bayes: zioprobit — Bayesian zero-inflated ordered probit regression

Description

bayes: zioprobit fits a Bayesian zero-inflated ordered probit regression to an ordinal outcome with a high fraction of zeros; see [BAYES] bayes and [R] zioprobit for details.

Quick start

Bayesian zero-inflated ordered probit regression of \( y \) on \( x_1 \) and \( x_2 \), using \( z \) to model excess zeros and using default normal priors for regression coefficients and flat priors for cutpoints

\[
\text{bayes: zioprobit } y \ x_1 \ x_2, \text{ inflate}(z)
\]

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

\[
\text{bayes, normalprior(10): zioprobit } y \ x_1 \ x_2, \text{ inflate}(z)
\]

Use uniform priors for the slopes and a normal prior for the intercept of the main regression

\[
\text{bayes, prior({y: x_1 \ x_2}, uniform(-10,10)) } ///
\text{prior({y:_cons}, normal(0,10)): zioprobit } y \ x_1 \ x_2, \text{ inflate}(z)
\]

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

\[
\text{bayes, saving(simdata) rseed(123): } ///
\text{zioprobit } y \ x_1 \ x_2, \text{ inflate}(z)
\]

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

\[
\text{bayes, mcmcsize(20000) burnin(5000) dots(500): } ///
\text{zioprobit } y \ x_1 \ x_2, \text{ inflate}(z)
\]

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

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

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

Menu

Statistics > Ordinal outcomes > Bayesian regression > Zero-inflated ordered probit regression
Bayesian zero-inflated ordered probit regression

**Syntax**

```plaintext
bayes [, bayesopts] : zioprobit depvar [ indepvars ] [ if ] [ in ] [ weight ],
    inflate(varlist[, noconstant offset(varname)] | _cons) [ options ]
```

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<td>equation that determines excess zero values</td>
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<tr>
<td><strong>offset(varname)</strong></td>
<td>include <code>varname</code> in model with coefficient constrained to 1</td>
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<td><strong>level(#)</strong></td>
<td>set credible level; default is <code>level(95)</code></td>
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*`inflate(varlist[, noconstant offset(varname)] | _cons)` is required.

`indepvars` and `varlist` may contain factor variables; see [U] 11.4.3 Factor variables.

fweights are allowed; see [U] 11.1.6 weight.

bayes: zioprobit, level() is equivalent to bayes, clevel(): zioprobit.

For a detailed description of options, see Options in [R] zioprobit.

**bayesopts**

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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()
nomleinit 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
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
chainedetail display detailed simulation summary for each chain
[nodots] 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

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 for the main regression and \{inflate\}:varlist for the inflation equation and cutpoints \{cut1\}, \{cut2\}, and so on. Use the dryrun option to see the definitions of model parameters prior to estimation.

Flat priors, flat, are used by default for cutpoints.
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] zioprobit.

For a simple example of the bayes prefix, see Introductory example in [BAYES] bayes. Also see Zero-inflated negative binomial models 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] zioprobit — Zero-inflated ordered probit 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