# Title

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**xtlogit postestimation —** Postestimation tools for xtlogit



## Postestimation commands

The following postestimation commands are available after `xtlogit`:

| 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 `xtlogit, pa`.

† `forecast` is not appropriate with `mi` estimation results or after `xtlogit, fe`.

# predict

## Description for predict

`predict` creates a new variable containing predictions such as linear predictions, probabilities, standard errors, and equation-level scores.

## Menu for predict

Statistics > Postestimation

## Syntax for predict

*Random-effects model*

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

*Fixed-effects model*

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

*Population-averaged model*

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

| *RE_statistic* | Description |
|---|---|
| Main | |
| `xb` | linear prediction; the default |
| `pr` | marginal probability of a positive outcome |
| `pu0` | probability of a positive outcome assuming that the random effect is zero |
| `stdp` | standard error of the linear prediction |

| *FE_statistic* | Description |
|---|---|
| Main | |
| `pc1` | predicted probability of a positive outcome conditional on one positive outcome within group; the default |
| `pu0` | probability of a positive outcome assuming that the fixed effect is zero |
| `xb` | linear prediction |
| `stdp` | standard error of the linear prediction |

The predicted probability for the fixed-effects model is conditional on there being only one outcome per group. See [R] **clogit** for details.

| *PA_statistic* | Description |
|---|---|
| Main | |
| `mu` | predicted probability of *depvar*; considers the `offset()` |
| `rate` | predicted probability of *depvar* |
| `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 model.

`pc1` calculates the predicted probability of a positive outcome conditional on one positive outcome within group. This is the default for the fixed-effects model.

`mu` and `rate` both calculate the predicted probability of *depvar*. `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.

`pr` calculates the probability of a positive outcome that is marginal with respect to the random effect, which means that the probability is calculated by integrating the prediction function with respect to the random effect over its entire support.

`pu0` calculates the probability of a positive outcome, assuming that the fixed or random effect for that observation's panel is zero ($\nu_i = 0$). This may not be similar to the proportion of observed outcomes in the group.

`stdp` calculates the standard error of the linear prediction.

`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 `xtlogit`. This option 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 and probabilities.

## Menu for margins

Statistics > Postestimation

## Syntax for margins

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

`margins` [*marginlist*] `,` `predict(`*statistic* ...`)` [`predict(`*statistic* ...`)` ...] [*options*]

*Random-effects model*

| *statistic* | Description |
|---|---|
| `pr` | marginal probability of a positive outcome; the default |
| `pu0` | probability of a positive outcome assuming that the random effect is zero |
| `xb` | linear prediction |
| `stdp` | not allowed with `margins` |

*Fixed-effects model*

| *statistic* | Description |
|---|---|
| `pu0` | probability of a positive outcome assuming that the fixed effect is zero; the default |
| `xb` | linear prediction |
| `pc1` | not allowed with `margins` |
| `stdp` | not allowed with `margins` |

*Population-averaged model*

| *statistic* | Description |
|---|---|
| `mu` | predicted probability of *depvar*; considers the `offset()` |
| `rate` | predicted probability of *depvar* |
| `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**.

# Remarks and examples

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## Example 1: Conducting hypothesis tests

In example 1 of [XT] **xtlogit**, we fit a random-effects model of union status on the person's age and level of schooling, whether she lived in an urban area, and whether she lived in the south. In fact, we included the full interaction between `south` and `year` to capture both the overall effect of residing in the south and a separate time-trend for southerners. To test whether residing in the south affects union status, we must determine whether `1.south` and `south#c.year` are jointly significant. First, we refit our model, store the estimation results for later use, and use `test` to conduct a Wald test of the joint significance of those two variables' parameters:

```
. use http://www.stata-press.com/data/r14/union
(NLS Women 14-24 in 1968)
. xtlogit union age grade not_smsa south##c.year
  (output omitted)
. estimates store fullmodel
. test 1.south 1.south#c.year
 ( 1)  [union]1.south = 0
 ( 2)  [union]1.south#c.year = 0
           chi2(  2) =  143.93
         Prob > chi2 =    0.0000
```

The test statistic is clearly significant, so we reject the null hypothesis that the coefficients are jointly zero and conclude that living in the south does significantly affect union status.

We can also test our hypothesis with a likelihood-ratio test. Here we fit the model without `south##c.year` and then call `lrtest` to compare this restricted model to the full model:

```
. xtlogit union age grade not_smsa
  (output omitted)
. lrtest fullmodel .
Likelihood-ratio test                                 LR chi2(3)  =    146.55
(Assumption: . nested in fullmodel)                   Prob > chi2 =    0.0000
```

These results confirm our finding that living in the south affects union status.

◁

# Also see

[XT] **xtlogit** — Fixed-effects, random-effects, and population-averaged logit models

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