

**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 group 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_options</code>	control columns and column formats, row spacing, and display of omitted paths

## 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`, `novalues`, `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

`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

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.

## Also see

[SEM] [estat stable](#) — Check stability of nonrecursive system

[SEM] [methods and formulas for sem](#) — Methods and formulas for sem

[SEM] [sem postestimation](#) — Postestimation tools for sem