

bayes: mvreg — Bayesian multivariate regression

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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 Markov chain Monte Carlo (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% highest posterior density (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](#).

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Syntax

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

| <i>options</i> | Description |
|----------------|-------------|
|----------------|-------------|

Model

| | |
|-------------------------|------------------------|
| <code>noconstant</code> | suppress constant term |
|-------------------------|------------------------|

Reporting

| | |
|------------------------------|---|
| <code>display_options</code> | control spacing, line width, and base and empty cells |
|------------------------------|---|

| | |
|-----------------------|--|
| <code>level(#)</code> | set credible level; default is level(95) |
|-----------------------|--|

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.

| <i>bayesopts</i> | Description |
|------------------|-------------|
|------------------|-------------|

Priors

| | |
|-------------------------------|--|
| * <code>gibbs</code> | specify Gibbs sampling; available only with normal priors for regression coefficients and multivariate Jeffreys prior for covariance |
| * <code>normalprior(#)</code> | specify standard deviation of default normal priors for regression coefficients; default is <code>normalprior(100)</code> |
| <code>prior(priorspec)</code> | prior for model parameters; this option may be repeated |
| <code>dryrun</code> | show model summary without estimation |

Simulation

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

Blocking

| | |
|--|--|
| * <code>blocksize(#)</code> | maximum block size; default is <code>blocksize(50)</code> |
| <code>block(paramref [, blockopts])</code> | specify a block of model parameters; this option may be repeated |
| <code>blocksummary</code> | display block summary |
| * <code>noblocking</code> | do not block parameters by default |

Initialization

| | |
|--------------------------------|--|
| <code>initial(initspec)</code> | specify initial values for model parameters with a single chain |
| <code>init#(initspec)</code> | specify initial values for #th chain; requires <code>nchains()</code> |
| <code>initall(initspec)</code> | specify initial values for all chains; requires <code>nchains()</code> |
| <code>nomleinitial</code> | suppress the use of maximum likelihood estimates as starting values |
| <code>initransom</code> | specify random initial values |
| <code>initsummary</code> | display initial values used for simulation |
| * <code>noisily</code> | display output from the estimation command during initialization |

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.

`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 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

[stata.com](http://www.stata.com)

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**

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