

Description

estat gof is for use after sem but not gsem.

estat gof displays a variety of overall goodness-of-fit statistics.

Menu

Statistics > SEM (structural equation modeling) > Goodness of fit > Overall goodness of fit

Syntax

estat gof [, *options*]

<i>options</i>	Description
<u>stats</u> (<i>statlist</i>)	statistics to be displayed
<u>nod</u> escribe	suppress descriptions of statistics

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

<i>statlist</i>	Description
chi2	χ^2 tests; the default
<u>rm</u> sea	root mean squared error of approximation
i	information indices
<u>in</u> dexes	indices for comparison against baseline
<u>re</u> siduals	measures based on residuals
all	all the above

Note: The statistics reported by chi2, rmsea, and indices are dependent on the assumption of joint normality of the observed variables. If vce(sbentler) is specified with sem, modified versions of these statistics that are computed using the Satorra–Bentler scaled χ^2 statistics will also be reported.

Options

`stats(statlist)` specifies the statistics to be displayed. The default is `stats(chi2)`.

`stats(chi2)` reports the model versus saturated test and the baseline versus saturated test. The saturated model is the model that fits the covariances perfectly.

The model versus saturated test is a repeat of the test reported at the bottom of the `sem` output.

In the baseline versus saturated test, the baseline model includes the means and variances of all observed variables plus the covariances of all observed exogenous variables. For a covariance model (a model with no endogenous variables), the baseline includes only the means and variances of observed variables. Be aware that different authors define the baseline model differently.

`stats(rmse)` reports the root mean squared error of approximation (RMSEA) and its 90% confidence interval, and `pclose`, the p -value for a test of close fit, namely, $\text{RMSEA} < 0.05$. Most interpreters of this test label the fit close if the lower bound of the 90% CI is below 0.05 and label the fit poor if the upper bound is above 0.10. See [Browne and Cudeck \(1993\)](#).

`stats(ic)` reports the Akaike information criterion (AIC) and Bayesian (or Schwarz) information criterion (BIC). These statistics are available only after estimation with `sem method(ml)` or `method(mlmv)`. These statistics are used not to judge fit in absolute terms but instead to compare the fit of different models. Smaller values indicate a better fit. Be aware that there are many variations (minor adjustments) to statistics labeled AIC and BIC. Reported here are statistics that match `estat ic`; see [\[R\] estat ic](#).

To compare models that use statistics based on likelihoods, such as AIC and BIC, models should include the same variables; see [\[SEM\] lrtest](#). See [Akaike \(1987\)](#), [Schwarz \(1978\)](#), and [Raftery \(1993\)](#).

`stats(indices)` reports CFI and TLI, two indices such that a value close to 1 indicates a good fit. CFI stands for comparative fit index. TLI stands for Tucker–Lewis index and is also known as the nonnormed fit index. See [Bentler \(1990\)](#).

`stats(residuals)` reports the standardized root mean squared residual (SRMR) and the coefficient of determination (CD).

A perfect fit corresponds to an SRMR of 0. A good fit is a small value, considered by some to be limited to 0.08.

Concerning CD, a perfect fit corresponds to a CD of 1. CD is like R^2 for the whole model.

`stats(all)` reports all the statistics. You can also specify just the statistics you wish reported, such as

```
. estat gof, stats(indices residuals)
```

`nodescribe` suppresses the descriptions of the goodness-of-fit measures.

Remarks and examples

See [\[SEM\] Example 4](#).

Stored results

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

Scalars

<code>r(chi2_ms)</code>	test of target model against saturated model
<code>r(df_ms)</code>	degrees of freedom for <code>r(chi2_ms)</code>
<code>r(p_ms)</code>	p -value for <code>r(chi2_ms)</code>
<code>r(chi2sb_ms)</code>	Satorra–Bentler scaled test of target model against saturated model
<code>r(psb_ms)</code>	p -value for <code>r(chi2sb_ms)</code>
<code>r(chi2_bs)</code>	test of baseline model against saturated model
<code>r(df_bs)</code>	degrees of freedom for <code>r(chi2_bs)</code>
<code>r(p_bs)</code>	p -value for <code>r(chi2_bs)</code>
<code>r(chi2sb_bs)</code>	Satorra–Bentler scaled test of baseline model against saturated model
<code>r(psb_bs)</code>	p -value for <code>r(chi2sb_bs)</code>
<code>r(rmse)</code>	root mean squared error of approximation
<code>r(lb90_rmsea)</code>	lower bound of 90% CI for RMSEA
<code>r(ub90_rmsea)</code>	upper bound of 90% CI for RMSEA
<code>r(pclose)</code>	p -value for test of close fit: $\text{RMSEA} < 0.05$
<code>r(rmse_sb)</code>	RMSEA using Satorra–Bentler χ^2
<code>r(aic)</code>	Akaike information criterion
<code>r(bic)</code>	Bayesian information criterion
<code>r(cfi)</code>	comparative fit index
<code>r(cfi_sb)</code>	CFI using Satorra–Bentler χ^2
<code>r(tli)</code>	Tucker–Lewis fit index
<code>r(tli_sb)</code>	TLI using Satorra–Bentler χ^2
<code>r(cd)</code>	coefficient of determination
<code>r(srmr)</code>	standardized root mean squared residual
<code>r(N_groups)</code>	number of groups

Matrices

<code>r(nobs)</code>	sample size for each group
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References

- Akaike, H. 1987. Factor analysis and AIC. *Psychometrika* 52: 317–332. <https://doi.org/10.1007/BF02294359>.
- Baldwin, S. 2019. *Psychological Statistics and Psychometrics Using Stata*. College Station, TX: Stata Press.
- Bentler, P. M. 1990. Comparative fit indexes in structural models. *Psychological Bulletin* 107: 238–246. <https://doi.org/10.1037/0033-2909.107.2.238>.
- Browne, M. W., and R. Cudeck. 1993. Alternative ways of assessing model fit. Reprinted in *Testing Structural Equation Models*, pp. 136–162. Newbury Park, CA: Sage.
- Raftery, A. E. 1993. Bayesian model selection in structural equation models. Reprinted in *Testing Structural Equation Models*, pp. 163–180. Newbury Park, CA: Sage.
- Schwarz, G. 1978. Estimating the dimension of a model. *Annals of Statistics* 6: 461–464. <https://doi.org/10.1214/aos/1176344136>.

Also see

- [SEM] [sem](#) — Structural equation model estimation command
- [SEM] [sem postestimation](#) — Postestimation tools for sem
- [SEM] [estat eqgof](#) — Equation-level goodness-of-fit statistics
- [SEM] [estat ggof](#) — Group-level goodness-of-fit statistics
- [SEM] [estat residuals](#) — Display mean and covariance residuals
- [SEM] [Example 4](#) — Goodness-of-fit statistics
- [SEM] [Methods and formulas for sem](#) — Methods and formulas for sem
- [R] [estat ic](#) — Display information criteria

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