slogit postestimation — Postestimation tools for slogit

Description

The following postestimation commands are available after `slogit`:

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<tr>
<td><code>testnl</code></td>
<td>Wald tests of nonlinear hypotheses</td>
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`lrtest` is not appropriate with `svy` estimation results.
Syntax for predict

```
predict [ type ] { stub* | newvar | newvarlist } [ if ] [ in ] [ , statistic outcome(outcome) ]
predict [ type ] { stub* | newvarlist } [ if ] [ in ], scores
```

**statistic**

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If you do not specify `outcome()`, `pr` (with one new variable specified), `xb`, and `stdp` assume `outcome(#1)`. You specify one or k new variables with `pr`, where k is the number of outcomes. You specify one new variable with `xb` and `stdp`. These statistics are available both in and out of sample; type `predict ... if e(sample) ...` if wanted only for the estimation sample.

**Menu for predict**

Statistics > Postestimation > Predictions, residuals, etc.

**Options for predict**

- **Main**

  - **pr**, the default, calculates the probability of each of the categories of the dependent variable or the probability of the level specified in `outcome(outcome)`. If you specify the `outcome(outcome)` option, you need to specify only one new variable; otherwise, you must specify a new variable for each category of the dependent variable.

  - **xb** calculates the index, \( \theta_k = \sum_{j=1}^{d} \phi_{jk} x_i \beta_j \), for outcome level \( k \neq e(i\_base) \) and dimension \( d = e(k\_dim) \). It returns a vector of zeros if \( k = e(i\_base) \). A synonym for `xb` is `index`. If `outcome()` is not specified, `outcome(#1)` is assumed.

  - **stdp** calculates the standard error of the index. A synonym for `stdp` is `seindex`. If `outcome()` is not specified, `outcome(#1)` is assumed.

  - `outcome(outcome)` specifies the outcome for which the statistic is to be calculated. `equation()` is a synonym for `outcome()`: it does not matter which you use. `outcome()` or `equation()` can be specified using

    - \#1, \#2, \ldots, where \#1 means the first category of the dependent variable, \#2 means the second category, etc.;

    - the values of the dependent variable; or

    - the value labels of the dependent variable if they exist.

  - **scores** calculates the equation-level score variables. For models with \( d \) dimensions and \( m \) levels, \( d + (d + 1)(m - 1) \) new variables are created. Assume \( j = 1, \ldots, d \) and \( k = 1, \ldots, m \) in the following.

    - The first \( d \) new variables will contain \( \partial \ln L / \partial (x \beta_j) \).
The next \(d(m-1)\) new variables will contain \(\partial \ln L / \partial \phi_{jk}\). The last \(m-1\) new variables will contain \(\partial \ln L / \partial \theta_k\).

**Remarks and examples**

Once you have fit a stereotype logistic model, you can obtain the predicted probabilities by using the `predict` command for both the estimation sample and other samples; see [U] 20 Estimation and postestimation commands and [R] predict.

`predict` without arguments (or with the `pr` option) calculates the predicted probability of each outcome of the dependent variable. You must therefore give a new variable name for each of the outcomes. To compute the estimated probability of one outcome, you use the `outcome(outcome)` option where `outcome` is the level encoding the outcome. If the dependent variable’s levels are labeled, the outcomes can also be identified by the label values (see [D] label).

The `xb` option in conjunction with `outcome(outcome)` specifies that the index be computed for the outcome encoded by level `outcome`. Its approximate standard error is computed if the `stdp` option is specified. Only one of the `pr`, `xb`, or `stdp` options can be specified with a call to `predict`.

Example 1

In example 2 of [R] `slogit`, we fit the one-dimensional stereotype model, where the `depvar` is `insure` with levels \(k = 1\) for outcome *Indemnity*, \(k = 2\) for *Prepaid*, and \(k = 3\) for *Uninsure*. The base outcome for the model is *Indemnity*, so for \(k \neq 1\) the vector of indices for the \(k\)th level is

\[
\eta_k = \theta_k - \phi_k (\beta_1 \text{age} + \beta_2 \text{male} + \beta_3 \text{nonwhite} + \beta_4 2.\text{site} + \beta_5 3.\text{site})
\]

We estimate the group probabilities by calling `predict` after `slogit`.

```
. use http://www.stata-press.com/data/r13/sysdsn1
(Health insurance data)
. slogit insure age male nonwhite i.site, dim(1) base(1) nolog
(output omitted)
. predict pIndemnity pPrepaid pUninsure, pr
. list pIndemnity pPrepaid pUninsure insure in 1/10

 pIndemnity pPrepaid pUninsure uninsure
 1.  .5419344  .3754875   .0825782     Indemnity
 2.  .4359638  .496328    .0677081     Prepaid
 3.  .5111583  .4105107   .0783309     Indemnity
 4.  .3941132  .5442234   .0616633     Prepaid
 5.  .4655651  .4625064   .0719285     Prepaid
 6.  .4401779  .4915102   .0683118     Prepaid
 7.  .4632122  .4651931   .0715948     Prepaid
 8.  .3772302  .5635696   .0592002     Prepaid
 9.  .4867758  .4383018   .0749225     Uninsure
10.  .5823668  .3295802   .0880531     Prepaid
```

Observations 5 and 8 are not used to fit the model because `insure` is missing at these points, but `predict` estimates the probabilities for these observations since none of the independent variables is missing. You can use `if e(sample)` in the call to `predict` to use only those observations that are used to fit the model.
Methods and formulas

predict

Let level $b$ be the base outcome that is used to fit the stereotype logistic regression model of dimension $d$. The index for observation $i$ and level $k \neq b$ is $\eta_{ik} = \theta_k - \sum_{j=1}^{d} \phi_{jk} x_i \beta_j$. This is the log odds of outcome encoded as level $k$ relative to that of $b$ so that we define $\eta_{ib} \equiv 0$. The outcome probabilities for this model are defined as $\Pr(Y_i = k) = \frac{e^{\eta_{ik}}}{\sum_{j=1}^{m} e^{\eta_{ij}}}$. Unlike in mlogit, ologit, and oprobit, the index is no longer a linear function of the parameters. The standard error of index $\eta_{ik}$ is thus computed using the delta method (see also [R] predictnl).

The equation-level score for regression coefficients is

$$\frac{\partial \ln L_{ik}}{\partial x_i \beta_j} = \left( \sum_{l=1}^{m-1} \phi_{jl} p_{il} - \phi_{jk} \right)$$

the equation-level score for the scale parameters is

$$\frac{\partial \ln L_{ik}}{\partial \phi_{jl}} = \begin{cases} x_i \beta_j (p_{ik} - 1), & \text{if } l = k \\ x_i \beta_j p_{il}, & \text{if } l \neq k \end{cases}$$

for $l = 1, \ldots, m - 1$; and the equation-level score for the intercepts is

$$\frac{\partial \ln L_{ik}}{\partial \theta_l} = \begin{cases} 1 - p_{ik}, & \text{if } l = k \\ - p_{il}, & \text{if } l \neq k \end{cases}$$

Also see

[R] slogit — Stereotype logistic regression

[U] 20 Estimation and postestimation commands