Title

> **meologit postestimation** — Postestimation tools for meologit

Postestimation commands

The following postestimation command is of special interest after `meologit`:

Command	Description
estat group	summarize the composition of the nested groups
estat icc	estimate intraclass correlations
estat sd	display variance components as standard deviations and correlations

The following standard postestimation commands are also available:

Command	Description
contrast	contrasts and ANOVA-style joint tests of estimates
estat ic	Akaike's, consistent Akaike's, corrected Akaike's, and Schwarz's Bayesian information criteria (AIC, CAIC, AICc, and BIC)
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 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	
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

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

predict

Description for predict

predict creates a new variable containing predictions such as probabilities, linear predictions, density and distribution functions, and standard errors.

Menu for predict

Statistics > Postestimation

Syntax for predict

Syntax for obtaining predictions of the outcome and other statistics

> predict [*type*] { *stub**|*newvarlist* } [*if*] [*in*] [, *statistic options*]

Syntax for obtaining estimated random effects and their standard errors

> predict [*type*] { *stub**|*newvarlist* } [*if*] [*in*], reffects [*re_options*]

Syntax for obtaining ML scores

> predict [*type*] { *stub**|*newvarlist* } [*if*] [*in*], <u>sc</u>ores

statistic	Description
Main	
pr	predicted probabilities; the default
eta	fitted linear predictor
xb	linear predictor for the fixed portion of the model only
<u>stdp</u>	standard error of the fixed-portion linear prediction
<u>density</u>	predicted density function
<u>distribution</u>	predicted distribution function

These statistics are available both in and out of sample; type predict ... if e(sample) ... if wanted only for the estimation sample.

options	Description
Main	
<u>conditional</u>(*ctype*)	compute *statistic* conditional on estimated random effects; default is conditional(ebmeans)
marginal	compute *statistic* marginally with respect to the random effects
nooffset	make calculation ignoring offset or exposure
<u>out</u>come(*outcome*)	outcome category for predicted probabilities
Integration	
int_options	integration options

You specify one or *k* new variables in *newvarlist* with pr, where *k* is the number of outcomes. If you do not specify outcome(), these options assume outcome(#1).

ctype	Description
<u>ebm</u>eans	empirical Bayes means of random effects; the default
<u>ebmo</u>des	empirical Bayes modes of random effects
<u>fixed</u>only	prediction for the fixed portion of the model only

re_options	Description
Main	
<u>ebm</u>eans	use empirical Bayes means of random effects; the default
<u>ebmo</u>des	use empirical Bayes modes of random effects
reses(*stub** | *newvarlist*)	calculate standard errors of empirical Bayes estimates
Integration	
int_options	integration options

int_options	Description
<u>intp</u>oints(*#*)	use *#* quadrature points to compute marginal predictions and empirical Bayes means
<u>iter</u>ate(*#*)	set maximum number of iterations in computing statistics involving empirical Bayes estimators
<u>tol</u>erance(*#*)	set convergence tolerance for computing statistics involving empirical Bayes estimators

Options for predict

Main

pr, the default, calculates the predicted probabilities.

You specify one or *k* new variables, where *k* is the number of categories of the dependent variable. If you specify the outcome() option, the probabilities will be predicted for the requested outcome only, in which case you specify only one new variable. If you specify one new variable and do not specify outcome(), outcome(#1) is assumed.

eta, xb, stdp, density, distribution, scores, conditional(), marginal, and nooffset; see [ME] **meglm postestimation**.

outcome(*outcome*) specifies the outcome for which 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.

reffects, ebmeans, ebmodes, and reses(), see [ME] **meglm postestimation**.

Integration

intpoints(), iterate(), tolerance(); see [ME] **meglm postestimation**.

margins

Description for margins

margins estimates margins of response for probabilities and linear predictions.

Menu for margins

Statistics > Postestimation

Syntax for margins

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

  margins [*marginlist*] , <u>predict</u>(*statistic* ...) [<u>predict</u>(*statistic* ...) ...] [*options*]

statistic	Description
default	probabilities for each outcome
pr	predicted probabilities for a specified outcome
eta	fitted linear predictor
xb	linear predictor for the fixed portion of the model only
stdp	not allowed with margins
<u>den</u>sity	not allowed with margins
distribution	not allowed with margins
reffects	not allowed with margins
scores	not allowed with margins

pr defaults to the first outcome.

