**Syntax**

*Standard estimation command syntax*

```
nestreg [ , options ]: command_name depvar (varlist) [ (varlist) ... ]
```

```
[ if ] [ in ] [ weight ] [ command_options ]
```

*Survey estimation command syntax*

```
nestreg [ , options ]: svy [ vcetype ] [ , svy_options ]: command_name depvar
```

```
(varlist) [ (varlist) ... ] [ if ] [ in ] [ , command_options ]
```

<table>
<thead>
<tr>
<th>options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>waldtable</em></td>
<td>report Wald test results; the default</td>
</tr>
<tr>
<td><em>lrtable</em></td>
<td>report likelihood-ratio test results</td>
</tr>
<tr>
<td><em>quietly</em></td>
<td>suppress any output from <em>command_name</em></td>
</tr>
<tr>
<td><em>store(stub)</em></td>
<td>store nested estimation results in <em>_est_stub</em>_#</td>
</tr>
</tbody>
</table>

*by* is allowed; see [U] 11.1.10 Prefix commands.

Weights are allowed if *command_name* allows them; see [U] 11.1.6 weight.

A *varlist* in parentheses indicates that this list of variables is to be considered as a block. Each variable in a *varlist* not bound in parentheses will be treated as its own block.

All postestimation commands behave as they would after *command_name* without the *nestreg* prefix; see the postestimation manual entry for *command_name*.

**Menu**

Statistics > Other > Nested model statistics

**Description**

*nestreg* fits nested models by sequentially adding blocks of variables and then reports comparison tests between the nested models.
Options

waldtable specifies that the table of Wald test results be reported. *waldtable* is the default.

lrtable specifies that the table of likelihood-ratio tests be reported. This option is not allowed if *pweights*, the *vce(robust)* option, or the *vce(cluster clustvar)* option is specified. *lrtable* is also not allowed with the *svy* prefix.

quietly suppresses the display of any output from *command_name*.

store(*stub*) specifies that each model fit by *nestreg* be stored under the name _est-_stub#, where # is the nesting order from first to last.

Remarks and examples

Remarks are presented under the following headings:

- *Estimation commands*
- *Wald tests*
- *Likelihood-ratio tests*
- *Programming for nestreg*

Estimation commands

*nestreg* removes collinear predictors and observations with missing values from the estimation sample before calling *command_name*.

The following Stata commands are supported by *nestreg*:

- clogit
- nbreg
- regress
- cloglog
- ologit
- scobit
- glm
- oprobit
- stcox
- intreg
- poisson
- stcrreg
- logistic
- probit
- streg
- logit
- qreg
- tobit

You do not supply a *depvar* for *stcox*, *stcrreg*, or *streg*; otherwise, *depvar* is required. You must supply two *depvars* for *intreg*.

Wald tests

Use *nestreg* to test the significance of blocks of predictors, building the regression model one block at a time. Using the data from example 1 of [R] test, we wish to test the significance of the following predictors of birth rate: *medage*, *medagesq*, and *region* (already partitioned into four indicator variables: *reg1*, *reg2*, *reg3*, and *reg4*).
. use http://www.stata-press.com/data/r13/census4
(birth rate, median age)

.nestreg: regress brate (medage) (medagesq) (reg2-reg4)

**Block 1: medage**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>32675.1044</td>
<td>1</td>
<td>32675.1044</td>
<td>F( 1, 48) = 164.72</td>
</tr>
<tr>
<td>Residual</td>
<td>9521.71561</td>
<td>48</td>
<td>198.369075</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
</tbody>
</table>

| Total | 42196.82 | 49 | 861.159592 | Adj R-squared = 0.7696 |

| brate                  | Coef.   | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|------------------------|---------|-----------|-------|------|---------------------|
| medage                 | -15.24893 | 1.188141  | -12.83 | 0.000     | -17.63785 to -12.86002 |
| _cons                  | 618.3935  | 35.15416  | 17.59  | 0.000     | 547.7113 to 689.0756  |

**Block 2: medagesq**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>36755.8524</td>
<td>2</td>
<td>18377.9262</td>
<td>F( 2, 47) = 158.75</td>
</tr>
<tr>
<td>Residual</td>
<td>5440.96755</td>
<td>47</td>
<td>115.765267</td>
<td>R-squared = 0.8711</td>
</tr>
</tbody>
</table>

| Total | 42196.82 | 49 | 861.159592 | Root MSE = 10.759 |

| brate                  | Coef.   | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|------------------------|---------|-----------|-------|------|---------------------|
| medage                 | -109.8925 | 15.96663  | -6.88 | 0.000     | -142.0132 to -77.7718 |
| medagesq               | 1.607332  | 0.2707228 | 5.94  | 0.000     | 1.062708 to 2.151956  |
| _cons                  | 2007.071  | 235.4316  | 8.53  | 0.000     | 1533.444 to 2480.698  |

