

exlogistic postestimation — Postestimation tools for exlogistic

Postestimation commands
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Postestimation commands

The following postestimation commands are of special interest after `exlogistic`:

Command	Description
<code>estat predict</code>	single-observation prediction
<code>estat se</code>	report ORs or coefficients and their asymptotic standard errors

The following standard postestimation commands are also available:

Command	Description
<code>estat summarize</code>	summary statistics for the estimation sample
<code>estimates</code>	cataloging estimation results
<code>etable</code>	table of estimation results

`estat summarize` is not allowed if the `binomial()` option was specified in `exlogistic`.

estat

Description for estat

`estat predict` computes a predicted probability (or linear predictor), its asymptotic standard error, and its exact confidence interval for 1 observation. Predictions are carried out by estimating the constant coefficient after shifting the independent variables and conditioned variables by the values specified in the `at()` option or by their medians. Therefore, predictions must be done with the estimation sample in memory. If a different dataset is used or if the dataset is modified, then an error will result.

`estat se` reports odds ratio or coefficients and their asymptotic standard errors. The estimates are stored in the matrix `r(estimates)`.

Menu for estat

Statistics > Postestimation

Syntax for estat

Single-observation prediction

```
estat predict [ , options ]
```

Report ORs or coefficients and their asymptotic standard errors

```
estat se [ , coef ]
```

<i>options</i>	Description
<code>pr</code>	probability; the default
<code>xb</code>	linear effect
<code>at(atspec)</code>	use the specified values for the <i>indepvars</i> and <code>condvars()</code>
<code>level(#)</code>	set confidence level for the predicted value; default is <code>level(95)</code>
<code>memory(#[b k m g])</code>	set limit on memory usage; default is <code>memory(10m)</code>
<code>[no]log</code>	display or suppress the enumeration log; default is to display

`collect` is allowed with `estat predict`; see [U] [11.1.10 Prefix commands](#).

These statistics are available only for the estimation sample.

Options for estat predict

`pr`, the default, calculates the probability.

`xb` calculates the linear effect.

`at(varname = # [[varname = #] [...]])` specifies values to use in computing the predicted value. Here *varname* is one of the independent variables, *indepvars*, or the conditioned variables, `condvars()`. The default is to use the median of each independent and conditioned variable.

`level(#)` specifies the confidence level, as a percentage, for confidence intervals. The default is `level(95)` or as set by `set level`; see [U] [20.8 Specifying the width of confidence intervals](#).

`memory(#[b|k|m|g])` sets a limit on the amount of memory `estat predict` can use when generating the conditional distribution of the constant parameter sufficient statistic. The default is `memory(10m)`, where `m` stands for megabyte, or 1,048,576 bytes. The following are also available: `b` stands for byte; `k` stands for kilobyte, which is equal to 1,024 bytes; and `g` stands for gigabyte, which is equal to 1,024 megabytes. The minimum setting allowed is `1m` and the maximum is `512m` or `0.5g`, but do not attempt to use more memory than is available on your computer. Also see [Remarks and examples](#) in [R] `exlogistic` for details on enumerating the conditional distribution.

`log` and `nolog` specify whether to display the enumeration log, which shows the progress of enumerating the distribution of the observed successes conditioned on the independent variables shifted by the values specified in `at()` (or by their medians). See [Methods and formulas](#) in [R] `exlogistic` for details of the computations. The enumeration log is displayed by default unless you used `set iterlog off` to suppress it; see `set iterlog` in [R] [set iter](#).

Option for `estat se`

`coef` requests that the estimated coefficients and their asymptotic standard errors be reported. The default is to report the odds ratios and their asymptotic standard errors.

Remarks and examples

[stata.com](http://www.stata.com)

Predictions must be done using the estimation sample. This is because the prediction is really an estimated constant coefficient (the intercept) after shifting the independent variables and conditioned variables by the values specified in `at()` or by their medians. The justification for this approach can be seen by rewriting the model as

$$\log\left(\frac{\pi_i}{1 - \pi_i}\right) = (\alpha + \mathbf{x}_0\beta) + (\mathbf{x}_i - \mathbf{x}_0)\beta$$

where \mathbf{x}_0 are the specified values for the *indepvars* (Mehta and Patel 1995). Because the estimation of the constant term is required, this technique is not appropriate for stratified models that used the `group()` option.

