Title

> **tnbreg postestimation** — Postestimation tools for tnbreg

Postestimation commands   predict   margins   Methods and formulas
Also see

Postestimation commands

The following postestimation commands are available after `tnbreg`:

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)
estat (svy)	postestimation statistics for survey data
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	number of events, incidence rates, probabilities, etc.
predictnl	point estimates, standard errors, testing, and inference for generalized predictions
pwcompare	pairwise comparisons of estimates
suest	seemingly unrelated estimation
test	Wald tests of simple and composite linear hypotheses
testnl	Wald tests of nonlinear hypotheses

*`forecast`, `hausman`, and `lrtest` are not appropriate with `svy` estimation results.

predict

Description for predict

`predict` creates a new variable containing predictions such as numbers of events, incidence rates, conditional means, probabilities, conditional probabilities, linear predictions, and standard errors.

Menu for predict

Statistics > Postestimation

Syntax for predict

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

> predict [*type*] *stub** [*if*] [*in*], <u>sc</u>ores

statistic	Description
Main	
n	number of events; the default
ir	incidence rate
cm	conditional mean, $E(y_j \mid y_j > \tau_j)$
pr(*n*)	probability $\Pr(y_j = n)$
pr(*a*,*b*)	probability $\Pr(a \leq y_j \leq b)$
cpr(*n*)	conditional probability $\Pr(y_j = n \mid y_j > \tau_j)$
cpr(*a*,*b*)	conditional probability $\Pr(a \leq y_j \leq b \mid y_j > \tau_j)$
xb	linear prediction
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

n, the default, calculates the predicted number of events, which is $\exp(\mathbf{x}_j\boldsymbol{\beta})$ if neither offset() nor exposure() was specified when the model was fit; $\exp(\mathbf{x}_j\boldsymbol{\beta} + \text{offset}_j)$ if offset() was specified; or $\exp(\mathbf{x}_j\boldsymbol{\beta}) \times \text{exposure}_j$ if exposure() was specified.

ir calculates the incidence rate $\exp(\mathbf{x}_j\boldsymbol{\beta})$, which is the predicted number of events when exposure is 1. This is equivalent to specifying both the n and the nooffset options.

cm calculates the conditional mean,

$$E(y_j \mid y_j > \tau_j) = \frac{E(y_j, y_j > \tau_j)}{\Pr(y_j > \tau_j)}$$

where τ_j is the truncation point found in e(llopt).

pr(*n*) calculates the probability $\Pr(y_j = n)$, where *n* is a nonnegative integer that may be specified as a number or a variable.

pr(*a*,*b*) calculates the probability $\Pr(a \le y_j \le b)$, where *a* and *b* are nonnegative integers that may be specified as numbers or variables;

> *b* missing ($b \ge .$) means $+\infty$;
> pr(20,.) calculates $\Pr(y_j \ge 20)$;
> pr(20,*b*) calculates $\Pr(y_j \ge 20)$ in observations for which $b \ge .$ and calculates $\Pr(20 \le y_j \le b)$ elsewhere.

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

cpr(*n*) calculates the conditional probability $\Pr(y_j = n \mid y_j > \tau_j)$, where τ_j is the truncation point found in e(llopt). *n* is an integer greater than the truncation point that may be specified as a number or a variable.

cpr(*a*,*b*) calculates the conditional probability $\Pr(a \le y_j \le b \mid y_j > \tau_j)$, where τ_j is the truncation point found in e(llopt). The syntax for this option is analogous to that used for pr(*a*,*b*) except that *a* must be greater than the truncation point.

xb calculates the linear prediction, which is $\mathbf{x}_j\boldsymbol{\beta}$ if neither offset() nor exposure() was specified when the model was fit; $\mathbf{x}_j\boldsymbol{\beta} + \text{offset}_j$ if offset() was specified; or $\mathbf{x}_j\boldsymbol{\beta} + \ln(\text{exposure}_j)$ if exposure() was specified; see nooffset below.

stdp calculates the standard error of the linear prediction.

nooffset is relevant only if you specified offset() or exposure() when you fit the model. It modifies the calculations made by predict so that they ignore the offset or exposure variable; the linear prediction is treated as $\mathbf{x}_j\boldsymbol{\beta}$ rather than as $\mathbf{x}_j\boldsymbol{\beta} + \text{offset}_j$ or $\mathbf{x}_j\boldsymbol{\beta} + \ln(\text{exposure}_j)$. Specifying predict ..., nooffset is equivalent to specifying predict ..., ir.

scores calculates equation-level score variables.

> The first new variable will contain $\partial \ln L / \partial(\mathbf{x}_j\boldsymbol{\beta})$.

> The second new variable will contain $\partial \ln L / \partial(\ln\alpha)$ for dispersion(mean).

> The second new variable will contain $\partial \ln L / \partial(\ln\delta)$ for dispersion(constant).

margins

Description for margins

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

Menu for margins

Statistics > Postestimation

Syntax for margins

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

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

statistic	Description
n	number of events; the default
ir	incidence rate
cm	conditional mean, $E(y_j \mid y_j > \tau_j)$
pr(*n*)	probability $\Pr(y_j = n)$
pr(*a*,*b*)	probability $\Pr(a \leq y_j \leq b)$
cpr(*n*)	conditional probability $\Pr(y_j = n \mid y_j > \tau_j)$
cpr(*a*,*b*)	conditional probability $\Pr(a \leq y_j \leq b \mid y_j > \tau_j)$
xb	linear prediction
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**.

Methods and formulas

In the following formulas, we use the same notation as in [R] **tnbreg**.

Methods and formulas are presented under the following headings:

> *Mean-dispersion model*
> *Constant-dispersion model*

Mean-dispersion model

The equation-level scores are given by

$$
\text{score}(\mathbf{x}\boldsymbol{\beta})_j = p_j(y_j - \mu_j) - \frac{p_j^{(m+1)}\mu_j}{\Pr(Y > \tau_j \,|\, p_j, m)}
$$

$$
\text{score}(\omega)_j = -m\left\{\frac{\alpha(\mu_j - y_j)}{1 + \alpha\mu_j} - \ln(1 + \alpha\mu_j) + \psi(y_j + m) - \psi(m)\right\}
$$

$$
- \frac{p_j^m}{\Pr(Y > \tau_j \,|\, p_j, m)}\left\{m\ln(p_j) + \mu_j p_j\right\}
$$

where $\omega_j = \ln\alpha_j$, $\psi(z)$ is the digamma function, and τ_j is the truncation point found in `e(llopt)`.

Constant-dispersion model

The equation-level scores are given by

$$
\text{score}(\mathbf{x}\boldsymbol{\beta})_j = m_j\left\{\psi(y_j + m_j) - \psi(m_j) + \ln(p) + \frac{p^{m_j}\ln(p)}{\Pr(Y > \tau_j \,|\, p, m_j)}\right\}
$$

$$
\text{score}(\omega)_j = y_j - (y_j + m_j)(1 - p) - \text{score}(\mathbf{x}\boldsymbol{\beta})_j - \frac{\mu_j p}{\Pr(Y > \tau_j \,|\, p, m_j)}
$$

where $\omega_j = \ln\delta_j$ and τ_j is the truncation point found in `e(llopt)`.

Also see

[R] **tnbreg** — Truncated negative binomial regression

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