**bayes: binreg** — Bayesian generalized linear models: Extensions to the binomial family

### Description

`bayes: binreg` fits a Bayesian binomial regression to a binary outcome, assuming different link functions; see [BAYES] `bayes` and [R] `binreg` for details.

### Quick start

Bayesian binomial regression of $y$ on $x_1$ and $x_2$, using the default logit link and using default normal priors for regression coefficients

```
bayes: binreg y x1 x2
```

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

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

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

```
bayes, saving(simdata) rseed(123): binreg 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): binreg 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 odds ratios instead of coefficients

```
bayes: binreg y x1 x2, or
```

Use the log link and report risk ratios

```
bayes: binreg y x1 x2, rr
```

Display coefficients instead of risk ratios

```
bayes, coefficients
```

Also see *Quick start* in [BAYES] `bayes` and *Quick start* in [R] `binreg`.

### Menu

```
Statistics > Generalized linear models > Bayesian GLM for the binomial family
```
Syntax

\texttt{bayes [ , bayesopts ] : binreg depvar [ indepvars ] [ if ] [ in ] [ weight ] [ , options ]}

\textbf{options} \hspace{20em} \textbf{Description}

\textbf{Model}

\texttt{noconstant} \hspace{1em} suppress constant term
\texttt{or} \hspace{1em} use logit link and report odds ratios
\texttt{rr} \hspace{1em} use log link and report risk ratios
\texttt{hr} \hspace{1em} use log-complement link and report health ratios
\texttt{rd} \hspace{1em} use identity link and report risk differences
\texttt{n(\# | varname)} \hspace{1em} use \# or varname for number of trials
\texttt{exposure(varname)} \hspace{1em} include ln(varname) in model with coefficient constrained to 1
\texttt{offset(varname)} \hspace{1em} include varname in model with coefficient constrained to 1
\texttt{mu(varname)} \hspace{1em} use varname as the initial estimate for the mean of depvar
\texttt{init(varname)} \hspace{1em} synonym for mu(varname)

\textbf{Reporting}

\texttt{coefficients} \hspace{1em} report nonexponentiated coefficients
\texttt{display_options} \hspace{1em} control spacing, line width, and base and empty cells
\texttt{level(#)} \hspace{1em} set credible level; default is level(95)

\textit{indepvars} may contain factor variables; see [U] \texttt{11.4.3 Factor variables}.
\texttt{depvar} and \texttt{indepvars} may contain time-series operators; see [U] \texttt{11.4.4 Time-series varlists}.
fweights are allowed; see [U] \texttt{11.1.6 weight}.
\texttt{bayes: binreg, level()} is equivalent to \texttt{bayes, clevel(): binreg}.
For a detailed description of \texttt{options}, see \textit{Options} in [R] \texttt{binreg}. \texttt{binreg}'s option ml is implied with \texttt{bayes: binreg}.

\textbf{bayesopts} \hspace{20em} \textbf{Description}

\textbf{Priors}

\texttt{normalprior(#)} \hspace{1em} specify standard deviation of default normal priors for regression coefficients; default is normalprior(100)
\texttt{prior(priorspec)} \hspace{1em} prior for model parameters; this option may be repeated
\texttt{dryrun} \hspace{1em} show model summary without estimation

\textbf{Simulation}

\texttt{nchains(#)} \hspace{1em} number of chains; default is to simulate one chain
\texttt{mcmcsize(#)} \hspace{1em} MCMC sample size; default is mcmcsize(10000)
\texttt{burnin(#)} \hspace{1em} burn-in period; default is burnin(2500)
\texttt{thinning(#)} \hspace{1em} thinning interval; default is thinning(1)
\texttt{rseed(#)} \hspace{1em} random-number seed
\texttt{exclude(paramref)} \hspace{1em} specify model parameters to be excluded from the simulation results

\textbf{ Blocking}

\texttt{blocksize(#)} \hspace{1em} maximum block size; default is blocksize(50)
\texttt{block(paramref[ , blockopts ])} \hspace{1em} specify a block of model parameters; this option may be repeated
\texttt{blocksummary} \hspace{1em} display block summary
\texttt{noblocking} \hspace{1em} do not block parameters by default
