Title

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bayes: heckoprobit — Bayesian ordered probit model with sample selection

Description

`bayes: heckoprobit` fits a Bayesian sample-selection ordered probit regression to a partially observed ordinal outcome; see [BAYES] **bayes** and [R] **heckoprobit** for details.

Quick start

Bayesian sample-selection ordered probit regression of `y` on `x1` and `x2`, using `z1` and `z2` to model selection, and using default normal priors for regression coefficients and atanh-correlation and flat priors for cutpoints

```
bayes: heckoprobit y x1 x2, select(z1 z2)
```

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

```
bayes, normalprior(10): heckoprobit y x1 x2, select(z1 z2)
```

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)): heckoprobit y x1 x2, select(z1 z2)
```

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

```
bayes, saving(simdata) rseed(123):, ///
heckoprobit y x1 x2, select(z1 z2)
```

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):, ///
heckoprobit y x1 x2, select(z1 z2)
```

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] **heckoprobit**.

Menu

Statistics > Ordinal outcomes > Bayesian regression > Ordered probit regression with sample selection

Syntax

`bayes` [, *bayesopts*] `: heckoprobit` *depvar* *indepvars* [*if*] [*in*] [*weight*] `,`
`select(` [$depvar_s$ `=`] $varlist_s$ [`, noconstant offset(`$varname_o$`)`] `)` [*options*]

options	Description
Model	
* `select()`	specify selection equation: dependent and independent variables; whether to have constant term and offset variable
`offset(`*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)`

* `select()` is required.
The full specification is `select(` [$depvar_s$ `=`] $varlist_s$ [`, noconstant offset(`$varname_o$`)`] `)`.
indepvars and $varlist_s$ may contain factor variables; see [U] **11.4.3 Factor variables**.
depvar, *indepvars*, $varlist_s$, and $depvar_s$ may contain time-series operators; see [U] **11.4.4 Time-series varlists**.
`fweight`s are allowed; see [U] **11.1.6 weight**.
`bayes: heckoprobit, level()` is equivalent to `bayes, clevel(): heckoprobit`.
For a detailed description of *options*, see *Options* in [R] **heckoprobit**.

bayesopts	Description
Priors	
* `normalprior(`*#*`)`	specify standard deviation of default normal priors for regression coefficients and atanh-correlation; 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
`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
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
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**.

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 {select:*varlist_s*} for the selection equation, atanh-transformed correlation {athrho}, 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

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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] **heckoprobit**.

For a simple example of the `bayes` prefix, see *Introductory example* in [BAYES] **bayes**. Also see *Heckman selection model* 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] **heckoprobit** — Ordered probit model with sample selection

[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**

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