**bayes: fracreg — Bayesian fractional response regression**

### Description

`bayes: fracreg` fits a Bayesian fractional response regression to a fractional outcome whose values are greater than or equal to 0 and less than or equal to 1; see [BAYES] bayes and [R] fracreg for details.

### Quick start

Bayesian fractional probit regression of \( y \) on \( x_1 \) and \( x_2 \), using default normal priors for regression coefficients

```
bayes: fracreg probit y x1 x2
```

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

```
bayes, normalprior(10): fracreg probit 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)): fracreg probit y x1 x2
```

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

```
bayes, saving(simdata) rseed(123): fracreg probit 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): fracreg probit 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
```

Fit a fractional logistic regression and display results as odds ratios

```
bayes: fracreg logit y x1 x2, or
```

Display odds ratios on replay

```
bayes, or
```

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

### Menu

Statistics > Fractional outcomes > Bayesian fractional regression
Syntax

Syntax for fractional probit regression

\[ \text{bayes[, bayesopts]: fracreg probit depvar [indepvars] [if] [in] [weight]} \[ , options] \]

Syntax for fractional logistic regression

\[ \text{bayes[, bayesopts]: fracreg logit depvar [indepvars] [if] [in] [weight]} \[ , options] \]

Syntax for fractional heteroskedastic probit regression

\[ \text{bayes[, bayesopts]: fracreg probit depvar [indepvars] [if] [in] [weight], het(varlist[, offset(varname)]}, [options] \]

options

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Model</strong></td>
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<tr>
<td>noconstant                                      suppress constant term</td>
</tr>
<tr>
<td>offset(varname)                                 include varname in model with coefficient constrained to 1</td>
</tr>
<tr>
<td>collinear                                        keep collinear variables</td>
</tr>
<tr>
<td>*het(varlist[, offset(varname)]                independent variables to model the variance and possible</td>
</tr>
<tr>
<td>offset variable with fracreg probit</td>
</tr>
<tr>
<td>Reporting</td>
</tr>
<tr>
<td>or display_options                              report odds ratios; only valid with fracreg logit</td>
</tr>
<tr>
<td>control spacing, line width, and base and empty cells</td>
</tr>
<tr>
<td>level(#)                                        set credible level; default is level(95)</td>
</tr>
</tbody>
</table>

* het() may be used only with fracreg probit to compute fractional heteroskedastic probit regression.

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: fracreg, level() is equivalent to bayes, clevel(): fracreg.
For a detailed description of options, see Options in [R] fracreg.

bayesopts

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

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

Blocking

\texttt{* blocksize(\#)} \quad \text{maximum block size; default is \texttt{blocksize(50)}}
\texttt{block(paramref[, blockopts])} \quad \text{specify a block of model parameters; this option may be repeated}
\texttt{blocksummary} \quad \text{display block summary}
\texttt{* noblocking} \quad \text{do not block parameters by default}

Initialization

\texttt{initial(initspec)} \quad \text{initial values for model parameters}
\texttt{nomleinitial} \quad \text{suppress the use of maximum likelihood estimates as starting values}
\texttt{initrandom} \quad \text{specify random initial values}
\texttt{initsummary} \quad \text{display initial values used for simulation}
\texttt{* noisily} \quad \text{display output from the estimation command during initialization}

Adaptation

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

Reporting

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

Advanced

\texttt{search(search_options)} \quad \text{control the search for feasible initial values}
\texttt{corrlag(\#)} \quad \text{specify maximum autocorrelation lag; default varies}
\texttt{corrtol(\#)} \quad \text{specify autocorrelation tolerance; default is \texttt{corrtol(0.01)}}
Starred options are specific to the `bayes` prefix; other options are common between `bayes` and `bayesmh`. Options `prior()` and `block()` can 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}` and, if option `het()` is specified, regression coefficients `{lnsigma:varlist}` for the log-standard deviation equation. 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] `fracreg`.

For a simple example of the `bayes` prefix, see Introductory example in [BAYES] `bayes`.

Stored results

See Stored results in [BAYES] `bayesmh`.

Methods and formulas

See Methods and formulas in [BAYES] `bayesmh`.

Also see

[BAYES] `bayes` — Bayesian regression models using the bayes prefix
[R] `fracreg` — Fractional response regression
[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`