value chain,
US Federal Reserve, 354, 381	322–324
US Federal Reserve Bank, 6	spatial interdependence and
US monetary policy, 279	technology spillovers,
US temperature dynamics, evolution of	308–309
15 Cities, 16	spillovers of technology through
historically traded cities, 16–17	factor input and technical
joint regression results for fifteen	change, 309-311
cities, 29–88	spillovers within country and
Philadelphia, 11–16	across border, 311–314
seasonality, 19	US-Sino trade, 304
sequential and joint regression results	
for Philadelphia, 23–28	Variable-lag space FAVAR model, 152
serial correlation, 19	VECM model, 332
trend, 17–19	Vector autoregressions (VARs), 3, 134
US Unconventional Monetary Policy	330–331, 336
Spillovers, 373–380	Vector error correction (VEC), 226
US-Sino decoupling analysis, 307	Volatility, 10
data, 315–316	
direct and indirect effect of input	War debt, 390
factors, 319–320	Wilson-Hilferty cube root
empirical results, 316	transformation, 99
estimation, 314–315	Window length selection, 233
estimations of production	conditional bias, 239–248
functions, 316–319	conditional MSE, 235–239
GVC, 306–307	results, 235
heterogeneous technical progress in	simulation design, 233–235
Solow residual, 307–308	World Input-Output tables, 306
intermediate product share in gross	World interest rate, 386–387, 394
export between United	WORLD KLEMS database, 315
States and China, 305	
model, 307	Yield curve, 249
productivity growth of industries	
and spillovers, 320–322	