bayes: glm — Bayesian generalized linear models

Description

bayes: glm fits a Bayesian generalized linear model to outcomes of different types such as continuous, binary, count, and so on; see [BAYES] bayes and [R] glm for details.

Quick start

Bayesian generalized linear model of y on x1 and x2, using the Gaussian family and log link and using default normal priors for regression coefficients

```stata
bayes: glm y x1 x2, family(gaussian) link(log)
```

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

```stata
bayes, normalprior(10): glm y x1 x2, family(gaussian) link(log)
```

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

```stata
bayes, prior({y: x1 x2}, uniform(-10,10)) ///
    prior({y: _cons}, normal(0,10)): ///
    glm y x1 x2, family(gaussian) link(log)
```

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

```stata
bayes, saving(simdata) rseed(123): ///
    glm y x1 x2, family(gaussian) link(log)
```

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

```stata
bayes, mcmcsize(20000) burnin(5000) dots(500): ///
    glm y x1 x2, family(gaussian) link(log)
```

In the above, request that the 90% HPD credible interval be displayed instead of the default 95% equal-tailed credible interval

```stata
bayes, clevel(90) hpd
```

Fit a logit model and display results as odds ratios

```stata
bayes: glm z x1 x2, family(binomial) eform
```

Display odds ratios on replay

```stata
bayes, eform
```

Also see Quick start in [BAYES] bayes and Quick start in [R] glm.

Menu

Statistics > Generalized linear models > Bayesian generalized linear models (GLM)
Syntax

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

**options**

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* `indepvars` may contain factor variables; see [U] 11.4.3 Factor variables.
* `depvar` and `indepvars` may contain time-series operators; see [U] 11.4.4 Time-series varlists.
* fweights are allowed; see [U] 11.1.6 weight.
* `bayes: glm, level()` is equivalent to `bayes, clevel(): glm`.

For a detailed description of `options`, see Options in [R] glm.

**bayesopts**

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Initialization

*init(initial(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()
*nomleinitial suppress the use of maximum likelihood estimates as starting values
*initrandom specify random initial 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
*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
*nodots 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
dots([, every(#)]) 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 {depvar:indepvars}. 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] glm.

For a simple example of the bayes prefix, see Introductory example in [BAYES] bayes. Also see Generalized linear model in [BAYES] bayes.

bayes: glm does not estimate the scale parameter but uses a fixed value as provided by the glm command. If you want to fit a GLM and estimate the scale parameter, use bayes: meglm without specifying random effects.

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] glm — Generalized linear models
[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