## Remarks and examples

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.

```stata
program mynormal_lf
    version 16.1
    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.

```stata
. use https://www.stata-press.com/data/r16/multistage
. svyset county [pw=sampwgt], strata(state) fpc(ncounties) || school, > fpc(nschools)
    pweight: sampwgt
    VCE: linearized
    Single unit: missing
    Strata 1: state
        SU 1: county
        FPC 1: ncounties
    Strata 2: <one>
        SU 2: school
        FPC 2: nschools
. ml model lf mynormal_lf (mu: weight = height) /lnsigma, svy
```
2 ml for svy — Maximum pseudolikelihood estimation for survey data

. 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

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<tr>
<th>weight</th>
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<td>Coef.</td>
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<td>P&gt;</td>
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<td>186.54</td>
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</tr>
</tbody>
</table>

Reference

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