**estat teffects — Decomposition of effects into total, direct, and indirect**

**Description**

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

`estat teffects` reports direct, indirect, and total effects for each path (Sobel 1987), along with standard errors obtained by the delta method.

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**Syntax**

`estat teffects [ , options ]`

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**Options**

`compact` is a popular option. Consider the following model:

```
. sem (y1<-y2 x1) (y2<-x2)
```

x2 has no direct effect on y1 but does have an indirect effect. `estat teffects` formats all its effects tables the same way by default, so there will be a row for the direct effect of x2 on y1 just because there is a row for the indirect effect of x2 on y1. The value reported for the direct effect, of course, will be 0. `compact` says to omit these unnecessary rows.

`standardized` reports effects in standardized form, but standard errors of the standardized effects are not reported.

`nolabel` is relevant only if estimation was with `sem`'s `group()` option and the group variable has a value label. Groups are identified by group value rather than label.

`nodirect`, `noindirect`, and `nototal` suppress the display of the indicated effect. The default is to display all effects.
display_options: noci, nopvalues, noomitted, vsquish, cformat(%,fmt), pformat(%,fmt), sformat(%,fmt), and nolstretch; see [R] Estimation options. Although estat teffects is not an estimation command, it allows these options.

Remarks and examples

See [SEM] Example 7.

Direct effects are the path coefficients in the model.

Indirect effects are all mediating effects. For instance, consider

```
. sem ... (y1<-y2) (y1<-x2) (y2<-x3) ..., ...
```

The direct effect of \( y_2 \) on \( y_1 \) is the path coefficient \( (y1<-y2) \).

In this example, changes in \( x_3 \) affect \( y_1 \), too. That is called the indirect effect and is the product of the path coefficients \( (y2<-x3) \) and \( (y1<-y2) \). If there were other paths in the model such that \( y_1 \) changed when \( x_3 \) changed, those effects would be added to the indirect effect as well. estat teffects reports total indirect effects.

The total effect is the sum of the direct and indirect effects.

When feedback loops are present in the model, such as

```
. sem ... (y1<-y2) (y1<-x2) (y2<-x3 y1) ..., ...
```

care must be taken when interpreting indirect effects. The feedback loop is when a variable indirectly affects itself, as \( y_1 \) does in the example; \( y_1 \) affects \( y_2 \) and \( y_2 \) affects \( y_1 \). Thus in calculating the indirect effect, the sum has an infinite number of terms although the term values get smaller and smaller and thus usually converge to a finite result. It is important that you check nonrecursive models for stability; see Bollen (1989, 397) and see [SEM] estat stable. Caution: if the model is unstable, the calculation of the indirect effect can sometimes still converge to a finite result.

Stored results

estat teffects stores the following in \( r() \):

Scalars

\( r(N_{groups}) \) number of groups

Matrices

\( r(nobs) \) sample size for each group
\( r(direct) \) direct effects
\( r(indirect) \) indirect effects
\( r(total) \) total effects
\( r(V_{direct}) \) covariance matrix of the direct effects
\( r(V_{indirect}) \) covariance matrix of the indirect effects
\( r(V_{total}) \) covariance matrix of the total effects

estat teffects with the standardized option additionally stores the following in \( r() \):

Matrices

\( r(direct_{std}) \) standardized direct effects
\( r(indirect_{std}) \) standardized indirect effects
\( r(total_{std}) \) standardized total effects
References


Also see

[SEM] sem — Structural equation model estimation command
[SEM] sem postestimation — Postestimation tools for sem
[SEM] estat stable — Check stability of nonrecursive system
[SEM] Methods and formulas for sem — Methods and formulas for sem