bayes: dsge — Bayesian linear dynamic stochastic general equilibrium models

Description

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 \( \{\text{rho}\} \)

```stata
bayes, prior({rho}, uniform(0,1)): dsge (y = z) (F.z = {rho}*z, state)
```

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

```stata
bayes, prior({rho}, uniform(0,1)) rseed(17) saving(bdsgesim): ///
    dsge (y = z) (F.z = {rho}*z, state)
```

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

```stata
bayes, prior({rho}, uniform(0,1)) mcmcsize(20000) burnin(5000): ///
    dsge (y = z) (F.z = {rho}*z, state)
```

Estimate an Euler equation for variable \( y \)

```stata
bayes, prior({rho}, uniform(0,1)) prior({sigma}, beta(5, 5)): ///
    dsge (y = f.y - {sigma}*r) (F.r = {rho}*r, 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.

```stata
bayes, clevel(90) hpd
```

Also see 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]
```

<table>
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<th>options</th>
<th>Description</th>
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<tr>
<td><strong>Advanced</strong></td>
<td></td>
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<tr>
<td>lintolerance(#)</td>
<td>set tolerance used for linearity check; seldom used</td>
</tr>
<tr>
<td>level(#)</td>
<td>set credible level; default is level(95)</td>
</tr>
<tr>
<td>noidencheck</td>
<td>do not check for parameter identification; implied</td>
</tr>
<tr>
<td>solve</td>
<td>return model solution at initial values; implied</td>
</tr>
</tbody>
</table>

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**

<table>
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<tr>
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<tr>
<td><strong>Priors</strong></td>
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<tr>
<td>*igammaprior(# #)</td>
</tr>
<tr>
<td>prior(priorspec)</td>
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<td>dryrun</td>
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**Simulation**

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<tr>
<td>nchains(#)</td>
</tr>
<tr>
<td>mcmcsize(#)</td>
</tr>
<tr>
<td>burnin(#)</td>
</tr>
<tr>
<td>thinning(#)</td>
</tr>
<tr>
<td>rseed(#)</td>
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<td>exclude(paramref)</td>
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**Blocking**

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<tr>
<td>block(paramref[, blockopts])</td>
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**Initialization**

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<tr>
<td>initial(initspec)</td>
</tr>
<tr>
<td>init#(initspec)</td>
</tr>
<tr>
<td>initall(initspec)</td>
</tr>
<tr>
<td>nomleinitial</td>
</tr>
<tr>
<td>initrandom</td>
</tr>
<tr>
<td>initsummary</td>
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<td>*noisily</td>
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</table>
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
[nodots] specify length of block for batch-means calculations; default is nodots
dots(#) display dots as simulation is performed
dots([, every(#)]) display dots as simulation is performed to the output
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

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