Title

> **xtnbreg postestimation** — Postestimation tools for xtnbreg

Postestimation commands

The following postestimation commands are available after `xtnbreg`:

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
† forecast	dynamic forecasts and simulations
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, number of events, incidence rates, probabilities
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

*`estat ic` and `lrtest` are not appropriate after `xtnbreg, pa`.

†`forecast` is not appropriate with `mi` estimation results.

predict

Description for predict

predict creates a new variable containing predictions such as linear predictions, standard errors, numbers of events, incidence rates, probabilities, and the equation-level score.

Menu for predict

Statistics > Postestimation

Syntax for predict

Random-effects (RE) and conditional fixed-effects (FE) overdispersion models

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

Population-averaged (PA) model

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

RE/FE_statistic	Description
Main	
xb	linear prediction; the default
stdp	standard error of the linear prediction
nu0	predicted number of events; assumes fixed or random effect is zero
iru0	predicted incidence rate; assumes fixed or random effect is zero
pr0(*n*)	probability $\Pr(y = n)$ assuming the random effect is zero; only allowed after xtnbreg, re
pr0(*a*,*b*)	probability $\Pr(a \le y \le b)$ assuming the random effect is zero; only allowed after xtnbreg, re

PA_statistic	Description
Main	
mu	predicted number of events; considers the offset(); the default
rate	predicted number of events
xb	linear prediction
stdp	standard error of the linear prediction
<u>sco</u>re	first derivative of the log likelihood with respect to $\mathbf{x}_{it}\boldsymbol{\beta}$

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 calculates the linear prediction. This is the default for the random-effects and fixed-effects models.

mu and rate both calculate the predicted number of events. mu takes into account the offset(), and rate ignores those adjustments. mu and rate are equivalent if you did not specify offset(). mu is the default for the population-averaged model.

stdp calculates the standard error of the linear prediction.

nu0 calculates the predicted number of events, assuming a zero random or fixed effect.

iru0 calculates the predicted incidence rate, assuming a zero random or fixed effect.

pr0(n) calculates the probability $\Pr(y = n)$ assuming the random effect is zero, where n is a nonnegative integer that may be specified as a number or a variable (only allowed after xtnbreg, re).

pr0(a,b) calculates the probability $\Pr(a \leq y \leq b)$ assuming the random effect is zero, where a and b are nonnegative integers that may be specified as numbers or variables (only allowed after xtnbreg, re);

> b missing ($b \geq .$) means $+\infty$;
> pr0(20,.) calculates $\Pr(y \geq 20)$;
> pr0(20,b) calculates $\Pr(y \geq 20)$ in observations for which $b \geq .$ and calculates $\Pr(20 \leq y \leq b)$ elsewhere.

> pr0(.,b) produces a syntax error. A missing value in an observation on the variable a causes a missing value in that observation for pr0(a,b).

score calculates the equation-level score, $u_{it} = \partial \ln L(\mathbf{x}_{it}\boldsymbol{\beta})/\partial(\mathbf{x}_{it}\boldsymbol{\beta})$.

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

margins

Description for margins

`margins` estimates margins of response for linear predictions, numbers of events, incidence rates, and probabilities.

Menu for margins

Statistics > Postestimation

Syntax for margins

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

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

Random-effects (RE) and conditional fixed-effects (FE) overdispersion models

statistic	Description
xb	linear prediction; the default
nu0	predicted number of events; assumes fixed or random effect is zero
iru0	predicted incidence rate; assumes fixed or random effect is zero
pr0(*n*)	probability $\Pr(y = n)$ assuming the random effect is zero; only allowed after xtnbreg, re
pr0(*a*,*b*)	probability $\Pr(a \leq y \leq b)$ assuming the random effect is zero; only allowed after xtnbreg, re
stdp	not allowed with margins

Population-averaged (PA) model

statistic	Description
mu	predicted number of events; considers the offset(); the default
rate	predicted number of events
xb	linear prediction
stdp	not allowed with margins
<u>sco</u>re	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**.

Methods and formulas

The probabilities calculated using the $\text{pr0}(n)$ option are the probability $\Pr(y_{it} = n)$ for a RE model assuming the random effect is zero. A negative binomial model is an overdispersed Poisson model, and the nominal overdispersion can be calculated as $\delta = s/(r - 1)$, where r and s are as given in the estimation results. Define $\mu_{it} = \exp(\mathbf{x}_{it}\boldsymbol{\beta} + \text{offset}_{it})$. Then the probabilities in $\text{pr0}(n)$ are calculated as the probability that $y_{it} = n$, where y_{it} has a negative binomial distribution with mean $\delta\mu_{it}$ and variance $\delta(1 + \delta)\mu_{it}$.

Also see

[XT] **xtnbreg** — Fixed-effects, random-effects, & population-averaged negative binomial models

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