

## Description

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

## Quick start

Bayesian bivariate probit regression of  $y_1$  and  $y_2$  on  $x_1$  and  $x_2$ , using default normal priors for regression coefficients and atanh-transformed correlation

```
bayes: bipoibit y1 y2 x1 x2
```

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

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

Use uniform priors for the slopes and a normal prior for the intercept of the dependent variable  $y_2$

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

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

```
bayes, saving(simdata) rseed(123): bipoibit 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, mcmcsz(20000) burnin(5000) dots(500): bipoibit 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: bipoibit (y1 = x1 x2 x3) (y2 = x1 x2)
```

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

## Menu

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# Syntax

Bayesian bivariate probit regression

```
bayes [ , bayesopts ] : biprobit devar1 devar2 [ indepvars ] [ if ] [ in ] [ weight ]
[ , options ]
```

Bayesian seemingly unrelated bivariate probit regression

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

where *equation*<sub>1</sub> and *equation*<sub>2</sub> are specified as

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

<i>options</i>	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.

*devar*<sub>1</sub>, *devar*<sub>2</sub>, *devar*, 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.

<i>bayesopts</i>	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

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

### Initialization

<code>initial(<i>initspec</i>)</code>	specify initial values for model parameters with a single chain
<code>init#(<i>initspec</i>)</code>	specify initial values for #th chain; requires <code>nchains()</code>
<code>initall(<i>initspec</i>)</code>	specify initial values for all chains; requires <code>nchains()</code>
<code>nomleinitial</code>	suppress the use of maximum likelihood estimates as starting values
<code>initransom</code>	specify random initial values
<code>initsummary</code>	display initial values used for simulation
* <code>noisily</code>	display output from the estimation command during initialization

### Adaptation

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

### Reporting

<code>clevel(#)</code>	set credible interval level; default is <code>clevel(95)</code>
<code>hpd</code>	display HPD credible intervals instead of the default equal-tailed credible intervals
<code>eform(<i>string</i>)</code>	report exponentiated coefficients and, optionally, label as <i>string</i>
<code>batch(#)</code>	specify length of block for batch-means calculations; default is <code>batch(0)</code>
<code>saving(<i>filename</i>[ , replace ])</code>	save simulation results to <i>filename.dta</i>
<code>nomodelsummary</code>	suppress model summary
<code>chainsdetail</code>	display detailed simulation summary for each chain
<code>[no]dots</code>	suppress dots or display dots every 100 iterations and iteration numbers every 1,000 iterations; default is <code>nodots</code>
<code>dots(#[ , every(#)])</code>	display dots as simulation is performed
<code>[no]show(<i>paramref</i>)</code>	specify model parameters to be excluded from or included in the output
<code>notable</code>	suppress estimation table
<code>noheader</code>	suppress output header
<code>title(<i>string</i>)</code>	display <i>string</i> as title above the table of parameter estimates
<code>display_options</code>	control spacing, line width, and base and empty cells

### Advanced

<code>search(<i>search_options</i>)</code>	control the search for feasible initial values
<code>corrlag(#)</code>	specify maximum autocorrelation lag; default varies
<code>corrto1(#)</code>	specify autocorrelation tolerance; default is <code>corrto1(0.01)</code>

\* Starred options are specific to the `bayan` prefix; other options are common between `bayan` 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 *baysesopts*, see *Options* in [BAYES] **bayses**.

## 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 `bayses` prefix, see [BAYES] **bayses**. For details about the estimation command, see [R] **biprobit**.

For a simple example of the `bayses` prefix, see *Introductory example* in [BAYES] **bayses**.

## Stored results

See *Stored results* in [BAYES] **bayses**.

## Methods and formulas

See *Methods and formulas* in [BAYES] **bayesmh**.

## Also see

[BAYES] **bayses** — Bayesian regression models using the `bayses` prefix

[R] **biprobit** — Bivariate 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**

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