

⁺Postestimation features after the two-mediator version of `mediate` are part of [StataNow](#).

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Postestimation commands

The following postestimation commands are of special interest after `mediate` with two mediators:

Command	Description
estat cde	controlled direct effects
estat smsensitivity	sequential mediation sensitivity analysis

The following standard postestimation commands are also available:

Command	Description
estat summarize	summary statistics for the estimation sample
estat vce	variance–covariance matrix of the estimators (VCE)
estimates	cataloging estimation results
etable	table of estimation results
lincom	point estimates, standard errors, testing, and inference for linear combinations of parameters
nlcom	point estimates, standard errors, testing, and inference for nonlinear combinations of parameters
predict	treatment effects, conditional means, etc.
predictnl	point estimates, standard errors, testing, and inference for generalized predictions
test	Wald tests of simple and composite linear hypotheses
testnl	Wald tests of nonlinear hypotheses

predict

Description for predict

predict creates a new variable (or variables) containing predictions such as treatment effects, conditional means, and linear predictions.

Menu for predict

Statistics > Postestimation

Syntax for predict

```
predict [type] { stub* | newvarlist } [if] [in] [ , effect_statistic ]
```

```
predict [type] newvar [if] [in] [ , fitted_statistic ]
```

<i>effect_statistic</i>	Description
Main	
nie	natural indirect effect; the default
nde	natural direct effect
te	total effect
cmean	conditional mean at treatment levels

<i>fitted_statistic</i>	Description
Main	
xb	linear prediction for outcome model
med1xb	linear prediction for first mediator model
med2xb	linear prediction for second mediator model

You specify the number of indirect effects, the number of direct effects, one total effect, or the number of potential outcomes for the model (depending on the selected statistic) with *effect_statistic*.

You specify one new variable with *fitted_statistic*.

Options for predict

Main

- nie, the default, calculates natural indirect effects. You must specify a new variable for each indirect effect or use the *stub** wildcard syntax.
- nde calculates natural direct effects. You must specify a new variable for each direct effect or use the *stub** wildcard syntax.
- te calculates the total effect.

`cmean` calculates the conditional mean for each potential outcome $Y[t, M_1(t'), M_2\{t'', M_1(t''')\}]$ (sequential case) or $Y\{t, M_1(t'), M_2(t'')\}$ (parallel case). You must specify a new variable for each potential outcome or use the `stub*` wildcard syntax.

`xb` calculates the linear prediction for the outcome model.

`med1xb` calculates the linear prediction for the first mediator model.

`med2xb` calculates the linear prediction for the second mediator model.

estat

Description for estat

`estat cde` calculates controlled direct effects.

`estat smsensitivity` performs a sensitivity analysis for sequential mediation models.

Menu for estat

Statistics > Postestimation

Syntax for estat

Controlled direct effects

`estat cde, mvalue(mvaluespec) [cde_options]`

Sequential mediation sensitivity analysis

`estat smsensitivity [, sens_options]`

<i>cde_options</i>	Description
* <code>mvalue(<i>mvaluespec</i>)</code>	values of the mediator variables
<code>level(#)</code>	set confidence level; default is <code>level(95)</code>
<code>contrast</code>	differences of controlled direct effects
<code>nolegend</code>	suppress table legend
<code>display_options</code>	control columns and column formats, row spacing, line width, display of omitted variables and base and empty cells, and factor-variable labeling

* `mvalue(mvaluespec)` is required.

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

<i>sens_options</i>	Description
<code>rho(<i>numlist</i>)</code>	values of rho at which to evaluate effects
<code>format(<i>%fmt</i>)</code>	specify format for effects and standard errors
<code>nose</code>	do not estimate standard errors

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

Options for estat cde

`mvalue(mvaluespec)` specifies the values of the mediator variables at which to evaluate the controlled direct effect. If the causal mediation model contained a continuous treatment variable, only a single value per mediator may be specified. `mvalue()` is required.

mvaluespec may contain one or more of the following specifications:

(*stat*) *varlist*
varname = #
varname = (*numlist*)

varname must be one of the mediators in the previously fit model. *stat* can be any of the following:

<i>stat</i>	Description
mean	means
median	medians
p1	1st percentile
p2	2nd percentile
...	3rd–49th percentiles
p50	50th percentile (same as median)
...	51st–97th percentiles
p98	98th percentile
p99	99th percentile
min	minimums
max	maximums
zero	fixed at zero

`level(#)` specifies the confidence level, as a percentage, for confidence intervals. The default is `level(95)` or as set by `set level`; see [\[U\] 20.8 Specifying the width of confidence intervals](#).

`contrast` specifies to calculate differences of controlled direct effects between evaluations at different points of the mediators, where the base effect is the one defined by the first value pair in `mvalue()`; this option requires at least two evaluation points per mediator to be specified in `mvalue()`.

