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

\[ \text{bayes: fracreg probit} \quad y \quad x_1 \quad x_2 \]

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

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

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

\[ \text{bayes, prior({} y: x_1 \quad x_2 \}, \quad \text{uniform(-10,10))} \quad /// \quad \text{prior({} y:cons\}, \quad \text{normal(0,10))}: \quad \text{fracreg probit} \quad y \quad x_1 \quad x_2 \]

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

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

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

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

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

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

Fit a fractional logistic regression and display results as odds ratios

\[ \text{bayes: fracreg logit} \quad y \quad x_1 \quad x_2, \quad \text{or} \]

Display odds ratios on replay

\[ \text{bayes, or} \]

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

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

### Syntax for fractional logistic regression

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

### Syntax for fractional heteroskedastic probit regression

```
bayes [, bayesopts] : fracreg probit depvar [indepvars] [if] [in] [weight], 
    het(varlist[, offset(varname_o)]) [options]
```

### options

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>suppress constant term</td>
</tr>
<tr>
<td>include varname in model with coefficient constrained to 1</td>
</tr>
<tr>
<td>independent variables to model the variance and possible offset variable with fracreg probit</td>
</tr>
<tr>
<td>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>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.

**indevars** may contain factor variables; see [U] 11.4.3 Factor variables.

**depvar** and **indevars** 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>
</tr>
</thead>
<tbody>
<tr>
<td>specify standard deviation of default normal priors for regression coefficients; default is normalprior(100)</td>
</tr>
<tr>
<td>prior for model parameters; this option may be repeated</td>
</tr>
<tr>
<td>show model summary without estimation</td>
</tr>
</tbody>
</table>

* `normalprior(#)` may be used only with fracreg probit to compute fractional heteroskedastic probit regression.
**Simulation**

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

**Blocking**

- `blocksize(#)`: maximum block size; default is `blocksize(50)`
- `block(paramref[, blockopts])`: specify a block of model parameters; this option may be repeated
- `blocksummary`: display block summary
- `*noblocking`: do not block parameters by default

**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()`
- `nomleinitial`: 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
- `*or`: report odds ratio; only valid with `fracreg logit`
- `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
**bayes: fracreg** — Bayesian fractional response regression

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}` 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] bayes.

**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