

**estat residuals** — Display mean and covariance residuals

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## Description

`estat residuals` is for use after `sem` but not `gsem`.

`estat residuals` displays the mean and covariance residuals. Normalized and standardized residuals are available.

Both mean and covariance residuals are reported unless `sem`'s option `nomeans` was specified or implied at the time the model was fit, in which case mean residuals are not reported.

`estat residuals` usually does not work following `sem` models fit with `method(mlmv)`. It also does not work if there are any missing values, which after all is the whole point of using `method(mlmv)`.

## Menu

Statistics > SEM (structural equation modeling) > Goodness of fit > Matrices of residuals

## Syntax

```
estat residuals [ , options ]
```

<i>options</i>	Description
<code><u>normalized</u></code>	report normalized residuals
<code><u>standardized</u></code>	report standardized residuals
<code><u>sample</u></code>	use sample covariances in residual variance calculations
<code><u>nm1</u></code>	use adjustment $N - 1$ in residual variance calculations
<code><u>zerotolerance(tol)</u></code>	apply tolerance to treat residuals as 0
<code><u>format(%fmt)</u></code>	display format

## Options

`normalized` and `standardized` are alternatives. If neither is specified, raw residuals are reported.

Normalized residuals and standardized residuals attempt to adjust the residuals in the same way, but they go about it differently. The normalized residuals are always valid, but they do not follow a standard normal distribution. The standardized residuals do follow a standard normal distribution but only if they can be calculated; otherwise, they will equal missing values. When both can be calculated (equivalent to both being appropriate), the normalized residuals will be a little smaller than the standardized residuals. See [Jöreskog and Sörbom \(1986\)](#).

`sample` specifies that the sample variance and covariances be used in variance formulas to compute normalized and standardized residuals. The default uses fitted variance and covariance values as described by [Bollen \(1989\)](#).

`nm1` specifies that the variances be computed using  $N - 1$  in the denominator rather than using sample size  $N$ .

`zerotolerance(tol)` treats residuals within `tol` of 0 as if they were 0. `tol` must be a numeric value less than 1. The default is `zerotolerance(0)`, meaning that no tolerance is applied.

When standardized residuals cannot be calculated, it is because a variance calculated by the [Hausman \(1978\)](#) theorem turns negative. Applying a tolerance to the residuals turns some residuals into 0 and then division by the negative variance becomes irrelevant, and that may be enough to solve the calculation problem.

`format(%fmt)` specifies the display format. The default is `format(%9.3f)`.

## Remarks and examples

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

See [\[SEM\] example 10](#).

## Stored results

`estat residuals` stores the following in `r()`:

### Scalars

`r(N_groups)`            number of groups

### Macros

`r(sample)`            empty or `sample`, if `sample` was specified  
`r(nm1)`                empty or `nm1`, if `nm1` was specified

### Matrices

`r(nobs)`                sample size for each group  
`r(res_mean[_#])`        raw mean residuals (for group #) (\*)  
`r(res_cov[_#])`        raw covariance residuals (for group #)  
`r(nres_mean[_#])`      normalized mean residuals (for group #) (\*)  
`r(nres_cov[_#])`        normalized covariance residuals (for group #)  
`r(sres_mean[_#])`      standardized mean residuals (for group #) (\*)  
`r(sres_cov[_#])`        standardized covariance residuals (for group #)

(\*) If there are no estimated means or intercepts in the `sem` model, these matrices are not returned.

## References

- Bollen, K. A. 1989. *Structural Equations with Latent Variables*. New York: Wiley.
- Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica* 46: 1251–1271.
- Jöreskog, K. G., and D. Sörbom. 1986. *Lisrel VI: Analysis of linear structural relationships by the method of maximum likelihood*. Mooresville, IN: Scientific Software.

## Also see

- [SEM] [example 10](#) — MIMIC model
- [SEM] [estat gof](#) — Goodness-of-fit statistics
- [SEM] [estat ggof](#) — Group-level goodness-of-fit statistics
- [SEM] [estat eqgof](#) — Equation-level goodness-of-fit statistics
- [SEM] [methods and formulas for sem](#) — Methods and formulas for sem
- [SEM] [sem postestimation](#) — Postestimation tools for sem