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

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

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

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

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

```stata
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

```stata
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

```stata
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

```stata
bayes, clevel(90) hpd
```

Fit a fractional logistic regression and display results as odds ratios

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

Display odds ratios on replay

```stata
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)]) [options]
```

### options

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tr>
<td>noconstant</td>
<td>suppress constant term</td>
</tr>
<tr>
<td>offset(varname)</td>
<td>include varname in model with coefficient constrained to 1</td>
</tr>
<tr>
<td>*het(varlist[, offset(varname)]]</td>
<td>independent variables to model the variance and possible offset variable with fracreg probit</td>
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<table>
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<tr>
<th>Reporting</th>
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<td>or</td>
<td>report odds ratios; only valid with fracreg logit</td>
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<tr>
<td>display_options</td>
<td>control spacing, line width, and base and empty cells</td>
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<tr>
<td>level(#)</td>
<td>set credible level; default is level(95)</td>
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* 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>
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* normalprior(#) specify standard deviation of default normal priors for regression coefficients; default is normalprior(100)

* prior(priorspec) prior for model parameters; this option may be repeated

* dryrun show model summary without estimation
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
display block summary
*blocking 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
intrandom 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
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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

stata.com

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