bayes: mvreg — Bayesian multivariate regression

Description

bayes: mvreg fits a Bayesian multivariate regression to multiple continuous outcomes; see [BAYES] bayes and [MV] mvreg for details.

Quick start

Bayesian multivariate regression of y1 and y2 on x1 and x2, using default normal priors for regression coefficients and Jeffreys prior for the covariance matrix

```
bayes: mvreg y1 y2 = x1 x2
```

Use a standard deviation of 10 instead of 100 for the default normal priors

```
bayes, normalprior(10): mvreg y1 y2 = x1 x2
```

Use uniform priors for the slopes and a normal prior for the intercept of the dependent variable y2

```
bayes, prior({y2: x1 x2}, uniform(-10,10)) ///
prior({y2:_cons}, normal(0,10)): mvreg y1 y2 = x1 x2
```

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

```
bayes, saving(simdata) rseed(123): mvreg y1 y2 = x1 x2
```

Specify 20,000 MCMC samples, set length of the burn-in period to 5,000, and request that a dot be displayed every 500 simulations

```
bayes, mcmcsize(20000) burnin(5000) dots(500): mvreg y1 y2 = x1 x2
```

In the above, request that the 90% HPD credible interval be displayed instead of the default 95% equal-tailed credible interval

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

Also see Quick start in [BAYES] bayes and Quick start in [MV] mvreg.

Menu

Statistics > Linear models and related > Bayesian regression > Multivariate regression
### Syntax

```markdown
bayes [, bayesopts] : mvreg depvars = indepvars [if] [in] [weight] [, options]
```

#### options

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td><code>noconstant</code></td>
</tr>
<tr>
<td><strong>Reporting</strong></td>
</tr>
<tr>
<td><code>display_options</code></td>
</tr>
<tr>
<td><code>level(#)</code></td>
</tr>
</tbody>
</table>

* `indepvars` may contain factor variables; see [U] 11.4.3 Factor variables.  
* `fweights` are allowed; see [U] 11.1.6 weight.  
* `bayes: mvreg, level()` is equivalent to `bayes, clevel(): mvreg`.  
* For a detailed description of `options`, see `Options` in [MV] `mvreg`.  

#### bayesopts

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Priors</strong></td>
</tr>
<tr>
<td><code>gibbs</code></td>
</tr>
<tr>
<td><code>normalprior(#)</code></td>
</tr>
<tr>
<td><code>prior(priorspec)</code></td>
</tr>
<tr>
<td><code>dryrun</code></td>
</tr>
<tr>
<td><strong>Simulation</strong></td>
</tr>
<tr>
<td><code>nchains(#)</code></td>
</tr>
<tr>
<td><code>mcmcsize(#)</code></td>
</tr>
<tr>
<td><code>burnin(#)</code></td>
</tr>
<tr>
<td><code>thinning(#)</code></td>
</tr>
<tr>
<td><code>rseed(#)</code></td>
</tr>
<tr>
<td><code>exclude(paramref)</code></td>
</tr>
<tr>
<td><strong>Blocking</strong></td>
</tr>
<tr>
<td><code>blocksize(#)</code></td>
</tr>
<tr>
<td><code>block([paramref[, blockopts]])</code></td>
</tr>
<tr>
<td><code>blocksummary</code></td>
</tr>
<tr>
<td><code>noblocking</code></td>
</tr>
<tr>
<td><strong>Initialization</strong></td>
</tr>
<tr>
<td><code>initial(initspec)</code></td>
</tr>
<tr>
<td><code>init#(initspec)</code></td>
</tr>
<tr>
<td><code>initall(initspec)</code></td>
</tr>
<tr>
<td><code>nomleinitial</code></td>
</tr>
<tr>
<td><code>inittrandom</code></td>
</tr>
<tr>
<td><code>initssummary</code></td>
</tr>
<tr>
<td><code>noisily</code></td>
</tr>
</tbody>
</table>
Adaptation
adaptation(adaptopts) control the adaptive MCMC procedure
scale(#) initial multiplier for scale factor; default is scale(2.38)
covariance(cov) initial proposal covariance; default is the identity matrix

Reporting
clevel(#) set credible interval level; default is clevel(95)
hpd display HPD credible intervals instead of the default equal-tailed credible intervals
eform[(string)] report exponentiated coefficients and, optionally, label as string
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.
Options prior() and block() may be repeated.
priorspec and paramref are defined in [BAYES] bayesmh.
paramref may contain factor variables; see [U] 11.4.3 Factor variables.
See [U] 20 Estimation and postestimation commands for more capabilities of estimation commands.
Model parameters are regression coefficients \{depvar1:indepvars\}, \{depvar2:indepvars\}, and so on, and covariance matrix \{Sigma, matrix\}. Use the dryrun option to see the definitions of model parameters prior to estimation.
Multivariate Jeffreys prior, jeffreys(d), is used by default for the covariance matrix of dimension d.
For a detailed description of bayesopts, see Options in [BAYES] bayes.

Remarks and examples

For a general introduction to Bayesian analysis, see [BAYES] Intro. For a general introduction to Bayesian estimation using adaptive Metropolis–Hastings and Gibbs algorithms, see [BAYES] bayesmh. For remarks and examples specific to the bayes prefix, see [BAYES] bayes. For details about the estimation command, see [MV] mvreg.

For a simple example of the bayes prefix, see Introductory example in [BAYES] bayes.
Stored results

See Stored results in [BAYES] bayes.

Methods and formulas

See Methods and formulas in [BAYES] bayesmh.

Also see

[BAYES] bayes — Bayesian regression models using the bayes prefix
[MV] mvreg — Multivariate regression
[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