Title

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<div style="border:1px solid black; padding:10px;">

menbreg postestimation — Postestimation tools for menbreg

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Postestimation commands

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

Command	Description
estat group	summarize the composition of the nested groups
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	means, probabilities, densities, REs, residuals, etc.
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.

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predict

Description for predict

`predict` creates a new variable containing predictions such as mean responses; linear predictions; density and distribution functions; standard errors; and Pearson, deviance, and Anscombe residuals.

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	
mu	mean response; the default
eta	fitted linear predictor
xb	linear predictor for the fixed portion of the model only
stdp	standard error of the fixed-portion linear prediction
<u>den</u>sity	predicted density function
<u>distrib</u>ution	predicted distribution function
<u>pea</u>rson	Pearson residuals
<u>dev</u>iance	deviance residuals
<u>ans</u>combe	Anscombe residuals

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>condition</u>al(*[ctype](#)*)	compute *statistic* conditional on estimated random effects; default is conditional(ebmeans)
marginal	compute *statistic* marginally with respect to the random effects
<u>nooff</u>set	make calculation ignoring offset or exposure
Integration	
[int_options](#)	integration options

pearson, deviance, anscombe may not be combined with marginal.

ctype	Description
ebmeans	empirical Bayes means of random effects; the default
ebmodes	empirical Bayes modes of random effects
<u>fixed</u>only	prediction for the fixed portion of the model only

re_options	Description
Main	
ebmeans	use empirical Bayes means of random effects; the default
ebmodes	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 ⌐

mu, the default, calculates the predicted mean, that is, the predicted number of events.

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

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

    ‏⌐ Integration ⌐

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

margins

Description for margins

margins estimates margins of response for mean responses 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
mu	mean response; the default
eta	fitted linear predictor
xb	linear predictor for the fixed portion of the model only
stdp	not allowed with margins
<u>density</u>	not allowed with margins
distribution	not allowed with margins
pearson	not allowed with margins
<u>deviance</u>	not allowed with margins
<u>ans</u>combe	not allowed with margins
reffects	not allowed with margins
scores	not allowed with margins

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 a mixed-effects negative binomial model with menbreg. For the most part, calculation centers around obtaining estimates of the subject/group-specific random effects. Random effects are not estimated when the model is fit but instead need to be predicted after estimation.

Here we show a short example of predicted counts and predicted random effects; refer to [ME] **meglm postestimation** for additional examples applicable to mixed-effects generalized linear models.

▷ Example 1: Predicting counts and random effects

In example 2 of [ME] **menbreg**, we modeled the number of deaths among males in nine European nations as a function of exposure to ultraviolet radiation (uv). We used a three-level negative binomial model with random effects at the nation and region levels.

```
. use https://www.stata-press.com/data/r18/melanoma
(Skin cancer (melanoma) data)
. menbreg deaths uv, exposure(expected) || nation: || region:
  (output omitted)
```

We can use predict to obtain the predicted counts as well as the estimates of the random effects at the nation and region levels.

```
. predict mu
(option mu assumed)
(predictions based on fixed effects and posterior means of random effects)
(using 7 quadrature points)
. predict re_nat re_reg, reffects
(calculating posterior means of random effects)
(using 7 quadrature points)
```

Stata displays a note that the predicted values of mu are based on the posterior means of random effects. You can use option modes to obtain predictions based on the posterior modes of random effects.

Here we list the data for the first nation in the dataset, which happens to be Belgium:

```
. list nation region deaths mu re_nat re_reg if nation==1, sepby(region)
```

	nation	region	deaths	mu	re_nat	re_reg
1.	Belgium	1	79	64.4892	-.0819939	.2937711
2.	Belgium	2	80	77.64736	-.0819939	.024005
3.	Belgium	2	51	44.56528	-.0819939	.024005
4.	Belgium	2	43	53.10434	-.0819939	.024005
5.	Belgium	2	89	65.35963	-.0819939	.024005
6.	Belgium	2	19	35.18457	-.0819939	.024005
7.	Belgium	3	19	8.770186	-.0819939	-.3434432
8.	Belgium	3	15	43.95521	-.0819939	-.3434432
9.	Belgium	3	33	34.17878	-.0819939	-.3434432
10.	Belgium	3	9	7.332448	-.0819939	-.3434432
11.	Belgium	3	12	12.93873	-.0819939	-.3434432

We can see that the predicted random effects at the nation level, re_nat, are the same for all the observations. Similarly, the predicted random effects at the region level, re_reg, are the same within each region.

◁

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] **menbreg** — Multilevel mixed-effects negative binomial regression

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

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