`nolegend` suppresses the display of the table legend.

display_options: `noci`, `nopvalues`, `nofvlabel`, `fvwrap(#)`, `fvwrapon(style)`, `cformat(%fmt)`, `pformat(%fmt)`, `sformat(%fmt)`, and `nolstretch`; see [\[R\] Estimation options](#).

Options for estat smsensitivity

`rho(numlist)` specifies the values of rho at which to evaluate effects and potential-outcome means.

`format(%fmt)` specifies the format for displaying effects and their standard errors.

`nose` suppresses calculation of standard errors for the effects evaluated at a given rho(*numlist*). `nose` is implied if the preceding specification of `mediate` was issued with the `nose` option.

Remarks and examples

Below, we provide examples for `predict`. To see an example of `estat cde`, see [Estimating controlled direct effects](#) in [CAUSAL] **mediate multiple**. To see an example of `estat smsensitivity`, see [Sensitivity analysis](#) in [CAUSAL] **mediate multiple**.

► Example 1: Predicting individual-level direct, indirect, and total effects

We can use `predict` to make a variety of predictions from the fitted mediation model, such as individual-level direct, indirect, and total effects; potential outcomes; and linear predictions of the outcome and mediator. Suppose we have the following mediation model:

```
. use https://www.stata-press.com/data/r19/qoflife
(Artificial quality-of-life data)

. mediate (hrqol c.age##c.age)
> (depress age i.male)
> (physact age i.male)
> (arthritis), sequential

Iteration 0: EE criterion = 3.447e-27
Iteration 1: EE criterion = 1.090e-29

Causal mediation analysis                                Number of obs = 2,000
Mediation type: Sequential
Mediator 1:      physact
Mediator 2:      depress
Treatment type: Binary
```

hrqol	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
NDE arthritis (Yes vs No)	-2.487514	.0581771	-42.76	0.000	-2.601539	-2.373489
NIE1 arthritis (Yes vs No)	-2.075981	.1567195	-13.25	0.000	-2.383146	-1.768817
NIE2 arthritis (Yes vs No)	-.3989949	.058067	-6.87	0.000	-.5128041	-.2851858
NIE12 arthritis (Yes vs No)	-.5471164	.060534	-9.04	0.000	-.6657608	-.4284719
TE arthritis (Yes vs No)	-5.509607	.2237507	-24.62	0.000	-5.94815	-5.071064

Using `predict` without options yields estimated natural indirect effects. Notice that we have three indirect effects here, so we need to specify three new variables. Or we can use the `stub*` wildcard syntax, which will generate as many variables as needed:

```
. predict nie_*
(option nie assumed; natural indirect effects)
```

Inspecting the generated variables, we can see that we have one variable for each indirect effect:

```
. describe nie_*
```

Variable name	Storage type	Display format	Value label	Variable label
nie_1	float	%9.0g		NIE1, arthritis: Yes vs No
nie_2	float	%9.0g		NIE2, arthritis: Yes vs No
nie_3	float	%9.0g		NIE12, arthritis: Yes vs No

We can predict direct and total effects by using the `nde` and `te` options, respectively. In this case, these are just single variables:

```
. predict nde, nde
. predict te, te
```

If we look at the sample means of the newly generated variables, we can see that their averages match the estimates from `mediate` for NIE1, NIE2, NIE12, NDE, and TE, respectively:

```
. summarize nie_* nde te
```

Variable	Obs	Mean	Std. dev.	Min	Max
nie_1	2,000	-2.075981	0	-2.075981	-2.075981
nie_2	2,000	-.3989949	0	-.3989949	-.3989949
nie_3	2,000	-.5471163	0	-.5471163	-.5471163
nde	2,000	-2.487514	0	-2.487514	-2.487514
te	2,000	-5.509607	0	-5.509607	-5.509607

In this case, the predictions are constant because our model did not include any interactions.



Stored results

`estat cde` stores the following results in `r()`:

Scalars

`r(N)` number of observations

Macros

`r(title)` title in estimation output

Matrices

`r(b)` vector of estimated controlled direct effects or their contrasts

`r(V)` variance–covariance matrix of the estimates

`r(table)` matrix containing the estimates with their standard errors, test statistics, *p*-values, and confidence intervals

`r(mvalues)` matrix containing the mediator values at which the controlled direct effects are evaluated

`estat smsensitivity` stores the following results in `r()`:

Scalars

`r(N)` number of observations

`r(k_rho)` number of ρ evaluation points

`r(rho_#)` #th ρ evaluation point

Matrices

`r(b_rho_#)` #th vector of estimated effects

`r(V_rho_#)` #th variance–covariance matrix of the estimates

Also see

[CAUSAL] [mediate multiple](#) — Causal mediation analysis (two mediators)⁺

[U] [20 Estimation and postestimation commands](#)

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