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
bayes: logistic — Bayesian logistic regression, reporting odds ratios

Syntax

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

Options

<table>
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<tr>
<th>Model</th>
<th>Description</th>
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<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>
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<table>
<thead>
<tr>
<th>Reporting</th>
<th>Description</th>
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<tr>
<td><code>coef</code></td>
<td>report estimated coefficients</td>
</tr>
<tr>
<td><code>display_options</code></td>
<td>control spacing, line width, and base and empty cells</td>
</tr>
<tr>
<td><code>level(#)</code></td>
<td>set credible level; default is <code>level(95)</code></td>
</tr>
</tbody>
</table>

`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: 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>
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<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>
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</table>

<table>
<thead>
<tr>
<th>Simulation</th>
<th>Description</th>
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<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>

<table>
<thead>
<tr>
<th>Blocking</th>
<th>Description</th>
</tr>
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<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

\texttt{initial(\textit{initspec})} specify initial values for model parameters with a single chain
\texttt{init\#(\textit{initspec})} specify initial values for \#th chain; requires \texttt{nchains()}
\texttt{initall(\textit{initspec})} specify initial values for all chains; requires \texttt{nchains()}
\texttt{nomleinit} suppress the use of maximum likelihood estimates as starting values
\texttt{initrandom} specify random initial values
\texttt{initsummary} display initial values used for simulation
\texttt{*noisily} display output from the estimation command during initialization

Adaptation

\texttt{adaptation(\textit{adaptopts})} control the adaptive MCMC procedure
\texttt{scale(\#)} initial multiplier for scale factor; default is \texttt{scale(2.38)}
\texttt{covariance(\textit{cov})} initial proposal covariance; default is the identity matrix

Reporting

\texttt{clevel(\#)} set credible interval level; default is \texttt{clevel(95)}
\texttt{hpd} display HPD credible intervals instead of the default equal-tailed credible intervals
\texttt{*coeff} report estimated coefficients
\texttt{eform(\textit{string})} report exponentiated coefficients and, optionally, label as \textit{string}
\texttt{batch(\#)} specify length of block for batch-means calculations; default is \texttt{batch(0)}
\texttt{saving(\textit{filename}, replace)} save simulation results to \textit{filename}.dta
\texttt{nomodelsummary} suppress model summary
\texttt{chainsdetail} display detailed simulation summary for each chain
\texttt{[no]dots} suppress dots or display dots every 100 iterations and iteration numbers every 1,000 iterations; default is \texttt{nodots}
\texttt{dots(\#, every(\#))} display dots as simulation is performed
\texttt{[no]show(paramref)} specify model parameters to be excluded from or included in the output
\texttt{notable} suppress estimation table
\texttt{noheader} suppress output header
\texttt{title(\textit{string})} display \textit{string} as title above the table of parameter estimates
\texttt{display_options} control spacing, line width, and base and empty cells

Advanced

\texttt{search(search_options)} control the search for feasible initial values
\texttt{corrlag(\#)} specify maximum autocorrelation lag; default varies
\texttt{corrtol(\#)} specify autocorrelation tolerance; default is \texttt{corrtol(0.01)}

*Starred options are specific to the \texttt{bayes} prefix; other options are common between \texttt{bayes} and \texttt{bayesmh}.

Options \texttt{prior()} and \texttt{block()} may be repeated.

\texttt{priorspec} and \texttt{paramref} are defined in \texttt{[BAYES] bayesmh}.

\texttt{paramref} may contain factor variables; see \texttt{[U] 11.4.3 Factor variables}.

See \texttt{[U] 20 Estimation and postestimation commands} for more capabilities of estimation commands.

Model parameters are regression coefficients \{\textit{depvar}:\textit{indepvars}\}. Use the \texttt{dryrun} option to see the definitions of model parameters prior to estimation.

For a detailed description of \texttt{bayesopts}, see \texttt{Options} in \texttt{[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