

⁺Postestimation features after cfprobit are part of [StataNow](#).

Postestimation commands

The following postestimation command is of special interest after cfprobit:

Command	Description
<code>estat endogenous</code>	perform tests of endogeneity

The following postestimation commands are also available:

Command	Description
<code>contrast</code>	contrasts and ANOVA-style joint tests of parameters
<code>estat summarize</code>	summary statistics for the estimation sample
<code>estat vce</code>	variance–covariance matrix of the estimators (VCE)
<code>estimates</code>	cataloging estimation results
<code>etable</code>	table of estimation results
<code>forecast</code>	dynamic forecasts and simulations
<code>hausman</code>	Hausman’s specification test
<code>lincom</code>	point estimates, standard errors, testing, and inference for linear combinations of parameters
<code>margins</code>	marginal means, predictive margins, marginal effects, and average marginal effects
<code>marginsplot</code>	graph the results from margins (profile plots, interaction plots, etc.)
<code>nlcom</code>	point estimates, standard errors, testing, and inference for nonlinear combinations of parameters
<code>predict</code>	predictions and their SEs, residuals, etc.
<code>predictnl</code>	point estimates, standard errors, testing, and inference for generalized predictions
<code>pwcompare</code>	pairwise comparisons of parameters
<code>test</code>	Wald tests of simple and composite linear hypotheses
<code>testnl</code>	Wald tests of nonlinear hypotheses

predict

Description for predict

`predict` creates a new variable containing predictions such as linear predictions, residuals, and standard errors.

Menu for predict

Statistics > Postestimation

Syntax for predict

```
predict [type] newvar [if] [in] [ , statistic ]
```

<i>statistic</i>	Description
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Main

<code>pr</code>	probability of a positive outcome; the default
<code>xb</code>	linear prediction
<code>xbv</code>	linear prediction that includes control functions
<code>stdp</code>	standard error of the prediction

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` calculates the probability of a positive outcome. This has an average structural function interpretation and is conditional on the control functions.

`xb` calculates the linear prediction for the main equation that does not include control-function terms, that is, $\mathbf{x}_i \mathbf{b}$.

`xbv` calculates the linear prediction for the main equation that includes the estimated control-function terms with their coefficients, that is, $\mathbf{x}_i \mathbf{b} + \hat{\nu}_i \mathbf{p} + h(\hat{\nu}_i, \mathbf{y}_i, \mathbf{x}_i)' \mathbf{p}_h$.

`stdp` calculates the standard error of the prediction, which can be thought of as the standard error of the predicted expected value or mean for the observation's covariate pattern. This is also referred to as the standard error of the fitted value.

margins

Description for margins

`margins` estimates margins of response for linear predictions and probabilities.

Menu for margins

Statistics > Postestimation

Syntax for margins

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

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

<i>statistic</i>	Description
<code>pr</code>	probability of a positive outcome; the default
<code>xb</code>	linear prediction
<code>xbv</code>	linear prediction that includes control functions
<code>stdp</code>	not allowed with <code>margins</code>

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

For the full syntax, see [\[R\] margins](#).

estat

Description for estat

`estat endogenous` performs tests to determine whether endogenous regressors in the model are in fact exogenous. Tests are performed as Wald tests on the coefficients of relevant control functions and their interactions in the model and account for the type of variance–covariance matrix used.

Menu for estat

Statistics > Postestimation

Syntax for estat

```
estat endogenous [varlist]
```

`collect` is allowed with `estat endogenous`; see [\[U\] 11.1.10 Prefix commands](#).

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Remarks and examples

Remarks are presented under the following headings:

Obtaining predicted values
estat endogenous

Obtaining predicted values

`predict`'s `pr` option calculates the probability of a positive outcome as specified by the model, conditional on the control functions. It corresponds to the result of `predict` after `ivprobit` with options `pr` and `asf` and has a similar average structural function interpretation; see [R] **ivprobit postestimation**.

estat endogenous

Control-function regression lends itself naturally to tests of endogeneity. Under the null hypothesis that an endogenous variable is in fact endogenous, the coefficient on its associated control function, as well as the coefficients on any interactions of the control function, will be zero. Accordingly, a test of these coefficients is a test of the endogeneity of the associated endogenous variable.

`estat endogenous` tests the endogeneity of all endogenous variables jointly if specified without a variable list. Otherwise, only the endogeneity of the listed variables is tested.

For an example of the use of `estat endogenous` after `cfprobit`, see [example 2](#) in [R] **cfprobit**.

Stored results

`estat endogenous` stores the following in `r()`:

Scalar	
<code>r(chi2)</code>	χ^2 statistic
<code>r(df)</code>	degrees of freedom
<code>r(p)</code>	p -value for χ^2 statistic

Methods and formulas

As discussed in [R] **cfprobit**, the equation estimated by `cfprobit` has the form

$$P(y_{i0} = 1 | \mathbf{y}_i, \mathbf{x}_i, \mathbf{w}_i, \mathbf{z}_i) = \Phi\{\mathbf{y}_i\beta_1 + \mathbf{x}_i\beta_2 + \mathbf{w}_i\beta_3 + \hat{\boldsymbol{\nu}}_i\boldsymbol{\rho} + h(\hat{\boldsymbol{\nu}}_i, \mathbf{y}_i, \mathbf{x}_i, \mathbf{z}_i, \mathbf{w}_i)'\boldsymbol{\rho}_h + \epsilon_i\}$$

where $\hat{\boldsymbol{\nu}}_i$ is a set of estimated control functions, one for each of the endogenous variables in \mathbf{y}_i , and $h(\cdot)$ is a known vector-valued function. $h(\cdot)$ can include, for our purposes, interactions between the control functions in $\hat{\boldsymbol{\nu}}_i$, as well as interactions between control functions and the exogenous and endogenous variables in the model.

Methods and formulas are presented under the following headings:

Obtaining predicted values
estat endogenous

Obtaining predicted values

The linear prediction using the `xb` option is computed as $\mathbf{y}_i\widehat{\beta}_1 + \mathbf{x}_i\widehat{\beta}_2 + \mathbf{w}_i\widehat{\beta}_3$. The linear prediction, including control functions using the `xbv` option, is computed as $\mathbf{y}_i\widehat{\beta}_1 + \mathbf{x}_i\widehat{\beta}_2 + \mathbf{w}_i\widehat{\beta}_3 + \widehat{\nu}_i\widehat{\rho} + h(\widehat{\nu}_i, \mathbf{y}_i, \mathbf{x}_i, \mathbf{z}_i, \mathbf{w}_i)' \widehat{\rho}_h$. The probability of a positive outcome using option `pr` is computed as the cumulative standard normal distribution function evaluated at the linear prediction including control functions.

estat endogenous

`estat endogenous`, when specified without a variable list, conducts a joint Wald test of $\rho = 0$ and $\rho_h = 0$.

When a variable list is specified, `estat endogenous` conducts a Wald test for the null hypothesis that all the coefficients in ρ and ρ_h , which involve the control functions of the specified variables, are jointly equal to 0. See [R] [test](#) for documentation of Wald tests.

Also see

[R] [cfprobit](#) — Control-function probit regression⁺

[U] [20 Estimation and postestimation commands](#)

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