slogit postestimation — Postestimation tools for slogit	

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* | *newvarlist* } [*if*] [*in*] [, *statistic* <u>o</u>utcome(*outcome*)]

predict [*type*] *stub** [*if*] [*in*], <u>sc</u>ores

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, $\theta_k - \sum_{j=1}^{d} \phi_{jk} \mathbf{x}_i \boldsymbol{\beta}_j$, 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 $j = 1, ..., d$ and $k = 1, ..., m$ 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*] , <u>pred</u>ict(*statistic* ...) [<u>pred</u>ict(*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

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

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**