Title

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xtstreg postestimation — Postestimation tools for xtstreg

Postestimation commands

The following postestimation command is of special interest after `xtstreg`:

Command	Description
stcurve	plot the survivor, hazard, and cumulative hazard functions

The following standard postestimation commands are also available:

Command	Description
contrast	contrasts and ANOVA-style joint tests of estimates
estat ic	Akaike's and Schwarz's Bayesian information criteria (AIC and BIC)
estat summarize	summary statistics for the estimation sample
estat vce	variance–covariance matrix of the estimators (VCE)
estimates	cataloging estimation results
hausman	Hausman's specification test
lincom	point estimates, standard errors, testing, and inference for linear combinations of coefficients
lrtest	likelihood-ratio test
margins	marginal means, predictive margins, marginal effects, and average marginal effects
marginsplot	graph the results from margins (profile plots, interaction plots, etc.)
nlcom	point estimates, standard errors, testing, and inference for nonlinear combinations of coefficients
predict	predictions, residuals, influence statistics, and other diagnostic measures
predictnl	point estimates, standard errors, testing, and inference for generalized predictions
pwcompare	pairwise comparisons of estimates
test	Wald tests of simple and composite linear hypotheses
testnl	Wald tests of nonlinear hypotheses

predict

Description for predict

predict creates a new variable containing predictions such as linear predictions, mean and median survival times, hazard functions, and standard errors.

Menu for predict

Statistics > Postestimation

Syntax for predict

> predict [*type*] *newvar* [*if*] [*in*] [, *statistic* <u>nooff</u>set]

statistic	Description
Main	
xb	linear prediction; the default
mean	marginal mean survival time
mean0	mean survival time assuming that the random effects are zero
median0	median survival time assuming that the random effects are zero
hazard	marginal hazard
hazard0	hazard assuming that the random effects are zero
surv	marginal predicted survivor function
surv0	predicted survivor function assuming that the random effects are zero
stdp	standard error of the linear prediction

These statistics are available both in and out of sample; type predict ... if e(sample) ... if wanted only for the estimation sample.

Options for predict

> [Main]

xb, the default, calculates the linear prediction.

mean calculates the mean survival time that is marginal with respect to the random effect, which means that the statistic is calculated by integrating the prediction function with respect to the random effect over its entire support.

mean0 calculates the mean survival time assuming that all random effects are zero.

median0 calculates the median survival time assuming that all random effects are zero.

hazard calculates the hazard function at _t0 that is marginal with respect to the random effect, which means that the statistic is calculated by integrating the prediction function with respect to the random effect over its entire support.

hazard0 calculates the hazard function at _t0, assuming that all random effects are zero.

surv calculates the predicted survivor function at _t0 that is marginal with respect to the random effect, which means that the statistic is calculated by integrating the prediction function with respect to the random effect over its entire support.

surv0 calculates the predicted survivor function at _t0, assuming that all random effects are zero.

stdp calculates the standard error of the linear prediction.

nooffset is relevant only if you specified offset(*varname*) with xtstreg. This option modifies the calculations made by predict so that they ignore the offset variable; the linear prediction is treated as $\mathbf{x}_{ij}\boldsymbol{\beta}$ rather than as $\mathbf{x}_{ij}\boldsymbol{\beta} + \text{offset}_{ij}$.

margins

Description for margins

margins estimates margins of response for linear predictions and mean and median survival times.

Menu for margins

Statistics > Postestimation

Syntax for margins

margins [*marginlist*] [, *options*]

margins [*marginlist*] , <u>predict</u>(*statistic* ...) [<u>predict</u>(*statistic* ...) ...] [*options*]

statistic	Description
mean	marginal mean survival time; the default
mean0	mean survival time conditional on zero random effects
median0	median survival time conditional on zero random effects
hazard	marginal hazard
surv	marginal predicted survivor function
xb	linear predictor for the fixed portion of the model only
hazard0	not allowed with margins
surv0	not allowed with margins
stdp	not allowed with margins

Statistics not allowed with margins are functions of stochastic quantities other than e(b).

For the full syntax, see [R] **margins**.

