bayes: logistic — Bayesian logistic regression, reporting odds ratios

Description

bayes: logistic fits a Bayesian logistic regression to a binary outcome; see [BAYES] bayes and [R] logistic for details.

Quick start

Bayesian logistic regression of y on x1 and x2, using default normal priors for regression coefficients

```
bayes: logistic y x1 x2
```

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

```
bayes, normalprior(10): logistic y x1 x2
```

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)): logistic y x1 x2
```

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

```
bayes, saving(simdata) rseed(123): logistic y x1 x2
```

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): logistic y x1 x2
```

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 coefficients instead of odds ratios

```
bayes: logistic y x1 x2, coef
```

Display coefficients on replay

```
bayes, coef
```

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

Menu

Statistics > Binary outcomes > Bayesian regression > Logistic regression
## Syntax

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

### Options

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>noconstant</code></td>
<td>suppress constant term</td>
</tr>
<tr>
<td><code>offset(varname)</code></td>
<td>include <code>varname</code> in model with coefficient constrained to 1</td>
</tr>
<tr>
<td><code>asis</code></td>
<td>retain perfect predictor variables</td>
</tr>
</tbody>
</table>

### Reporting

|coef | report estimated coefficients                  |
|display_options| control spacing, line width, and base and empty cells |
|`level(#)` | set credible level; default is `level(95)` |

`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.

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

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

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

### bayesopts

<table>
<thead>
<tr>
<th>Priors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>normalprior(#)</code></td>
<td>specify standard deviation of default normal priors for regression coefficients; default is <code>normalprior(100)</code></td>
</tr>
<tr>
<td><code>prior(priorspec)</code></td>
<td>prior for model parameters; this option may be repeated</td>
</tr>
<tr>
<td><code>dryrun</code></td>
<td>show model summary without estimation</td>
</tr>
</tbody>
</table>

### Simulation

<table>
<thead>
<tr>
<th>Simulation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>nchains(#)</code></td>
<td>number of chains; default is to simulate one chain</td>
</tr>
<tr>
<td><code>mcmcsize(#)</code></td>
<td>MCMC sample size; default is <code>mcmcsize(10000)</code></td>
</tr>
<tr>
<td><code>burnin(#)</code></td>
<td>burn-in period; default is <code>burnin(2500)</code></td>
</tr>
<tr>
<td><code>thinning(#)</code></td>
<td>thinning interval; default is <code>thinning(1)</code></td>
</tr>
<tr>
<td><code>rseed(#)</code></td>
<td>random-number seed</td>
</tr>
<tr>
<td><code>exclude(paramref)</code></td>
<td>specify model parameters to be excluded from the simulation results</td>
</tr>
</tbody>
</table>

### Blocking

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td><code>blocksize(#)</code></td>
<td>maximum block size; default is <code>blocksize(50)</code></td>
</tr>
<tr>
<td><code>block(paramref[, blockopts])</code></td>
<td>specify a block of model parameters; this option may be repeated</td>
</tr>
<tr>
<td><code>blocksummary</code></td>
<td>display block summary</td>
</tr>
<tr>
<td><code>noblocking</code></td>
<td>do not block parameters by default</td>
</tr>
</tbody>
</table>
Initialization

initial(initspec) specify initial values for model parameters with a single chain
init#(initspec) specify initial values for #th chain; requires nchains()
nomleinit suppress the use of maximum likelihood estimates as starting values
initall(initspec) specify initial values for all chains; requires nchains()
initrandom specify random initial values
initsummary display initial values used for simulation

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
*coef report estimated coefficients
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 {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] logistic.

For a simple example of the bayes prefix, see Introductory example in [BAYES] bayes. Also see Logistic regression with perfect predictors in [BAYES] bayes.

Stored results

See Stored results in [BAYES] bayes.

Methods and formulas

See Methods and formulas in [BAYES] bayesmh.

Reference


Also see

[BAYES] bayes — Bayesian regression models using the bayes prefix
[R] logistic — Logistic regression, reporting odds ratios
[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