

nestreg — Nested model statistics

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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]
```

<i>options</i>	Description
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Reporting

<u>waldtable</u>	report Wald test results; the default
<u>lrtable</u>	report likelihood-ratio test results
<u>quietly</u>	suppress any output from <i>command_name</i>
<u>store(stub)</u>	store nested estimation results in <code>_est_stub#</code>

`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

Reporting

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

`lrttable` 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. `lrttable` 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

[stata.com](http://www.stata.com)

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`:

<code>clogit</code>	<code>nbreg</code>	<code>regress</code>
<code>cloglog</code>	<code>ologit</code>	<code>scobit</code>
<code>glm</code>	<code>oprobit</code>	<code>stcox</code>
<code>intreg</code>	<code>poisson</code>	<code>stcrreg</code>
<code>logistic</code>	<code>probit</code>	<code>streg</code>
<code>logit</code>	<code>qreg</code>	<code>tobit</code>

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

Source	SS	df	MS			
Model	32675.1044	1	32675.1044	Number of obs =	50	
Residual	9521.71561	48	198.369075	F(1, 48) =	164.72	
Total	42196.82	49	861.159592	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]	
brate						
medage	-15.24893	1.188141	-12.83	0.000	-17.63785	-12.86002
_cons	618.3935	35.15416	17.59	0.000	547.7113	689.0756

Block 2: medagesq

Source	SS	df	MS			
Model	36755.8524	2	18377.9262	Number of obs =	50	
Residual	5440.96755	47	115.765267	F(2, 47) =	158.75	
Total	42196.82	49	861.159592	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]	
brate						
medage	-109.8925	15.96663	-6.88	0.000	-142.0132	-77.7718
medagesq	1.607332	.2707228	5.94	0.000	1.062708	2.151956
_cons	2007.071	235.4316	8.53	0.000	1533.444	2480.698

Block 3: reg2 reg3 reg4

Source	SS	df	MS			
Model	38803.419	5	7760.68381	Number of obs =	50	
Residual	3393.40095	44	77.1227489	F(5, 44) =	100.63	
Total	42196.82	49	861.159592	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]	
brate						
medage	-109.0957	13.52452	-8.07	0.000	-136.3526	-81.83886
medagesq	1.635208	.2290536	7.14	0.000	1.173581	2.096835
reg2	15.00284	4.252068	3.53	0.001	6.433365	23.57233
reg3	7.366435	3.953336	1.86	0.069	-.6009898	15.33386
reg4	21.39679	4.650602	4.60	0.000	12.02412	30.76946
_cons	1947.61	199.8405	9.75	0.000	1544.858	2350.362

Block	F	Block df	Residual df	Pr > F	R2	Change in R2
1	164.72	1	48	0.0000	0.7743	
2	35.25	1	47	0.0000	0.8711	0.0967
3	8.85	3	44	0.0001	0.9196	0.0485

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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	Number of obs = 50		
Residual	9521.71561	48	198.369075	F(1, 48) = 164.72		
				Prob > F = 0.0000		
				R-squared = 0.7743		
				Adj R-squared = 0.7696		
				Root MSE = 14.084		
<hr/>						
brate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
medage	-15.24893	1.188141	-12.83	0.000	-17.63785	-12.86002
_cons	618.3935	35.15416	17.59	0.000	547.7113	689.0756

```
. regress brate medage medagesq
```

Source	SS	df	MS			
Model	36755.8524	2	18377.9262	Number of obs = 50		
Residual	5440.96755	47	115.765267	F(2, 47) = 158.75		
				Prob > F = 0.0000		
				R-squared = 0.8711		
				Adj R-squared = 0.8656		
				Root MSE = 10.759		
<hr/>						
brate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
medage	-109.8925	15.96663	-6.88	0.000	-142.0132	-77.7718
medagesq	1.607332	.2707228	5.94	0.000	1.062708	2.151956
_cons	2007.071	235.4316	8.53	0.000	1533.444	2480.698

```
. regress brate medage medagesq reg2-reg4
```

Source	SS	df	MS			
Model	38803.419	5	7760.68381	Number of obs = 50		
Residual	3393.40095	44	77.1227489	F(5, 44) = 100.63		
				Prob > F = 0.0000		
				R-squared = 0.9196		
				Adj R-squared = 0.9104		
				Root MSE = 8.782		
<hr/>						
brate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
medage	-109.0957	13.52452	-8.07	0.000	-136.3526	-81.83886
medagesq	1.635208	.2290536	7.14	0.000	1.173581	2.096835
reg2	15.00284	4.252068	3.53	0.001	6.433365	23.57233
reg3	7.366435	3.953336	1.86	0.069	-.6009898	15.33386
reg4	21.39679	4.650602	4.60	0.000	12.02412	30.76946
_cons	1947.61	199.8405	9.75	0.000	1544.858	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
Pseudo R2      =          0.0801
Log likelihood = -107.93404
```

low	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	2.922593	1.189229	2.64	0.008	1.316457	6.488285
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
Pseudo R2      =          0.1416
Log likelihood = -100.724
```

low	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	.9061578	1.045339
lwt	.9849634	.0068217	-2.19	0.029	.9716834	.9984249
ptl	1.719161	.5952579	1.56	0.118	.8721455	3.388787
ht	6.249602	4.322408	2.65	0.008	1.611152	24.24199
_cons	1.586014	1.910496	0.38	0.702	.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 `nestreg`

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

Stored results

`nestreg` stores the following in `r()`:

Matrices

<code>r(wald)</code>	matrix corresponding to the Wald table
<code>r(lr)</code>	matrix corresponding to the likelihood-ratio table

Acknowledgment

We thank Paul H. Bern of Syracuse University for developing the hierarchical regression command that inspired `nestreg`.

Reference

Acock, A. C. 2014. *A Gentle Introduction to Stata*. 4th ed. College Station, TX: Stata Press.

Also see

[P] [program properties](#) — Properties of user-defined programs