bayes: dsge — Bayesian linear dynamic stochastic general equilibrium models

Description

bayes: dsge fits a Bayesian linear dynamic stochastic general equilibrium model to continuous multivariate time series; see [BAYES] bayes and [DSGE] dsge for details.

Quick start

Autoregressive model of order 1 with uniform prior for the autoregressive coefficient \( \rho \)

\[ \text{bayes, prior(} \rho \text{, uniform(0,1))}: \text{dsge (} y = z \text{) (} F.z = \rho \cdot z \text{, state)} \]

Save simulation results to bdsgesim.dta, and use a random-number seed for reproducibility

\[ \text{bayes, prior(} \rho \text{, uniform(0,1)} \text{) rseed(17) saving(bdsgesim): ///} \]
\[ \text{dsge (} y = z \text{) (} F.z = \rho \cdot z \text{, state)} \]

Specify 20,000 Markov chain Monte Carlo (MCMC) samples, and set length of burn-in period to 5,000

\[ \text{bayes, prior(} \rho \text{, uniform(0,1)} \text{) mcmcsize(20000) burnin(5000): ///} \]
\[ \text{dsge (} y = z \text{) (} F.z = \rho \cdot z \text{, state)} \]

Estimate an Euler equation for variable \( y \)

\[ \text{bayes, prior(} \rho \text{, uniform(0,1)} \text{) prior(} \sigma \text{, beta(5, 5))}: /// \]
\[ \text{dsge (} y = f.y - \sigma \cdot r \text{) (} F.r = \rho \cdot r \text{, state)} \]

In the above, request that a 90% highest posterior density (HPD) credible interval be displayed instead of the default 95% equal-tailed credible interval.

\[ \text{bayes, clevel(90) hpd} \]

Also see \textit{Quick start} in [BAYES] bayes.

Menu

Statistics > Multivariate time series > Bayesian models > Linear DSGE models
Syntax

bayes, prior(userparams,...) [bayesopts] : dsge eqlist [if] [in] [ , options ]

options Description

Advanced
lintolerance(#) set tolerance used for linearity check; seldom used
level(#) set credible level; default is level(95)
noidencheck do not check for parameter identification; implied
solve return model solution at initial values; implied

bayes: dsge, level() is equivalent to bayes, clevel(): dsge.
For a detailed description of options, see Options in [DSGE] dsge.
Options level(), noidencheck, and stable do not appear on the dialog box.

bayesopts Description

Priors
  *igammaprior(# #) specify shape and scale of default inverse-gamma prior for standard
deviations of shocks; default is igammaprior(0.01 0.01)
prior(priorspec) prior for model parameters; this option may be repeated and is
required for all user-defined parameters userparams
dryrun show model summary without estimation

Simulation
  nchains(#) number of chains; default is to simulate one chain
  mcmcsize(#) MCMC sample size; default is mcmcsize(10000)
  burnin(#) burn-in period; default is burnin(2500)
  thinning(#) thinning interval; default is thinning(1)
  rseed(#) random-number seed
  exclude(paramref) specify model parameters to be excluded from the simulation results

Blocking
  block(paramref[ , blockopts ] ) specify a block of model parameters; this option may be repeated
  blocksummary display block summary

Initialization
  initial(initspec) specify initial values for model parameters with a single chain
  init#(initspec) specify initial values for #th chain; requires nchains()
  initall(initspec) specify initial values for all chains; requires nchains()
  nomleinit suppress the use of maximum likelihood estimates as starting values
  initrandom specify random initial values
  initsummary display initial values used for simulation
  *noisily display output from the estimation command during initialization
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### Reporting

- **clevel(#)***
  - set credible interval level; default is `clevel(95)`
- **hpd***
  - display HPD credible intervals instead of the default equal-tailed credible intervals
- **batch(#)***
  - specify length of block for batch-means calculations; default is `batch(0)`
- **saving(filename[, replace])**
  - save simulation results to `filename.dta`
- **nomodelsummary***
  - suppress model summary
- **chainsdetail***
  - display detailed simulation summary for each chain
- **[no] dots***
  - suppress dots or display dots every 100 iterations and iteration numbers every 1,000 iterations; default is `nodots`
- **dots(#[, every(#)])***
  - display dots as simulation is performed
- **[no] show(paramref)**
  - specify model parameters to be excluded from or included in the output
- **notable***
  - suppress estimation table
- **noheader***
  - suppress output header
- **title(string)**
  - display `string` as title above the table of parameter estimates
- **display_options**
  - control spacing, line width, and base and empty cells

### Advanced

- **search(search_options)**
  - control the search for feasible initial values
- **corrlag(#)***
  - specify maximum autocorrelation lag; default varies
- **corrtol(#)***
  - specify autocorrelation tolerance; default is `corrtol(0.01)`

*Starred options are specific to the `bayes` prefix; other options are common between `bayes` and `bayesmh`. `priorspec` and `paramref` are defined in [BAYES] `bayesmh`.

`paramref` may contain factor variables; see [U] 11.4.3 Factor variables.

`collect` is allowed; see [U] 11.1.10 Prefix commands.

See [U] 20 Estimation and postestimation commands for more capabilities of estimation commands.

Model parameters are user-defined parameters `userparams` and standard deviations of shocks `{sd(e.exogstate)}`. Use the `dryrun` option to see the definitions of model parameters prior to estimation.

For a detailed description of `bayesopts`, see Options in [BAYES] `bayes`.

`nomleinitial` is assumed. Default parameter values are set to means of priors.

### Remarks and examples

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For a general introduction to Bayesian analysis, see [BAYES] Intro. For a general introduction to Bayesian estimation using an adaptive Metropolis–Hastings algorithm, see [BAYES] `bayesmh`. For remarks and examples specific to the `bayes` prefix, see [BAYES] `bayes`. For details about the estimation command, see [DSGE] `dsge`.

For a simple example of the `bayes` prefix, see Introductory example in [BAYES] `bayes`. For an introduction to and examples of Bayesian DSGEs, see [DSGE] Intro 9 and [DSGE] Intro 9a.

### Stored results

See Stored results in [BAYES] `bayes`. Also see Stored results in [DSGE] `dsge`. 
Methods and formulas


Also see

[BAYES] bayes: dsge postestimation — Postestimation tools for bayes: dsge and bayes: dsgenl
[BAYES] bayes — Bayesian regression models using the bayes prefix*
[DSGE] dsge — Linear dynamic stochastic general equilibrium models
[BAYES] Bayesian postestimation — Postestimation tools for bayesmh and the bayes prefix
[BAYES] Bayesian estimation — Bayesian estimation commands
[BAYES] Bayesian commands — Introduction to commands for Bayesian analysis
[BAYES] Intro — Introduction to Bayesian analysis
[BAYES] Glossary

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