**Block 3: reg2 reg3 reg4**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>38803.419</td>
<td>5</td>
<td>7760.68381</td>
<td>F( 5, 44) = 100.63</td>
</tr>
<tr>
<td>Residual</td>
<td>3393.40095</td>
<td>44</td>
<td>77.1227489</td>
<td>R-squared = 0.9196</td>
</tr>
</tbody>
</table>

| Total | 42196.82 | 49 | 861.159592 | Root MSE = 8.782 |

| brate                  | Coef.   | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|------------------------|---------|-----------|-------|------|---------------------|
| medage                 | -109.0957 | 13.52452  | -8.07 | 0.000     | -136.3526 to -81.83886 |
| medagesq               | 1.635208  | 0.2290536 | 7.14  | 0.000     | 1.173581 to 2.096835  |
| reg2                   | 15.00284  | 4.252068  | 3.53  | 0.001     | 6.433365 to 23.57233  |
| reg3                   | 7.366435  | 3.953336  | 1.86  | 0.069     | -0.6009898 to 15.33386 |
| reg4                   | 21.39679  | 4.650602  | 4.60  | 0.000     | 12.02412 to 30.76946  |
| _cons                  | 1947.61   | 199.8405  | 9.75  | 0.000     | 1544.858 to 2350.362  |

<table>
<thead>
<tr>
<th>Block</th>
<th>F</th>
<th>df</th>
<th>Residual F</th>
<th>df</th>
<th>Pr &gt; F</th>
<th>R2 in R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>164.72</td>
<td>1</td>
<td>48</td>
<td>0.0000</td>
<td>0.7743</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>35.25</td>
<td>1</td>
<td>47</td>
<td>0.0000</td>
<td>0.8711</td>
<td>0.0967</td>
</tr>
<tr>
<td>3</td>
<td>8.85</td>
<td>3</td>
<td>44</td>
<td>0.0001</td>
<td>0.9196</td>
<td>0.0485</td>
</tr>
</tbody>
</table>
This single call to `nestreg` ran `regress` three times, adding a block of predictors to the model for each run as in

```
. regress brate medage
    Source | SS    df  MS
----------+--------+-------+
    Model  | 32675.1044  1  32675.1044
    Residual | 9521.71561  48  198.369075
----------+--------+-------+
    Total  | 42196.82  49  861.159592
----------+--------+-------+
    Number of obs = 50
F( 1, 48) = 164.72
Prob > F = 0.0000
R-squared = 0.7743
Adj R-squared = 0.7696
Root MSE = 14.084

| Coef.   | Std. Err. | t    | P>|t|   [95% Conf. Interval] |
|---------|-----------|------|------|-------------------------|
| medage  | -15.24893 | 1.188141 | -12.83 | 0.000 | -17.63785 to -12.86002 |
| _cons   | 618.3935  | 35.15416 | 17.59  | 0.000 | 547.7113 to 689.0756   |
```

```
. regress brate medage medagesq
    Source | SS    df  MS
----------+--------+-------+
    Model  | 36755.8524  2  18377.9262
    Residual | 5440.96755  47  115.765267
----------+--------+-------+
    Total  | 42196.82  49  861.159592
----------+--------+-------+
    Number of obs = 50
F( 2, 47) = 158.75
Prob > F = 0.0000
R-squared = 0.8711
Adj R-squared = 0.8656
Root MSE = 10.759

| Coef.   | Std. Err. | t    | P>|t|   [95% Conf. Interval] |
|---------|-----------|------|------|-------------------------|
| medage  | -109.8925 | 15.96663 | -6.88  | 0.000 | -142.0132 to -77.7718  |
| medagesq| 1.607332  | .2707228 | 5.94   | 0.000 | 1.062708 to 2.151956   |
| _cons   | 2007.071  | 235.4316 | 8.53   | 0.000 | 1533.444 to 2480.698   |
```

```
. regress brate medage medagesq reg2-reg4
    Source | SS    df  MS
----------+--------+-------+
    Model  | 38803.419  5  7760.68381
    Residual | 3393.40095  44  77.1227489
----------+--------+-------+
    Total  | 42196.82  49  861.159592
----------+--------+-------+
    Number of obs = 50
F( 5, 44) = 100.63
Prob > F = 0.0000
R-squared = 0.9196
Adj R-squared = 0.9104
Root MSE = 8.782

| Coef.   | Std. Err. | t    | P>|t|   [95% Conf. Interval] |
|---------|-----------|------|------|-------------------------|
| medage  | -109.0957 | 13.52452 | -8.07  | 0.000 | -136.3526 to -81.83886 |
| medagesq| 1.635208  | .2290536 | 7.14   | 0.000 | 1.173581 to 2.096835   |
| reg2    | 15.00284  | 4.252068 | 3.53   | 0.001 | 6.433365 to 23.57233   |
| reg3    | 7.366435  | 3.953336 | 1.86   | 0.069 | -6.009898 to 15.33386  |
| reg4    | 21.39679  | 4.650602 | 4.60   | 0.000 | 12.02412 to 30.76946   |
| _cons   | 1947.61   | 199.8405 | 9.75   | 0.000 | 1544.858 to 2350.362   |
```

`nestreg` collected the $F$ statistic for the corresponding block of predictors and the model $R^2$ statistic from each model fit.

