slogit postestimation — Postestimation tools for slogit

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Postestimation commands

The following postestimation commands are available after `slogit`:

Command	Description
`contrast`	contrasts and ANOVA-style joint tests of parameters
`estat ic`	Akaike's, consistent Akaike's, corrected Akaike's, and Schwarz's Bayesian information criteria (AIC, CAIC, AICc, and BIC, respectively)
`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
* `hausman`	Hausman's specification test
`lincom`	point estimates, standard errors, testing, and inference for linear combinations of parameters
* `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 parameters
`predict`	probabilities, linear predictions and their SEs, etc.
`predictnl`	point estimates, standard errors, testing, and inference for generalized predictions
`pwcompare`	pairwise comparisons of parameters
`suest`	seemingly unrelated estimation
`test`	Wald tests of simple and composite linear hypotheses
`testnl`	Wald tests of nonlinear hypotheses

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

predict

Description for predict

`predict` creates a new variable containing predictions such as probabilities, indexes for the kth outcome, and standard errors.

Menu for predict

Statistics > Postestimation

Syntax for predict

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

`predict` [*type*] *stub*`*` [*if*] [*in*] `, scores`

statistic	Description
Main	
`pr`	probability of one of or all the dependent variable outcomes; the default
`xb`	index for the kth outcome
`stdp`	standard error of the index for the kth outcome

You specify one or k new variables with `pr`, where k is the number of outcomes. If you specify one new variable and you do not specify `outcome()`, then `outcome(#1)` is assumed.

You specify one new variable with `xb` and `stdp`. If you do not specify `outcome()`, then `outcome(#1)` is assumed.

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

`pr`, the default, computes the predicted probabilities for all outcomes or for a specific outcome. To compute probabilities for all outcomes, you specify k new variables, where k is the number of categories of the dependent variable. Alternatively, you can specify *stub*`*`; in which case, `pr` will store predicted probabilities in variables *stub*`1`, *stub*`2`, ..., *stub*k. To compute the probability for a specific outcome, you specify one new variable and, optionally, the outcome value in option `outcome()`; if you omit `outcome()`, the first outcome value, `outcome(#1)`, is assumed.

Say that you fit a model by typing *estimation_cmd* `y x1 x2`, and `y` takes on four values. Then, you could type `predict p1 p2 p3 p4` to obtain all four predicted probabilities; alternatively, you could type `predict p*` to generate the four predicted probabilities. To compute specific probabilities one at a time, you can type `predict p1, outcome(#1)` (or simply `predict p1`), `predict p2, outcome(#2)`, and so on. See option `outcome()` for other ways to refer to outcome values.

`xb` calculates the index, $\theta_k - \sum_{j=1}^{d} \phi_{\mathrm{jk}} \mathbf{x}_i \boldsymbol{\beta}_j$, 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 for which outcome the predicted probabilities are to be calculated. `outcome()` should contain either one value of the dependent variable or one of `#1`, `#2`, …, with `#1` meaning the first category of the dependent variable, `#2` meaning the second category, etc. `outcome()` is not allowed with `scores`.

`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 $\partial \ln L/\partial(\mathbf{x}\boldsymbol{\beta}_j)$.

The next $d(m-1)$ new variables will contain $\partial \ln L/\partial\phi_{jk}$.

The last $m-1$ new variables will contain $\partial \ln L/\partial\theta_k$.

margins

Description for margins

`margins` estimates margins of response for probabilities and indexes for the kth outcome.

Menu for margins

Statistics > Postestimation

Syntax for margins

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

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

statistic	Description
default	probabilities for each outcome
`pr`	probability of one of or all the dependent variable outcomes
`xb`	index for the kth outcome
`stdp`	not allowed with `margins`

`pr` and `xb` default to the first outcome.

Statistics not allowed with `margins` are functions of stochastic quantities other than `e(b)`.

For the full syntax, see [R] **margins**.

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 kth level is

$$\boldsymbol{\eta}_k = \theta_k - \phi_k \left(\beta_1 \texttt{age} + \beta_2 \texttt{male} + \beta_3 \texttt{nonwhite} + \beta_4 \texttt{2.site} + \beta_5 \texttt{3.site}\right)$$

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

```
. use https://www.stata-press.com/data/r19/sysdsn1
(Health insurance data)
. slogit insure age male nonwhite i.site, dim(1) base(1) nolog
  (output omitted)
. predict pIndemnity pPrepaid pUninsure, p
. list pIndemnity pPrepaid pUninsure insure in 1/10
```

	pIndem~y	pPrepaid	pUnins~e	insure
1.	.5419344	.3754875	.0825782	Indemnity
2.	.4359638	.496328	.0677081	Prepaid
3.	.5111583	.4105107	.0783309	Indemnity
4.	.3941132	.5442234	.0616633	Prepaid
5.	.4655651	.4625064	.0719285	.
6.	.4401779	.4915102	.0683118	Prepaid
7.	.4632122	.4651931	.0715948	Prepaid
8.	.3772302	.5635696	.0592002	.
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 because 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 $\eta_{ik} = \theta_k - \sum_{j=1}^{d} \phi_{jk}\mathbf{x}_i\boldsymbol{\beta}_j$. 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 $\Pr(Y_i = k) = e^{\eta_{ik}} / \sum_{j=1}^{m} e^{\eta_{ij}}$. Unlike in `mlogit`, `ologit`, and `oprobit`, the index is no longer a linear function of the parameters. The standard error of index η_{ik} is thus computed using the delta method (see also [R] **predictnl**).

The equation-level score for regression coefficients is

$$\frac{\partial \ln L_{ik}}{\partial \mathbf{x}_i\boldsymbol{\beta}_j} = \left(\sum_{l=1}^{m-1} \phi_{jl} p_{il} - \phi_{jk} \right)$$

the equation-level score for the scale parameters is

$$\frac{\partial \ln L_{ik}}{\partial \phi_{jl}} = \begin{cases} \mathbf{x}_i\boldsymbol{\beta}_j(p_{ik} - 1), & \text{if } l = k \\ \mathbf{x}_i\boldsymbol{\beta}_j p_{il}, & \text{if } l \neq k \end{cases}$$

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

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