Options conditional(ebmeans) and conditional(ebmodes) are not allowed with margins.

Option marginal is assumed where applicable if conditional(fixedonly) is not specified.

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

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

Remarks and examples

Various predictions, statistics, and diagnostic measures are available after fitting an ordered logistic mixed-effects model with meologit. Here we show a short example of predicted probabilities and predicted random effects; refer to [ME] **meglm postestimation** for additional examples applicable to mixed-effects generalized linear models.

▷ Example 1: Obtaining predicted probabilities and random effects

In example 2 of [ME] **meologit**, we modeled the tobacco and health knowledge (thk) score—coded 1, 2, 3, 4—among students as a function of two treatments (cc and tv) by using a three-level ordered logistic model with random effects at the school and class levels.

```
. use https://www.stata-press.com/data/r18/tvsfpors
(Television, School, and Family Project)
. meologit thk prethk cc##tv || school: || class:
  (output omitted )
```

We obtain predicted probabilities for all four outcomes based on the contribution of both fixed effects and random effects by typing

```
. predict pr*
(option pr assumed)
(predictions based on fixed effects and posterior means of random effects)
(using 7 quadrature points)
```

As the note says, the predicted values are based on the posterior means of random effects. You can use the modes option to obtain predictions based on the posterior modes of random effects.

Because we specified a stub name, Stata saved the predicted random effects in variables pr1 through pr4. Here we list the predicted probabilities for the first two classes for school 515:

```
. list class thk pr? if school==515 & (class==515101 | class==515102),
> sepby(class)
```

	class	thk	pr1	pr2	pr3	pr4
1464.	515101	2	.1485538	.2354556	.2915916	.3243991
1465.	515101	2	.372757	.3070787	.1966117	.1235526
1466.	515101	1	.372757	.3070787	.1966117	.1235526
1467.	515101	4	.2831409	.3021398	.2397316	.1749877
1468.	515101	3	.2079277	.2760683	.2740791	.2419248
1469.	515101	3	.2831409	.3021398	.2397316	.1749877
1470.	515102	1	.3251654	.3074122	.2193101	.1481123
1471.	515102	2	.4202843	.3011963	.1749344	.103585
1472.	515102	2	.4202843	.3011963	.1749344	.103585
1473.	515102	2	.4202843	.3011963	.1749344	.103585
1474.	515102	2	.3251654	.3074122	.2193101	.1481123
1475.	515102	1	.4202843	.3011963	.1749344	.103585
1476.	515102	2	.3251654	.3074122	.2193101	.1481123

For each observation, our best guess for the predicted outcome is the one with the highest predicted probability. For example, for the very first observation in the table above, we would choose outcome 4 as the most likely to occur.

We obtain predictions of the posterior means themselves at the school and class levels by typing

```
. predict re_s re_c, reffects
(calculating posterior means of random effects)
(using 7 quadrature points)
```

Here we list the predicted random effects for the first two classes for school 515:

```
. list class re_s re_c if school==515 & (class==515101 | class==515102),
> sepby(class)
```

	class	re_s	re_c
1464.	515101	-.0473739	.0633081
1465.	515101	-.0473739	.0633081
1466.	515101	-.0473739	.0633081
1467.	515101	-.0473739	.0633081
1468.	515101	-.0473739	.0633081
1469.	515101	-.0473739	.0633081
1470.	515102	-.0473739	-.1354929
1471.	515102	-.0473739	-.1354929
1472.	515102	-.0473739	-.1354929
1473.	515102	-.0473739	-.1354929
1474.	515102	-.0473739	-.1354929
1475.	515102	-.0473739	-.1354929
1476.	515102	-.0473739	-.1354929

We can see that the predicted random effects at the school level (re_s) are the same for all classes and that the predicted random effects at the class level (re_c) are constant within each class.

◁

Methods and formulas

Methods and formulas for predicting random effects and other statistics are given in *Methods and formulas* of [ME] **meglm postestimation**.

Also see

[ME] **meologit** — Multilevel mixed-effects ordered logistic regression

[ME] **meglm postestimation** — Postestimation tools for meglm

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