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, consistent Akaike's, corrected Akaike's, and Schwarz's Bayesian information criteria (AIC, CAIC, AICc, and BIC)
`estat summarize`	summary statistics for the estimation sample
`estat vce`	variance–covariance matrix of the estimators (VCE)
`estimates`	cataloging estimation results
`etable`	table of 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`	linear predictions and their SEs, means, medians
`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* `nooffset`]

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*] `,` `predict(`*statistic* ...`)` [`predict(`*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

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▷ 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 https://www.stata-press.com/data/r18/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)
```

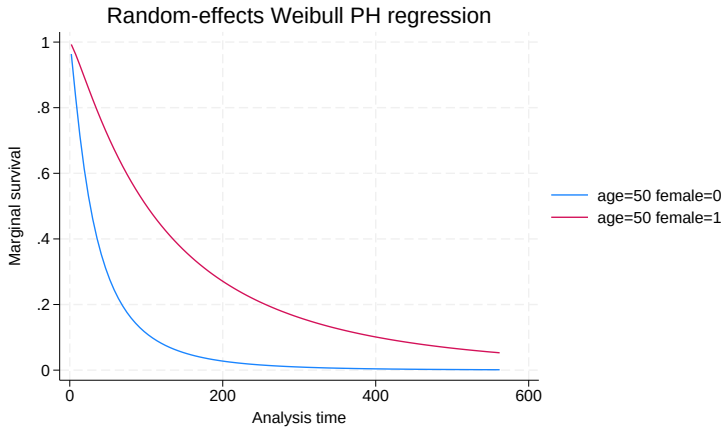
	patient	mean	mean0	median0
1.	1	60.97527	40.39634	32.34459
2.	1	60.97527	40.39634	32.34459
3.	2	204.0082	135.1562	108.217
4.	2	204.0082	135.1562	108.217
5.	3	59.56653	39.46305	31.59731
6.	3	59.56653	39.46305	31.59731
7.	4	224.6581	148.8368	119.1708
8.	4	224.6581	148.8368	119.1708
9.	5	67.7384	44.87694	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, failure, 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)
note: function evaluated at specified values of selected covariates and
      overall means of other covariates (if any).
```



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

◁

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 the survivor or related function after streg, stcox, and more

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