

bayes: hetregress — Bayesian heteroskedastic linear regression

[Description](#)[Remarks and examples](#)[Quick start](#)[Stored results](#)[Menu](#)[Methods and formulas](#)[Syntax](#)[Also see](#)

Description

`bayes: hetregress` fits a Bayesian heteroskedastic linear regression to a continuous outcome; see [\[BAYES\] bayes](#) and [\[R\] hetregress](#) for details.

Quick start

Bayesian heteroskedastic linear regression of y on x_1 and x_2 , using z_1 to model the variance and using default normal priors for regression coefficients and log-variance coefficients

```
bayes: hetregress y x1 x2, het(z1)
```

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

```
bayes, normalprior(10): hetregress y x1 x2, het(z1)
```

Use uniform priors for the slopes and a normal prior for the intercept of the main regression

```
bayes, prior({y: x1 x2}, uniform(-10,10)) ///
prior({y:_cons}, normal(0,10)): hetregress y x1 x2, het(z1)
```

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

```
bayes, saving(simdata) rseed(123): ///
hetregress y x1 x2, het(z1)
```

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): ///
hetregress y x1 x2, het(z1)
```

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 [\[R\] hetregress](#).

Menu

Statistics > Linear models and related > Bayesian regression > Heteroskedastic linear regression

Syntax

```
bayes [ , bayesopts ] : hetregress depvar [indepvars] [if] [in] [weight]
[ , options ]
```

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

Model

<code>het(<i>varlist</i>)</code>	independent variables to model the variance
<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 and *varlist* may contain factor variables; see [U] 11.4.3 Factor variables.

depvar, *indepvars*, and *varlist* may contain time-series operators; see [U] 11.4.4 Time-series varlists.

fweights are allowed; see [U] 11.1.6 weight.

`bayes: hetregress`, `level()` is equivalent to `bayes, clevel(): hetregress`.

For a detailed description of *options*, see *Options for maximum likelihood estimation* and *Options for two-step GLS estimation* in [R] `hetregress`.

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

Priors

* <code>normalprior(#)</code>	specify standard deviation of default normal priors for regression coefficients and log-variance coefficients; default is <code>normalprior(100)</code>
<code>prior(<i>priorspec</i>)</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(<i>paramref</i>)</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(<i>paramref</i> [, <i>blockopts</i>])</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><u>initial</u>(<i>initspec</i>)</code>	specify initial values for model parameters with a single chain
<code>init#(<i>initspec</i>)</code>	specify initial values for #th chain; requires <code>nchains()</code>
<code>initall(<i>initspec</i>)</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><u>initransom</u></code>	specify random initial values
<code><u>initsummary</u></code>	display initial values used for simulation
* <code>noisily</code>	display output from the estimation command during initialization

Adaptation

<code><u>adaptation</u>(<i>adaptopts</i>)</code>	control the adaptive MCMC procedure
<code><u>scale</u>(#)</code>	initial multiplier for scale factor; default is <code>scale(2.38)</code>
<code><u>covariance</u>(<i>cov</i>)</code>	initial proposal covariance; default is the identity matrix

Reporting

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

Advanced

<code><u>search</u>(<i>search_options</i>)</code>	control the search for feasible initial values
<code>corrlag(#)</code>	specify maximum autocorrelation lag; default varies
<code>corrtol(#)</code>	specify autocorrelation tolerance; default is <code>corrtol(0.01)</code>

*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 `{depvar: indepvars}` for the main regression and `{lnsigma2: varlist}` for the log-variance equation. 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`.

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 [\[R\] hetregress](#).

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⁺

[\[R\] hetregress](#) — Heteroskedastic linear 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](#)

Stata, Stata Press, and Mata are registered trademarks of StataCorp LLC. Stata and Stata Press are registered trademarks with the World Intellectual Property Organization of the United Nations. StataNow and NetCourseNow are trademarks of StataCorp LLC. Other brand and product names are registered trademarks or trademarks of their respective companies. Copyright © 1985–2023 StataCorp LLC, College Station, TX, USA. All rights reserved.



For suggested citations, see the FAQ on [citing Stata documentation](#).