Title

bayes: probit — Bayesian probit regression

Description

bayes: probit fits a Bayesian probit regression to a binary outcome; see [BAYES] **bayes** and [R] **probit** for details.

Quick start

Bayesian probit regression of y on x1 and x2, using default normal priors for regression coefficients

    bayes: probit y x1 x2

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

    bayes, normalprior(10): probit y x1 x2

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

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

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

    bayes, saving(simdata) rseed(123): probit y x1 x2

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): probit y x1 x2

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] **probit**.

Menu

Statistics > Binary outcomes > Bayesian regression > Probit regression

Syntax

> bayes $\big[$, *bayesopts* $\big]$: <u>probit</u> *depvar* $\big[$ *indepvars* $\big]$ $\big[$ *if* $\big]$ $\big[$ *in* $\big]$ $\big[$ *weight* $\big]$ $\big[$, *options* $\big]$

options	Description
[Model]	
<u>nocon</u>stant	suppress constant term
<u>off</u>set(*varname*)	include *varname* in model with coefficient constrained to 1
asis	retain perfect predictor variables
[Reporting]	
display_options	control spacing, line width, and base and empty cells
<u>l</u>evel(*#*)	set credible level; default is level(95)

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

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

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]	
<u>nchains</u>(*#*)	number of chains; default is to simulate one chain
<u>mcmcsize</u>(*#*)	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)
<u>rseed</u>(*#*)	random-number seed
<u>exclude</u>(*paramref*)	specify model parameters to be excluded from the simulation results
[Blocking]	
* <u>blocksize</u>(*#*)	maximum block size; default is blocksize(50)
<u>block</u>(*paramref* $\big[$, *blockopts* $\big]$)	specify a block of model parameters; this option may be repeated
<u>blocksummary</u>	display block summary
* <u>noblock</u>ing	do not block parameters by default
[Initialization]	
<u>initial</u>(*initspec*)	specify initial values for model parameters with a single chain
init#(*initspec*)	specify initial values for #th chain; requires nchains()
<u>initall</u>(*initspec*)	specify initial values for all chains; requires nchains()
<u>nomleinit</u>ial	suppress the use of maximum likelihood estimates as starting values
<u>initrand</u>om	specify random initial values
<u>initsumm</u>ary	display initial values used for simulation
* <u>nois</u>ily	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)

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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*}. 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] **probit**.

For a simple example of the bayes prefix, see *Introductory example* in [BAYES] **bayes**. Also see
Logistic regression with perfect predictors 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] **probit** — 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**