bayes: zioprobit — Bayesian zero-inflated ordered probit regression

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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 x1 and x2, using z to model excess zeros and using default normal priors for regression coefficients and flat priors for cutpoints

    bayes: zioprobit y x1 x2, inflate(z)

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

    bayes, normalprior(10): zioprobit y x1 x2, inflate(z)

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

    bayes, prior({y: x1 x2}, uniform(-10,10)) ///
    prior({y:_cons}, normal(0,10)): zioprobit y x1 x2, inflate(z)

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

    bayes, saving(simdata) rseed(123): ///
    zioprobit y x1 x2, inflate(z)

Specify 20,000 Markov chain Monte Carlo (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): ///
    zioprobit y x1 x2, inflate(z)

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

    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

Syntax

> bayes [, *bayesopts*] : zioprobit *depvar* [*indepvars*] [*if*] [*in*] [*weight*] ,
>
> > <u>infl</u>ate(*varlist*[, <u>nocons</u>tant <u>off</u>set(*varname*)] | _cons) [*options*]

options	Description
Model	
* <u>infl</u>ate( )	inflation equation that determines excess zero values
<u>off</u>set(*varname*)	include *varname* in model with coefficient constrained to 1
Reporting	
display_options	control spacing, line width, and base and empty cells
level(*#*)	set credible level; default is level(95)

*<u>infl</u>ate(*varlist*[, <u>nocons</u>tant <u>off</u>set(*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	Description
[Priors]	
* <u>normalprior</u>(*#*)	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)
<u>burnin</u>(*#*)	burn-in period; default is burnin(2500)
<u>thinning</u>(*#*)	thinning interval; default is thinning(1)
rseed(*#*)	random-number seed
<u>exclu</u>de(*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
* <u>noblock</u>ing	do not block parameters by default

  <u>initial</u>(*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()
  <u>nomleinitial</u>   suppress the use of maximum likelihood estimates as starting values
  initrandom   specify random initial values
  initsummary   display initial values used for simulation
 * <u>noi</u>sily   display output from the estimation command during initialization

  <u>adaptation</u>(*adaptopts*)   control the adaptive MCMC procedure
  <u>scale</u>(#)   initial multiplier for scale factor; default is scale(2.38)
  <u>covariance</u>(*cov*)   initial proposal covariance; default is the identity matrix

  <u>clevel</u>(#)   set credible interval level; default is clevel(95)
  hpd   display HPD credible intervals instead of the default equal-tailed
                           credible intervals
  <u>ef</u>orm[(*string*)]   report exponentiated coefficients and, optionally, label as *string*
  batch(#)   specify length of block for batch-means calculations;
                           default is batch(0)
  <u>saving</u>(*filename*[, replace])   save simulation results to *filename*.dta
  <u>nomodelsummary</u>   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
  <u>notable</u>   suppress estimation table
  <u>noheader</u>   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

  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)

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* 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**.

collect is allowed; see [U] **11.1.10 Prefix commands**.

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 after Bayesian estimation

[BAYES] **Bayesian estimation** — Bayesian estimation commands

[BAYES] **Bayesian commands** — Introduction to commands for Bayesian analysis

[BAYES] **Intro** — Introduction to Bayesian analysis

[BAYES] **Glossary**

For suggested citations, see the FAQ on citing Stata documentation.