

**bayes: probit** — Bayesian probit regression

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## 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  $x_1$  and  $x_2$ , 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](#).

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## Syntax

```
bayes [ , bayesopts ] : probit depvar [indepvars] [if] [in] [weight] [ , options ]
```

<i>options</i>	Description
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Model	
<u>noconstant</u>	suppress constant term
<u>offset</u> ( <i>varname</i> )	include <i>varname</i> in model with coefficient constrained to 1
<u>asis</u>	retain perfect predictor variables

Reporting	
<u>display_options</u>	control spacing, line width, and base and empty cells
<u>level</u> (#)	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`.

<i>bayesopts</i>	Description
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Priors	
* <u>normalprior</u> (#)	specify standard deviation of default normal priors for regression coefficients; default is <code>normalprior(100)</code>
<u>prior</u> ( <i>priorspec</i> )	prior for model parameters; this option may be repeated
<u>dryrun</u>	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 <code>mcmcsize(10000)</code>
<u>burnin</u> (#)	burn-in period; default is <code>burnin(2500)</code>
<u>thinning</u> (#)	thinning interval; default is <code>thinning(1)</code>
<u>rseed</u> (#)	random-number seed
<u>exclude</u> ( <i>paramref</i> )	specify model parameters to be excluded from the simulation results

Blocking	
* <u>blocksize</u> (#)	maximum block size; default is <code>blocksize(50)</code>
<u>block</u> ( <i>paramref</i> [ , <i>blockopts</i> ])	specify a block of model parameters; this option may be repeated
<u>blocksummary</u>	display block summary
* <u>noblocking</u>	do not block parameters by default

Initialization	
<u>initial</u> ( <i>initspec</i> )	specify initial values for model parameters with a single chain
<u>init</u> #( <i>initspec</i> )	specify initial values for #th chain; requires <code>nchains()</code>
<u>initall</u> ( <i>initspec</i> )	specify initial values for all chains; requires <code>nchains()</code>
<u>nomleinitial</u>	suppress the use of maximum likelihood estimates as starting values
<u>initransom</u>	specify random initial values
<u>initsummary</u>	display initial values used for simulation
* <u>noisily</u>	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 `{devar: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

[stata.com](http://www.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] `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**