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 \( x_1 \) and \( x_2 \), using default normal priors for regression coefficients

\[
\text{bayes: logistic } y \ x_1 \ x_2
\]

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

\[
\text{bayes, normalprior(10): logistic } y \ x_1 \ x_2
\]

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

\[
\text{bayes, prior\{y: x_1 \ x_2\}, uniform(-10,10) ///}
\text{prior\{y:_cons\}, normal(0,10): logistic } y \ x_1 \ x_2
\]

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

\[
\text{bayes, saving(simdata) rseed(123): logistic } y \ x_1 \ x_2
\]

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

\[
\text{bayes, mcmcsize(20000) burnin(5000) dots(500): logistic } y \ x_1 \ x_2
\]

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

\[
\text{bayes, clevel(90) hpd}
\]

Display coefficients instead of odds ratios

\[
\text{bayes: logistic } y \ x_1 \ x_2, \ coef
\]

Display coefficients on replay

\[
\text{bayes, coef}
\]

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

Menu

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

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

### Options

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<td>level(#)</td>
<td>set credible level; default is level(95)</td>
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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.

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

### bayesopts

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<td>burn-in period; default is burnin(2500)</td>
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<td>specify model parameters to be excluded from the simulation results</td>
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<td>Blocking</td>
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<td>* blocksize(#)</td>
<td>maximum block size; default is blocksize(50)</td>
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<tr>
<td>block(paramref[, blockopts])</td>
<td>specify a block of model parameters; this option may be repeated</td>
</tr>
<tr>
<td>blocksummary</td>
<td>display block summary</td>
</tr>
<tr>
<td>* noblocking</td>
<td>do not block parameters by default</td>
</tr>
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</table>
Initialization

`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()`
`nomleinit` 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
`*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`

`[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

`slist(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