

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

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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 ]
```

<i>options</i>	Description
<code>compact</code>	do not display effects with no path
<code>standardized</code>	report standardized effects
<code>nolabel</code>	display <code>group</code> values, not labels
<code>nodirect</code>	do not display direct effects
<code>noindirect</code>	do not display indirect effects
<code>nototal</code>	do not display total effects
<code>display_<i>options</i></code>	control columns and column formats, row spacing, and display of omitted paths

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

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: `nocl`, `nopvalues`, `noomitted`, `vsquish`, `cformat(%fmt)`, `pformat(%fmt)`, `sformat(%fmt)`, and `no1stretch`; see [R] [Estimation options](#). Although `estat teffects` is not an estimation command, it allows these options.

Remarks and examples

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

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 `y2` on `y1` is the path coefficient `(y1<-y2)`.

In this example, changes in `x3` affect `y1`, 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 `y1` changed when `x3` 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 `y1` does in the example; `y1` affects `y2` and `y2` affects `y1`. 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

<code>r(N_groups)</code>	number of groups
--------------------------	------------------

Matrices

<code>r(nobs)</code>	sample size for each group
<code>r(direct)</code>	direct effects
<code>r(indirect)</code>	indirect effects
<code>r(total)</code>	total effects
<code>r(V_direct)</code>	covariance matrix of the direct effects
<code>r(V_indirect)</code>	covariance matrix of the indirect effects
<code>r(V_total)</code>	covariance matrix of the total effects

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

Matrices

<code>r(direct_std)</code>	standardized direct effects
<code>r(indirect_std)</code>	standardized indirect effects
<code>r(total_std)</code>	standardized total effects

References

- Bollen, K. A. 1989. *Structural Equations with Latent Variables*. New York: Wiley.
- Sobel, M. E. 1987. Direct and indirect effects in linear structural equation models. *Sociological Methods and Research* 16: 155–176. <https://doi.org/10.1177/0049124187016001006>.

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

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