The $F$ statistic for the first block, 164.72, is for a test of the joint significance of the first block of variables; it is simply the $F$ statistic from the regression of `brate` on `medage`. The $F$ statistic for the second block, 35.25, is for a test of the joint significance of the second block of variables in a regression of both the first and second blocks of variables. In our example, it is an $F$ test of `medagesq` in the regression of `brate` on `medage` and `medagesq`. Similarly, the third block’s $F$ statistic of 8.85 corresponds to a joint test of `reg2`, `reg3`, and `reg4` in the final regression.
Likelihood-ratio tests

The `nestreg` command provides a simple syntax for performing likelihood-ratio tests for nested model specifications; also see `lrtest`. Using the data from example 1 of \[R\] `lrtest`, we wish to jointly test the significance of the following predictors of low birthweight: `age`, `lwt`, `ptl`, and `ht`.

```
use http://www.stata-press.com/data/r13/lbw
(Hosmer & Lemeshow data)
```

```
.xi: nestreg, lr: logistic low (i.race smoke ui) (age lwt ptl ht)
.i.race
   _Irace_1-3 (naturally coded; _Irace_1 omitted)
Block 1: _Irace_2 _Irace_3 smoke ui
Logistic regression
Number of obs = 189
LR chi2(4) = 18.80
Prob > chi2 = 0.0009
Log likelihood = -107.93404 Pseudo R2 = 0.0801

Odds Ratio Std. Err. z P>|z| [95% Conf. Interval]
_Irace_2 3.052746 1.498087 2.27 0.023 1.166747 7.987382
_Irace_3 2.922693 1.189229 2.64 0.008 1.316457 6.489285
smoke 2.945742 1.101838 2.89 0.004 1.415167 6.131715
ui 2.419131 1.047359 2.04 0.041 1.035459 5.651788
_cons .1402209 .0512295 -5.38 0.000 .0685216 .2869447
```

```
Block 2: age lwt ptl ht
Logistic regression
Number of obs = 189
LR chi2(8) = 33.22
Prob > chi2 = 0.0001
Log likelihood = -100.724 Pseudo R2 = 0.1416

Odds Ratio Std. Err. z P>|z| [95% Conf. Interval]
_Irace_2 3.534767 1.860737 2.40 0.016 1.259736 9.918406
_Irace_3 2.368079 1.039949 1.96 0.050 1.001356 5.600207
smoke 2.517698 1.00916 2.30 0.021 1.147676 5.523162
ui 2.1351 .9808153 1.65 0.099 .8677528 5.2534
age .9732636 .0354759 -0.74 0.457 .9015758 .9480231
lwt .9849634 .0068217 -2.19 0.029 .9716834 .9984249
ptl 1.719161 .5952579 1.55 0.122 1.212455 2.427877
ht 6.249602 4.322408 2.66 0.008 1.611152 24.214199
_cons 1.586014 1.910496 0.80 0.417 .1496092 16.8134
```

```
Block LL LR df Pr > LR AIC BIC
1 -107.934 18.80 4 0.0009 225.8681 242.0768
2 -100.724 14.42 4 0.0061 219.448 248.6237
```

The estimation results from the full model are left in `e()`, so we can later use `estat` and other postestimation commands.

```
.estat gof
Logistic model for low, goodness-of-fit test
number of observations = 189
number of covariate patterns = 182
Pearson chi2(173) = 179.24
Prob > chi2 = 0.3567
```
Programming for \texttt{nestreg}

If you want your user-written command (\textit{command name}) to work with \texttt{nestreg}, it must follow standard Stata syntax and allow the \texttt{if} qualifier. Furthermore, \textit{command name} must have \texttt{sw} or \texttt{swml} as a program property; see [P] \texttt{program properties}. If \textit{command name} has \texttt{swml} as a property, \textit{command name} must store the log-likelihood value in \texttt{e(ll)} and the model degrees of freedom in \texttt{e(df_m)}.

\section*{Stored results}

\texttt{nestreg} stores the following in \texttt{r()}:

\begin{itemize}
\item Matrices
  \begin{itemize}
  \item \texttt{r(wald)}  \quad \text{matrix corresponding to the Wald table}
  \item \texttt{r(lr)}  \quad \text{matrix corresponding to the likelihood-ratio table}
  \end{itemize}
\end{itemize}

\section*{Acknowledgment}

We thank Paul H. Bern of Syracuse University for developing the hierarchical regression command that inspired \texttt{nestreg}.

\section*{Reference}

Acock, A. C. 2014. \textit{A Gentle Introduction to Stata}. 4th ed. College Station, TX: Stata Press.

\section*{Also see}

[P] \texttt{program properties} — Properties of user-defined programs