xthtaylor postestimation — Postestimation tools for xthtaylor

Postestimation commands

The following postestimation commands are available after `xthtaylor`:

Command	Description
`estat summarize`	summary statistics for the estimation sample
`estat vce`	variance–covariance matrix of the estimators (VCE)
`estimates`	cataloging estimation results
`etable`	table of estimation results
`forecast`	dynamic forecasts and simulations
`hausman`	Hausman's specification test
`lincom`	point estimates, standard errors, testing, and inference for linear combinations of coefficients
`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`	predictions and their SEs, residuals, etc.
`predictnl`	point estimates, standard errors, testing, and inference for generalized predictions
`test`	Wald tests of simple and composite linear hypotheses
`testnl`	Wald tests of nonlinear hypotheses

predict

Description for predict

`predict` creates a new variable containing predictions such as fitted values, standard errors, combined residuals, predictions, random-error components, and idiosyncratic error components.

Menu for predict

Statistics > Postestimation

Syntax for predict

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

statistic	Description
Main	
`xb`	$\mathbf{X}_{it}\widehat{\boldsymbol{\beta}} + \mathbf{Z}_i\widehat{\boldsymbol{\delta}}$, fitted values; the default
`stdp`	standard error of the fitted values
`ue`	$\widehat{\mu}_i + \widehat{\epsilon}_{it}$, the combined residual
* `xbu`	$\mathbf{X}_{it}\widehat{\boldsymbol{\beta}} + \mathbf{Z}_i\widehat{\boldsymbol{\delta}} + \widehat{\mu}_i$, prediction including effect
* `u`	$\widehat{\mu}_i$, the random-error component
* `e`	$\widehat{\epsilon}_{it}$, prediction of the idiosyncratic error component

Unstarred statistics are available both in and out of sample; type `predict ... if e(sample) ...` if wanted only for the estimation sample. Starred statistics are calculated only for the estimation sample, even when `if e(sample)` is not specified.

Options for predict

Main

`xb`, the default, calculates the linear prediction, that is, $\mathbf{X}_{it}\widehat{\boldsymbol{\beta}} + \mathbf{Z}_{it}\widehat{\boldsymbol{\delta}}$.

`stdp` calculates the standard error of the linear prediction.

`ue` calculates the prediction of $\widehat{\mu}_i + \widehat{\epsilon}_{it}$.

`xbu` calculates the prediction of $\mathbf{X}_{it}\widehat{\boldsymbol{\beta}} + \mathbf{Z}_{it}\widehat{\boldsymbol{\delta}} + \widehat{\nu}_i$, the prediction including the random effect.

`u` calculates the prediction of $\widehat{\mu}_i$, the estimated random effect.

`e` calculates the prediction of $\widehat{\epsilon}_{it}$.

margins

Description for margins

`margins` estimates margins of response for fitted values.

Menu for margins

Statistics > Postestimation

Syntax for margins

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

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

statistic	Description
`xb`	$\mathbf{X}_{it}\widehat{\boldsymbol{\beta}} + \mathbf{Z}_i\widehat{\boldsymbol{\delta}}$, fitted values; the default
`stdp`	not allowed with `margins`
`ue`	not allowed with `margins`
`xbu`	not allowed with `margins`
`u`	not allowed with `margins`
`e`	not allowed with `margins`

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

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

Remarks and examples

stata.com

▷ Example 1

Continuing with example 1 of [XT] **xthtaylor**, we use `hausman` to test whether we should use the Hausman–Taylor estimator instead of the fixed-effects estimator. We follow the empirical illustration in Baltagi (2013, sec. 7.5), but we fit the model without including the `exp2` and `wks` variables.