► Example 1

To demonstrate, we return to the [example 2](#) in [R] `exlogistic` using data from a prospective study of perinatal infection and HIV-1. Here there was an investigation into whether the blood serum levels of CD4 and CD8 measured in infants at 6 months of age might predict their development of HIV infection. The blood serum levels are coded as ordinal values 0, 1, and 2. These data are used by Mehta and Patel (1995) as an exposition of exact logistic.

```
. use https://www.stata-press.com/data/r17/hiv_n
(Prospective study of perinatal infection of HIV-1; binomial form)
. generate byte cd4_0 = (cd4==0)
. generate byte cd4_1 = (cd4==1)
. generate byte cd8_0 = (cd8==0)
. generate byte cd8_1 = (cd8==1)
. exlogistic hiv cd4_0 cd4_1 cd8_0 cd8_1, terms(cd4=cd4_0 cd4_1,
> cd8=cd8_0 cd8_1) binomial(n) test(probability) saving(dist)
(output omitted)
```

```
. estat predict
Enumerating sample-space combinations:
observation 1: enumerations =      3
observation 2: enumerations =     12
observation 3: enumerations =      5
observation 4: enumerations =      5
observation 5: enumerations =      5
observation 6: enumerations =     35
observation 7: enumerations =     15
observation 8: enumerations =     15
observation 9: enumerations =      9
observation 10: enumerations =      9
observation 11: enumerations =      5
observation 12: enumerations =     18
note: CMLE estimate for _cons is -inf; computing MUE.
Predicted value at cd4_0 = 0, cd4_1 = 0, cd8_0 = 0, cd8_1 = 1
```

hiv	Predicted	Std. err.	[95% conf. interval]	
Probability	0.0390*	N/A	0.0000	0.1962

(*) identifies median unbiased estimates (MUE); because an MUE is computed, there is no SE estimate

Because we did not specify values by using the `at()` option, the median values of the *indepvars* are used for the prediction. By default, medians are used instead of means because we want to use values that are observed in the dataset. If the means of the binary variables `cd4_0`–`cd8_1` were used, we would have created floating point variables in $(0, 1)$ that not only do not properly represent the indicator variables but also would be a source of computational inefficiency in generating the conditional distribution. Because the MUE is computed for the predicted value, there is no standard error estimate.

From the example discussions in [R] **exlogistic**, the infants at highest risk are those with a CD4 level of 0 and a CD8 level of 2. Below, we use the `at()` option to make a prediction at these blood serum levels.

```
. estat predict, at(cd4_0=1 cd4_1=0 cd8_0=0 cd8_1=0) nolog
note: CMLE estimate for _cons is +inf; computing MUE.
Predicted value at cd4_0 = 1, cd4_1 = 0, cd8_0 = 0, cd8_1 = 0
```

hiv	Predicted	Std. err.	[95% conf. interval]	
Probability	0.9063*	N/A	0.4637	1.0000

(*) identifies median unbiased estimates (MUE); because an MUE is computed, there is no SE estimate

Stored results

`estat predict` stores the following in `r()`:

Scalars

<code>r(imue)</code>	1 if <code>r(pred)</code> is an MUE and 0 if a CMLE
<code>r(pred)</code>	estimated probability or the linear effect
<code>r(se)</code>	asymptotic standard error of <code>r(pred)</code>

Macros

<code>r(estimate)</code>	prediction type: <code>pr</code> or <code>xb</code>
<code>r(level)</code>	confidence level

Matrices

<code>r(ci)</code>	confidence interval
<code>r(x)</code>	<i>indepvars</i> and <i>condvars()</i> values

Reference

Mehta, C. R., and N. R. Patel. 1995. Exact logistic regression: Theory and examples. *Statistics in Medicine* 14: 2143–2160. <https://doi.org/10.1002/sim.4780141908>.

Also see

[R] [exlogistic](#) — Exact logistic regression

[U] [20 Estimation and postestimation commands](#)