

**nestreg** — Nested model statistics[Description](#)[Quick start](#)[Menu](#)[Syntax](#)[Options](#)[Remarks and examples](#)[Stored results](#)[Acknowledgment](#)[References](#)[Also see](#)

## Description

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

## Quick start

Fit nested (hierarchical) models sequentially, including covariates `x1` and `x2` first and then adding `x3` and `x4`

```
nestreg: regress y (x1 x2) (x3 x4)
```

Also fit third model including `d1`, `d2`, and `d3`

```
nestreg: regress y (x1 x2) (x3 x4) (d1 d2 d3)
```

Report table of likelihood-ratio tests instead of Wald tests comparing models

```
nestreg, lrtable: regress y (x1 x2) (x3 x4) (d1 d2 d3)
```

Fit nested models and adjust for complex survey design using `svyset` data

```
nestreg: svy: regress y (x1 x2) (x3 x4) (d1 d2 d3)
```

Note: In the above examples, `regress` could be replaced with any estimation command allowing the `nestreg` prefix.

## Menu

Statistics > Other > Nested model statistics

## 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

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

## Options

Reporting

`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

[stata.com](http://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`:

`betareg`, `clogit`, `cloglog`, `glm`, `intreg`, `logistic`, `logit`, `nbreg`, `ologit`, `oprobit`, `poisson`, `probit`, `qreg`, `regress`, `scobit`, `stcox`, `stcrreg`, `streg`, and `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`).

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```
. use http://www.stata-press.com/data/r14/census4
(birth rate, median age)
. nestreg: regress brate (medage) (medagesq) (reg2-reg4)
```

Block 1: medage

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

  

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

Block 2: medagesq

Source	SS	df	MS	Number of obs	=	50
Model	36755.8524	2	18377.9262	F(2, 47)	=	158.75
Residual	5440.96755	47	115.765267	Prob > F	=	0.0000
				R-squared	=	0.8711
				Adj R-squared	=	0.8656
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	-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	Number of obs	=	50
Model	38803.419	5	7760.68381	F(5, 44)	=	100.63
Residual	3393.40095	44	77.1227489	Prob > F	=	0.0000
				R-squared	=	0.9196
				Adj R-squared	=	0.9104
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	-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	Block		Residual		Pr > F	R2	Change in R2
	F	df	df				
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	

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	Number of obs	=	50
Model	32675.1044	1	32675.1044	F(1, 48)	=	164.72
Residual	9521.71561	48	198.369075	Prob > F	=	0.0000
				R-squared	=	0.7743
				Adj R-squared	=	0.7696
Total	42196.82	49	861.159592	Root MSE	=	14.084

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	Number of obs	=	50
Model	36755.8524	2	18377.9262	F(2, 47)	=	158.75
Residual	5440.96755	47	115.765267	Prob > F	=	0.0000
				R-squared	=	0.8711
				Adj R-squared	=	0.8656
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	-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	Number of obs	=	50
Model	38803.419	5	7760.68381	F(5, 44)	=	100.63
Residual	3393.40095	44	77.1227489	Prob > F	=	0.0000
				R-squared	=	0.9196
				Adj R-squared	=	0.9104
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	-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/r14/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
```

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
Log likelihood = -100.724   Pseudo R2   =       0.1416
```

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`.

## References

- Acock, A. C. 2016. *A Gentle Introduction to Stata*. 5th ed. College Station, TX: Stata Press.
- Lindsey, C., and S. J. Sheather. 2015. Best subsets variable selection in nonnormal regression models. *Stata Journal* 15: 1046–1059.

## Also see

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