**bayes: streg** fits a Bayesian parametric survival model to a survival-time outcome; see [BAYES] `bayes` and [ST] `streg` for details.

### Quick start

Bayesian Weibull survival model of `stset` survival-time outcome on `x1` and `x2`, using default normal priors for regression coefficients and log-ancillary parameters

\[
bayes: streg x1 x2, distribution(weibull)\]

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

\[
bayes, normalprior(10): streg x1 x2, distribution(weibull)\]

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

\[
bayes, prior({_t: x1 x2}, uniform(-10,10)) ///
\]
\[
prior({_t:_cons}, normal(0,10)): streg x1 x2, distribution(weibull)\]

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

\[
bayes, saving(simdata) rseed(123): ///
\]
\[
streg x1 x2, distribution(weibull)\]

Specify 20,000 MCMC samples, set length of the burn-in period to 5,000, and request that a dot be displayed every 500 simulations

\[
bayes, mcmcsize(20000) burnin(5000) dots(500): ///
\]
\[
streg x1 x2, distribution(weibull)\]

In the above, request that the 90% HPD credible interval be displayed instead of the default 95% equal-tailed credible interval

\[
bayes, clevel(90) hpd\]

Use accelerated failure-time metric instead of proportional-hazards parameterization, and display time ratios instead of coefficients

\[
bayes, tratio: streg x1 x2, distribution(weibull) time\]

Display time ratios on replay

\[
bayes, tratio\]

Also see *Quick start* in [BAYES] `bayes` and *Quick start* in [ST] `streg`.

### Menu

- **Statistics > Survival analysis > Regression models > Bayesian parametric survival models**
Bayes: streg — Bayesian parametric survival models

Syntax

```
bayes [, bayesopts ] : streg [ varlist ] [ if ] [ in ] [ , options ]
```

**options**

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You must stset your data before using `bayes: streg`; see [ST] stset.

`varlist` may contain factor variables; see [U] 11.4.3 Factor variables.

`bayes: streg, level()` is equivalent to `bayes, clevel(): streg`.

For a detailed description of `options`, see `Options` in [ST] streg.

**bayesopts**

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</table>
### 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

- **initsrandom**
  - 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

- **nohr**
  - do not report hazard ratios

- **tratio**
  - report time ratios; requires option time with streg

- **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

- **[no]show(paramref)**
  - display dots as simulation is performed

- **[no]table**
  - 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
Bayes: streg — Bayesian parametric survival models

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.

See [U] 20 Estimation and postestimation commands for more capabilities of estimation commands.

Model parameters are regression coefficients `{depvar:indepvars}` and ancillary parameters as described in Ancillary model parameters. 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 [ST] streg.

For a simple example of the `bayes` prefix, see Introductory example in [BAYES] bayes. Also see Parametric survival model in [BAYES] bayes.

Ancillary model parameters

In addition to regression coefficients `{_t:varlist}`, `bayes: streg` defines ancillary parameters that depend on the chosen survival model; see table 1 below. Positive ancillary parameters are transformed to be defined on the whole real line. All ancillary parameters are assigned default normal priors with zero mean and variance of 10,000.

<table>
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<tr>
<th>Distribution</th>
<th>Ancillary parameters</th>
<th>Transformed model parameters</th>
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<td>Exponential</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Weibull</td>
<td>$p$</td>
<td>{ln_p}</td>
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<td>Gompertz</td>
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<tr>
<td>Lognormal</td>
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<td>Loglogistic</td>
<td>$\gamma$</td>
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<tr>
<td>Generalized gamma</td>
<td>$\sigma, \kappa$</td>
<td>{lnsigma}, {kappa}</td>
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</table>

For frailty models, when option `frailty()` or option `shared()` is specified with `streg`, `bayes: streg` also defines the log-frailty parameter \{lntheta\}.

If option `ancillary(varlist)` is specified, regression coefficients \{ln_p:varlist\}, \{gamma:varlist\}, and so on are defined for all ancillary parameters except $\kappa$. If option `anc2(varlist)` is specified, then regression coefficients \{kappa:varlist\} are defined for $\kappa$. 
If option \texttt{strata(varname)} is specified, additional stratum-specific coefficients of the form \{\textit{eqname}:#.\textit{varname}\} are defined for the main regression and ancillary parameters. For example, if \texttt{drug} contains three strata, then specifying option \texttt{strata(drug)} will result in additional main regression coefficients \{_t:2.drug\} and \{_t:3.drug\} and—say, for Weibull regression—in additional parameters \{\textit{ln_p}:2.drug\} and \{\textit{ln_p}:3.drug\}. In the model summary with default priors, you may see these parameters labeled as \{_t:i.drug\} and \{\textit{ln_p}:i.drug\}, for short.

Use the \texttt{dryrun} option with the \texttt{bayes} prefix to see the definitions of model parameters prior to estimation.

\section*{Stored results}

See \textit{Stored results} in [BAYES] \texttt{bayes}.

\section*{Methods and formulas}

See \textit{Methods and formulas} in [BAYES] \texttt{bayesmh}.

\section*{Also see}

[BAYES] \texttt{bayes} — Bayesian regression models using the bayes prefix  
[ST] \texttt{streg} — Parametric survival models  
[BAYES] \texttt{Bayesian postestimation} — Postestimation tools for bayesmh and the bayes prefix  
[BAYES] \texttt{Bayesian estimation} — Bayesian estimation commands  
[BAYES] \texttt{Bayesian commands} — Introduction to commands for Bayesian analysis  
[BAYES] \texttt{Intro} — Introduction to Bayesian analysis  
[BAYES] \texttt{Glossary}