Title

estat residuals — Display mean and covariance residuals

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 $\underline{\text{res}}$iduals $\begin{bmatrix} , & options \end{bmatrix}$

options	Description
$\underline{\text{normalized}}$	report normalized residuals
$\underline{\text{standardized}}$	report standardized residuals
$\underline{\text{sample}}$	use sample covariances in residual variance calculations
nm1	use adjustment $N-1$ in residual variance calculations
$\underline{\text{zerotolerance}}$(*tol*)	apply tolerance to treat residuals as 0
$\underline{\text{format}}$(% *fmt*)	display format

collect is allowed; see [U] 11.1.10 Prefix commands.

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

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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. https://doi.org/10.2307/1913827.

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