

bayes: biprobit — Bayesian bivariate probit regression

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Description

`bayes: biprobit` fits a Bayesian bivariate probit regression to two binary outcomes; see [\[BAYES\] bayes](#) and [\[R\] biprobit](#) for details.

Quick start

Bayesian bivariate probit regression of `y1` and `y2` on `x1` and `x2`, using default normal priors for regression coefficients and atanh-transformed correlation

```
bayes: biprobit y1 y2 x1 x2
```

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

```
bayes, normalprior(10): biprobit y1 y2 x1 x2
```

Use uniform priors for the slopes and a normal prior for the intercept of the dependent variable `y2`

```
bayes, prior({y2: x1 x2}, uniform(-10,10)) ///
prior({y2:_cons}, normal(0,10)): biprobit y1 y2 x1 x2
```

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

```
bayes, saving(simdata) rseed(123): biprobit y1 y2 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): biprobit y1 y2 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
```

Bayesian seemingly unrelated bivariate probit regression using default priors

```
bayes: biprobit (y1 = x1 x2 x3) (y2 = x1 x2)
```

Also see [Quick start](#) in [\[BAYES\] bayes](#) and [Quick start](#) in [\[R\] biprobit](#).

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Syntax

Bayesian bivariate probit regression

```
bayes [ , bayesopts ] : biprobit depvar1 depvar2 [indepvars] [if] [in] [weight]
[ , options ]
```

Bayesian seemingly unrelated bivariate probit regression

```
bayes [ , bayesopts ] : biprobit equation1 equation2 [if] [in] [weight] [ , options ]
```

where *equation*₁ and *equation*₂ are specified as

```
( [eqname: ] depvar [=] [indepvars] [ , noconstant offset(varname) ] )
```

options

Description

Model

<u>noconstant</u>	suppress constant term
<u>offset1</u> (<i>varname</i>)	offset variable for first equation
<u>offset2</u> (<i>varname</i>)	offset variable for second equation

Reporting

<i>display_options</i>	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*₁, *depvar*₂, *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: **biprobit**, **level**() is equivalent to **bayes**, **clevel**(): **biprobit**.

For a detailed description of *options*, see *Options* in [R] **biprobit**. Options **noconstant**, **offset1**(), and **offset2**() are not allowed with seemingly unrelated bivariate probit regression.

bayesopts

Description

Priors

* <u>normalprior</u> (#)	specify standard deviation of default normal priors for regression coefficients and atanh-transformed correlation; default is normalprior(100)
<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 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> (<i>paramref</i>)	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
 - `corrctl(#)` specify autocorrelation tolerance; default is `corrctl(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 $\{depvar_1: indepvars\}$ and $\{depvar_2: indepvars\}$ and atanh-transformed correlation $\{athrho\}$. 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](https://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] `biprobit`.

For a simple example of the `bayes` prefix, see *Introductory example* 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] `biprobit` — Bivariate 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**

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