bayes: gnbreg — Bayesian generalized negative binomial regression

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, lalpha(z)

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

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

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

bayes, saving(simdata) rseed(123): gnbreg y x1 x2, lalpha(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): gnbreg y x1 x2, lalpha(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, lalpha(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 ]
```

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

`fweight` are allowed; see [U] 11.1.6 weight.

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

**bayesopts**

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Initialization

**init**(initspec)
- specify initial values for model parameters with a single chain
**init#**(initspec)
- specify initial values for #th chain; requires nchains()
**initall**(initspec)
- specify initial values for all chains; requires nchains()
**nomleinit**
- suppress the use of maximum likelihood estimates as starting values
**initsummary**
- display initial values used for simulation
*noisily*
- 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
**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 \( \{ \text{depvar:indepvars} \} \) for the main regression and \( \{ \text{lnalpha:varlist} \} \) 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

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] bayes.

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