# Title

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**bayes: tnbreg —** Bayesian truncated negative binomial regression



## Description

`bayes: tnbreg` fits a Bayesian truncated negative binomial regression to a positive count outcome whose values are all above the truncation point; see [BAYES] **bayes** and [R] **tnbreg** for details.

## Quick start

Bayesian truncated negative binomial regression of `y` on `x1` and `x2`, using a lower truncation limit of 5 and using default normal priors for regression coefficients and log-overdispersion parameter

```
bayes: tnbreg y x1 x2, ll(5)
```

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

```
bayes, normalprior(10): tnbreg y x1 x2, ll(5)
```

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)): tnbreg y x1 x2, ll(5)
```

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

```
bayes, saving(simdata) rseed(123): tnbreg y x1 x2, ll(5)
```

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): tnbreg y x1 x2, ll(5)
```

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
```

Display incidence-rate ratios instead of coefficients

```
bayes: tnbreg y x1 x2, ll(5) irr
```

Display incidence-rate ratios on replay

```
bayes, irr
```

Also see *Quick start* in [BAYES] **bayes** and *Quick start* in [R] **tnbreg**.

## Menu

Statistics > Count outcomes > Bayesian regression > Truncated negative binomial regression

# Syntax

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

| *options* | Description |
|---|---|
| **Model** | |
| noconstant | suppress constant term |
| ll(# \| *varname*) | truncation point; default value is ll(0), zero truncation |
| dispersion(mean) | parameterization of dispersion; the default |
| dispersion(constant) | constant dispersion for all observations |
| exposure(*varname*$_e$) | include ln(*varname*$_e$) in model with coefficient constrained to 1 |
| offset(*varname*$_o$) | include *varname*$_o$ in model with coefficient constrained to 1 |
| **Reporting** | |
| irr | report incidence-rate ratios |
| *display_options* | control spacing, line width, and base and empty cells |
| level(#) | 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: tnbreg, level() is equivalent to bayes, clevel(): tnbreg.

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

| *bayesopts* | Description |
|---|---|
| **Priors** | |
| * normalprior(#) | specify standard deviation of default normal priors for regression coefficients and log-overdispersion parameter; 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 |
| *irr | report incidence-rate ratios |
| 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*} and log-overdispersion parameter {lnalpha} with mean dispersion or {lndelta} with constant dispersion. 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

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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] **tnbreg**.

For a simple example of the `bayes` prefix, see *Introductory example* in [BAYES] **bayes**. Also see *Truncated Poisson regression* 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] **tnbreg** — Truncated negative binomial 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**