# Title

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**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 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 |
| † `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` | 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 |

* `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 equation-level scores.

## 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* `nooffset`]

*Population-averaged (PA) model*

`predict` [*type*] *newvar* [*if*] [*in*] [, *PA_statistic* `nooffset`]

| *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 $\Pr(a \leq y \leq b)$ 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 |
| `score` | 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*] `,` `predict(`*statistic* ...`)` [`predict(`*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` |
| `score` | 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 `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 `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**