

bayes: hetprobit — Bayesian heteroskedastic probit regression
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Description

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

Quick start

Bayesian heteroskedastic probit 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: hetprobit y x1 x2, het(z)
```

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

```
bayes, normalprior(10): hetprobit y x1 x2, het(z)
```

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)): hetprobit y x1 x2, het(z)
```

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

```
bayes, saving(simdata) rseed(123): hetprobit y x1 x2, het(z)
```

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): hetprobit y x1 x2, het(z)
```

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

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Syntax

```
bayes [ , bayesopts ] : hetprobit devar [indepvars] [if] [in] [weight] ,
    het(varlist [ , offset(varnameo) ] ) [options]
```

<i>options</i>	Description
Model	
* <u>het</u> (<i>varlist</i> [...])	independent variables to model the variance and possible offset variable
<u>noconstant</u>	suppress constant term
<u>offset</u> (<i>varname</i>)	include <i>varname</i> in model with coefficient constrained to 1
<u>asis</u>	retain perfect predictor variables
<u>collinear</u>	keep collinear variables
Reporting	
<u>display_options</u>	control spacing, line width, and base and empty cells
<u>level</u> (#)	set credible level; default is <code>level(95)</code>
<p>*<u>het</u>() is required. The full specification is <code>het(<i>varlist</i> [, <u>offset</u>(<i>varname_o</i>)])</code>. <i>indepvars</i> and <i>varlist</i> may contain factor variables; see [U] 11.4.3 Factor variables. <i>devar</i> and <i>indepvars</i> may contain time-series operators; see [U] 11.4.4 Time-series varlists. <i>fweights</i> are allowed; see [U] 11.1.6 weight.</p> <p><code>bayes: hetprobit</code>, <code>level()</code> is equivalent to <code>bayes, clevel(): hetprobit</code>. For a detailed description of <i>options</i>, see <i>Options</i> in [R] hetprobit.</p>	
<i>bayesopts</i>	Description
Priors	
* <u>normalprior</u> (#)	specify standard deviation of default normal priors for regression coefficients and log-variance coefficients; default is <code>normalprior(100)</code>
<u>prior</u> (<i>priorspec</i>)	prior for model parameters; this option may be repeated
<u>dryrun</u>	show model summary without estimation
Simulation	
<u>mcmcsize</u> (#)	MCMC sample size; default is <code>mcmcsize(10000)</code>
<u>burnin</u> (#)	burn-in period; default is <code>burnin(2500)</code>
<u>thinning</u> (#)	thinning interval; default is <code>thinning(1)</code>
<u>rseed</u> (#)	random-number seed
<u>exclude</u> (<i>paramref</i>)	specify model parameters to be excluded from the simulation results
Blocking	
* <u>blocksize</u> (#)	maximum block size; default is <code>blocksize(50)</code>
<u>block</u> (<i>paramref</i> [, <i>blockopts</i>])	specify a block of model parameters; this option may be repeated
<u>blocksummary</u>	display block summary
* <u>noblocking</u>	do not block parameters by default

Initialization

<code><u>initial</u>(<i>initspec</i>)</code>	initial values for model parameters
<code><u>nomleinitial</u></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><u>noisily</u></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><u>hpd</u></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><u>batch</u>(#)</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>[<u>no</u>] <u>dots</u></code>	suppress dots or display dots every 100 iterations and iteration numbers every 1,000 iterations; default is <code>nodots</code>
<code><u>dots</u>(#[, <i>every</i>(#)])</code>	display dots as simulation is performed
<code>[<u>no</u>] <u>show</u>(<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><u>title</u>(<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><u>corrlag</u>(#)</code>	specify maximum autocorrelation lag; default varies
<code><u>corrtol</u>(#)</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()` can 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 `{devar: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 [\[R\] hetprobit](#).

For a simple example of the `bayes` prefix, see *Introductory example* in [\[BAYES\] bayes](#).

Stored results

See *Stored results* in [\[BAYES\] bayesmh](#).

Methods and formulas

See *Methods and formulas* in [\[BAYES\] bayesmh](#).

Also see

[\[BAYES\] bayes](#) — Bayesian regression models using the `bayes` prefix

[\[R\] hetprobit](#) — Heteroskedastic probit model

[\[BAYES\] 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](#)