Remarks and examples

▷ Example 1

In example 1 of [XT] **xtstreg**, we analyzed the time to infection of the catheter-insertion point for 38 kidney dialysis patients. We fit the following model:

```
. use http://www.stata-press.com/data/r14/catheter
(Kidney data, McGilchrist and Aisbett, Biometrics, 1991)
. xtset patient
  (output omitted )
. xtstreg age female, distribution(weibull)
  (output omitted )
```

The `predict` command allows us to compute the marginal mean and the mean and median survival time assuming that all random effects are zero:

```
. predict mean, mean
. predict mean0, mean0
. predict median0, median0
```

Here we list the predicted mean and median survival times for the first five patients:

```
. list patient mean mean0 median0 in 1/10, sepby(patient)
```

	patient	mean	mean0	median0
1.	1	60.97527	40.39634	32.34459
2.	1	60.97527	40.39634	32.34459
3.	2	204.0082	135.1562	108.217
4.	2	204.0082	135.1562	108.217
5.	3	59.56654	39.46305	31.59731
6.	3	59.56654	39.46305	31.59731
7.	4	224.6581	148.8368	119.1708
8.	4	224.6581	148.8368	119.1708
9.	5	67.7384	44.87694	35.93212
10.	5	67.7384	44.87694	35.93212

This example illustrates that for nonlinear models, the mean computed with the random effects equal to zero is usually not representative of the marginal mean.

`predict` can also compute the predicted survivor function and the predicted hazard function. All of these predictions can be marginal or conditional on the random effects being zero.

Predicted survivor, hazard, or cumulative hazard functions can be visualized with `stcurve`. For example, below we compute marginal predictions for the survivor function for men and women at age 50.

```
. stcurve, survival at1(age=50 female=0) at2(age=50 female=1)
(option marginal assumed)
```
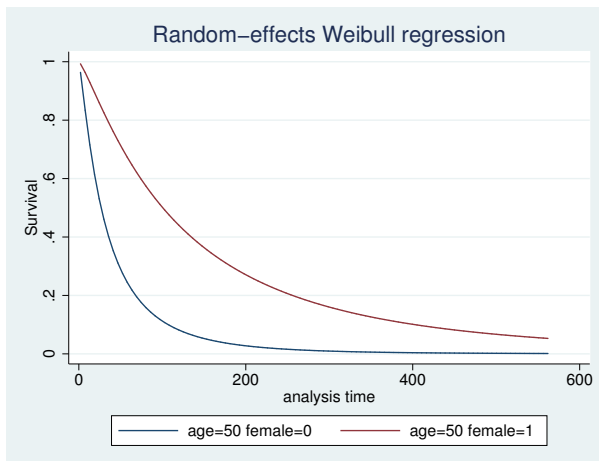

The graph above shows that women who are 50 years old have larger survival probabilities than men of the same age.

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Methods and formulas

predict *newvar* computes the following predictions:

mean0:

$$newvar_{ij} = \int_0^{\infty} \widehat{S}(t|\mathbf{x}_{ij}, u_{ij})dt$$

median0:

$$newvar_{ij} = \{t : \widehat{S}(t|\mathbf{x}_{ij}, u_{ij}) = 1/2\}$$

surv0:

$$newvar_{ij} = \widehat{S}(t_{ij}|\mathbf{x}_{ij}, u_{ij})$$

hazard0:

$$newvar_{ij} = \widehat{g}(t_{ij}|\mathbf{x}_{ij}, u_{ij})/\widehat{S}(t_{ij}|\mathbf{x}_{ij}, u_{ij})$$

Here $\widehat{S}(t|\mathbf{x}_{ij}, u_{ij})$ is the survivor function $S(t|\mathbf{x}_{ij}\boldsymbol{\beta} + u_{ij})$, and $\widehat{g}(t|\mathbf{x}_{ij}, u_{ij})$ is the density $g(t|\mathbf{x}_{ij}\boldsymbol{\beta} + u_{ij})$ with the parameter estimates substituted in for $\boldsymbol{\beta}$ and zero substituted for u_{ij}.

Also see

[XT] **xtstreg** — Random-effects parametric survival models

[ST] **stcurve** — Plot survivor, hazard, cumulative hazard, or cumulative incidence function

[U] **20 Estimation and postestimation commands**