Bayes: binreg — Bayesian generalized linear models: Extensions to the binomial family

### Initialization

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>initial(initspec)</code></td>
<td>specify initial values for model parameters with a single chain</td>
</tr>
<tr>
<td><code>init#(initspec)</code></td>
<td>specify initial values for #th chain; requires <code>nchains()</code></td>
</tr>
<tr>
<td><code>initall(initspec)</code></td>
<td>specify initial values for all chains; requires <code>nchains()</code></td>
</tr>
<tr>
<td><code>nomleinit</code></td>
<td>suppress the use of maximum likelihood estimates as starting values</td>
</tr>
<tr>
<td><code>initrandom</code></td>
<td>specify random initial values</td>
</tr>
<tr>
<td><code>initsummary</code></td>
<td>display initial values used for simulation</td>
</tr>
<tr>
<td><code>nositely</code></td>
<td>display output from the estimation command during initialization</td>
</tr>
</tbody>
</table>

### Adaptation

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>adaptation(adaptopts)</code></td>
<td>control the adaptive MCMC procedure</td>
</tr>
<tr>
<td><code>scale(#)</code></td>
<td>initial multiplier for scale factor; default is <code>scale(2.38)</code></td>
</tr>
<tr>
<td><code>covariance(cov)</code></td>
<td>initial proposal covariance; default is the identity matrix</td>
</tr>
</tbody>
</table>

### Reporting

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<tbody>
<tr>
<td><code>clevel(#)</code></td>
<td>set credible interval level; default is <code>clevel(95)</code></td>
</tr>
<tr>
<td><code>hpd</code></td>
<td>display HPD credible intervals instead of the default equal-tailed credible intervals</td>
</tr>
<tr>
<td><code>coefficients</code></td>
<td>report nonexponentiated coefficients</td>
</tr>
<tr>
<td><code>eform(string)</code></td>
<td>report exponentiated coefficients and, optionally, label as <code>string</code></td>
</tr>
<tr>
<td><code>batch(#)</code></td>
<td>specify length of block for batch-means calculations; default is <code>batch(0)</code></td>
</tr>
<tr>
<td><code>saving(filename[, replace])</code></td>
<td>save simulation results to <code>filename.dta</code></td>
</tr>
<tr>
<td><code>nomodelsummary</code></td>
<td>suppress model summary</td>
</tr>
<tr>
<td><code>chainsdetail</code></td>
<td>display detailed simulation summary for each chain</td>
</tr>
<tr>
<td><code>nодots</code></td>
<td>suppress dots or display dots every 100 iterations and iteration numbers</td>
</tr>
<tr>
<td><code>every(#)</code></td>
<td>every 1,000 iterations; default is <code>nodots</code></td>
</tr>
<tr>
<td><code>dots(#[, every(#)])</code></td>
<td>display dots as simulation is performed</td>
</tr>
<tr>
<td><code>show(paramref)</code></td>
<td>specify model parameters to be excluded from or included in the output</td>
</tr>
<tr>
<td><code>notable</code></td>
<td>suppress estimation table</td>
</tr>
<tr>
<td><code>noheader</code></td>
<td>suppress output header</td>
</tr>
<tr>
<td><code>title(string)</code></td>
<td>display <code>string</code> as title above the table of parameter estimates</td>
</tr>
<tr>
<td><code>display_options</code></td>
<td>control spacing, line width, and base and empty cells</td>
</tr>
</tbody>
</table>

### Advanced

<table>
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</tr>
</thead>
<tbody>
<tr>
<td><code>search(search_options)</code></td>
<td>control the search for feasible initial values</td>
</tr>
<tr>
<td><code>corrlag(#)</code></td>
<td>specify maximum autocorrelation lag; default varies</td>
</tr>
<tr>
<td><code>corrtol(#)</code></td>
<td>specify autocorrelation tolerance; default is <code>corrtol(0.01)</code></td>
</tr>
</tbody>
</table>

*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] binreg.

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.

Also see

[BAYES] bayes — Bayesian regression models using the bayes prefix
[R] binreg — Generalized linear models: Extensions to the binomial family
[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