We first fit the model with `xthtaylor` and then with `xtreg, fe`:

```
. use https://www.stata-press.com/data/r17/psidextract
. xthtaylor lwage occ south smsa ind exp ms union fem blk ed,
> endog(exp ms union ed)
  (output omitted)
. estimates store eq_ht
. xtreg lwage occ south smsa ind exp ms union fem blk ed, fe
  (output omitted)
. estimates store eq_fe
```

We can now use `hausman` to compare the two estimators, but we need to specify the `df()` to indicate the degrees of freedom for the χ^2 statistic, which would be determined by the overidentifying restrictions in the Hausman–Taylor estimation. In this case, there are three degrees of freedom because there are four time-varying exogenous variables (`occ`, `south`, `smsa`, `ind`) that can be used as instruments for only one time-invariant endogenous variable (`ed`).

```
. hausman eq_fe eq_ht, df(3)

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     eq_fe        eq_ht        Difference       Std. err.
-------------+----------------------------------------------------------------
         occ |   -.0239323    -.0231694       -.0007629        .0002395
       south |   -.0037282     .0062699       -.0099982        .0124188
        smsa |   -.0436251    -.0433518       -.0002733        .0042296
         ind |     .021184     .0156376        .0055465        .0025159
         exp |    .0965738     .0964748        .0000991         .000063
          ms |   -.0299908    -.0300703        .0000795         .000321
       union |    .0349156     .0348494        .0000662        .0006336
------------------------------------------------------------------------------
                          b = Consistent under H0 and Ha; obtained from xtreg.
       B = Inconsistent under Ha, efficient under H0; obtained from xthtaylor.

Test of H0: Difference in coefficients not systematic

    chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   5.22
Prob > chi2 = 0.1567
(V_b-V_B is not positive definite)
```

The p-value for the test provides evidence favoring the null hypothesis; therefore, in this case, the Hausman–Taylor estimation is adequate.

Notice that the variance–covariance matrix for the difference (b-B) is not positive definite. As Greene (2012, 237) points out, this kind of result is due to finite-sample conditions. He also states that Hausman considers it preferable to take the test statistic as zero and, therefore, not to reject the null hypothesis.

◁

▷ Example 2

We now want to determine whether the Amemiya–MaCurdy estimator produces significant efficiency gains with respect to the Hausman–Taylor estimator. We refit the two models, and we use the Hausman test again:

```
. use https://www.stata-press.com/data/r17/psidextract
. xthtaylor lwage occ south smsa ind exp ms union fem blk ed,
> endog(exp ms union ed)
  (output omitted)
. estimates store eq_ht
. xthtaylor lwage occ south smsa ind exp ms union fem blk ed,
> endog(exp ms union ed) amacurdy
  (output omitted)
. estimates store eq_am
```

```
. hausman eq_ht eq_am
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     eq_ht        eq_am        Difference       Std. err.
-------------+----------------------------------------------------------------
         occ |   -.0231694     -.023354        .0001846        .0006485
       south |    .0062699     .0060857        .0001842        .0010641
        smsa |   -.0433518    -.0434638        .0001121        .0006297
         ind |    .0156376     .0156602       -.0000226         .000492
         exp |    .0964748     .0962147          .00026        .0000694
          ms |   -.0300703    -.0303139        .0002436        .0006735
       union |    .0348494     .0345742        .0002752        .0006471
         fem |   -.1277756    -.1287857        .0010101        .0036717
         blk |   -.2911574     -.291645        .0004876        .0082831
          ed |    .1390257     .1380699        .0009558         .005436
------------------------------------------------------------------------------
                          b = Consistent under H0 and Ha; obtained from xthtaylor.
           B = Inconsistent under Ha, efficient under H0; obtained from xthtaylor.

Test of H0: Difference in coefficients not systematic

   chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =  14.42
Prob > chi2 = 0.1548
```

The result indicates that we should use the more efficient estimation produced by the Amemiya–MaCurdy estimator.

◁

References

Baltagi, B. H. 2013. *Econometric Analysis of Panel Data*. 5th ed. Chichester, UK: Wiley.

Greene, W. H. 2012. *Econometric Analysis*. 7th ed. Upper Saddle River, NJ: Prentice Hall.

Also see

[XT] **xthtaylor** — Hausman–Taylor estimator for error-components models

[U] 20 Estimation and postestimation commands