

bayes: gnbreg — Bayesian generalized negative binomial regression

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Description

`bayes: gnbreg` fits a Bayesian generalized negative binomial regression to a nonnegative count outcome; see [\[BAYES\] bayes](#) and [\[R\] nbreg](#) for details.

Quick start

Bayesian generalized negative binomial regression of `y` on `x1` and `x2`, using `z` to model the log-overdispersion and using default normal priors for regression coefficients and log-overdispersion parameter

```
bayes: gnbreg y x1 x2, lnalpha(z)
```

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

```
bayes, normalprior(10): gnbreg y x1 x2, lnalpha(z)
```

Use uniform priors for the slopes and a normal prior for the intercept

```
bayes, prior({y: x1 x2}, uniform(-10,10)) ///
prior({y:_cons}, normal(0,10)): gnbreg y x1 x2, lnalpha(z)
```

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

```
bayes, saving(simdata) rseed(123): gnbreg y x1 x2, lnalpha(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, mcmcsample(20000) burnin(5000) dots(500): gnbreg y x1 x2, lnalpha(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
```

Display incidence-rate ratios instead of coefficients

```
bayes: gnbreg y x1 x2, lnalpha(z) irr
```

Display incidence-rate ratios on replay

```
bayes, irr
```

Also see [Quick start](#) in [\[BAYES\] bayes](#) and [Quick start](#) in [\[R\] nbreg](#).

Menu

Statistics > Count outcomes > Bayesian regression > Generalized negative binomial regression

Syntax

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

<i>options</i>	Description
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Model

<code>noconstant</code>	suppress constant term
<code>lnalpha(<i>varlist</i>)</code>	dispersion model variables
<code>exposure(<i>varname_e</i>)</code>	include $\ln(\text{varname}_e)$ in model with coefficient constrained to 1
<code>offset(<i>varname_o</i>)</code>	include varname_o in model with coefficient constrained to 1
<code>collinear</code>	keep collinear variables

Reporting

<code>irr</code>	report incidence-rate ratios
<code>display_options</code>	control spacing, line width, and base and empty cells
<code>level(#)</code>	set credible level; default is <code>level(95)</code>

indepvars and *varlist* may contain factor variables; see [U] 11.4.3 **Factor variables**.

fwrights are allowed; see [U] 11.1.6 **weight**.

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

For a detailed description of *options*, see *Options for gnbreg* in [R] **nbreg**.

<i>bayesopts</i>	Description
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Priors

* <code>normalprior(#)</code>	specify standard deviation of default normal priors for regression coefficients and log-overdispersion parameter; 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>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>initial(<i>initspec</i>)</code>	initial values for model parameters
<code>nonleinitial</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

* `irr` report incidence-rate ratios
`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
`[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()` 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 `{depvar: indepvars}` for the main regression and `{lnalpha: varlist}` for the log-dispersion 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

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

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] `nbreg`.

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] **nbreg** — Negative binomial 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**