

ml for svy — Maximum pseudolikelihood estimation for survey data

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Remarks and examples

stata.com

Stata's `ml` command can fit maximum likelihood–based models for survey data. Many `ml`-based estimators can now be modified to handle one or more stages of clustering, stratification, sampling weights, finite population correction, calibration, poststratification, and subpopulation estimation. See [\[R\] ml](#) for details.

See [\[P\] program properties](#) for a discussion of the programming requirements for an estimation command to work with the `svy` prefix. See [Gould, Pitblado, and Poi \(2010\)](#) for examples of community-contributed estimation commands that support the `svy` prefix.

▷ Example 1: User-written survey regression

The `ml` command requires a program that computes likelihood values to perform maximum likelihood. Here is a likelihood evaluator used in [Gould, Pitblado, and Poi \(2010\)](#) to fit linear regression models using likelihood from the normal distribution.

```

program mynormal_lf
    version 17.0
    args lnf mu lnsigma
    quietly replace `lnf' = ln(normalden($ML_y1,`mu',exp(`lnsigma')))
end

```

Here we fit a survey regression model using a multistage survey dataset with `ml` and the above likelihood evaluator.

```

. use https://www.stata-press.com/data/r17/multistage
. svyset county [pw=sampwgt], strata(state) fpc(ncounties) || school,
> fpc(nschools)
Sampling weights: sampwgt
                  VCE: linearized
    Single unit: missing
      Strata 1: state
Sampling unit 1: county
                FPC 1: ncounties
      Strata 2: <one>
Sampling unit 2: school
                FPC 2: nschools

. ml model lf mynormal_lf (mu: weight = height) /lnsigma, svy

```

```

. ml max
initial:      log pseudolikelihood =      -<inf> (could not be evaluated)
feasible:    log pseudolikelihood = -7.301e+08
rescale:     log pseudolikelihood = -51944380
rescale eq:  log pseudolikelihood = -47565331
Iteration 0: log pseudolikelihood = -47565331
Iteration 1: log pseudolikelihood = -41226725 (not concave)
Iteration 2: log pseudolikelihood = -41221650 (not concave)
Iteration 3: log pseudolikelihood = -41176159 (not concave)
Iteration 4: log pseudolikelihood = -41154139 (not concave)
Iteration 5: log pseudolikelihood = -41052368
Iteration 6: log pseudolikelihood = -39379181 (backed up)
Iteration 7: log pseudolikelihood = -38333242
Iteration 8: log pseudolikelihood = -38328742
Iteration 9: log pseudolikelihood = -38328739

Number of strata = 50      Number of obs = 4,071
Number of PSUs  = 100    Population size = 8,000,000
                                Design df = 50
                                F(1, 50) = 593.99
                                Prob > F = 0.0000

```

weight	Linearized		t	P> t	[95% conf. interval]	
	Coefficient	std. err.				
height	.716311	.0293908	24.37	0.000	.6572778	.7753442
_cons	-149.6181	12.57266	-11.90	0.000	-174.871	-124.3652
/lnsigma	3.372153	.0180777	186.54	0.000	3.335843	3.408464



Reference

Gould, W. W., J. S. Pitblado, and B. P. Poi. 2010. *Maximum Likelihood Estimation with Stata*. 4th ed. College Station, TX: Stata Press.

Also see

- [SVY] [Survey](#) — Introduction to survey commands
- [P] [program properties](#) — Properties of user-defined programs
- [R] [Maximize](#) — Details of iterative maximization
- [R] [ml](#) — Maximum likelihood estimation