

Title

mi estimate using — Estimation using previously saved estimation results

Syntax

Compute MI estimates of coefficients using previously saved estimation results

```
mi estimate using miestfile [, options]
```

Compute MI estimates of transformed coefficients using previously saved estimation results

```
mi estimate [spec] using miestfile [, options]
```

where *spec* may be one or more terms of the form (*[name:] exp*). *exp* is any function of the parameter estimates allowed by `nlcom`; see [R] **nlcom**.

miestfile.ster contains estimation results previously saved by `mi estimate, saving(miestfile)`; see [MI] **mi estimate**.

<i>options</i>	description
Options	
<u>nimputations</u> (#)	specify number of imputations to use; default is to use all saved imputations
<u>imputations</u> (<i>numlist</i>)	specify which imputations to use
<u>estimations</u> (<i>numlist</i>)	specify which estimation results to use
<u>ufmitest</u>	perform unrestricted FMI model test
<u>nosmall</u>	do not apply small-sample adjustment to degrees of freedom
Tables	
<u>[no]citable</u>	suppress/display standard estimation table containing parameter-specific confidence intervals; default is <code>citable</code>
<u>dftable</u>	display degrees-of-freedom table; <code>dftable</code> implies <code>nocitable</code>
<u>var</u> table	display variance information about estimates; <code>var</code> table implies <code>citable</code>
<u>table_options</u>	control table output
<u>display_options</u>	control spacing and display of omitted variables and base and empty cells
Reporting	
<u>level</u> (#)	set confidence level; default is <code>level(95)</code>
<u>dots</u>	display dots as estimations performed
<u>noisily</u>	display any output from <code>nlcom</code> if transformations are specified
<u>trace</u>	trace <code>nlcom</code> if transformations are specified; implies <code>noisily</code>
<u>replay</u>	replay command-specific results from each individual estimation in <i>miestfile.ster</i> ; implies <code>noisily</code>
<u>cmdlegend</u>	display the command legend
<u>nogroup</u>	suppress summary about groups displayed for <code>xt</code> commands
<u>xtme_options</u>	control output from mixed-effects commands

Advanced

<code>errorok</code>	allow estimation even when <code>nlcom</code> errors out in some imputations; such imputations are discarded from the analysis
† <code>coeflegend</code>	display coefficients' legend instead of coefficient table; implies <code>nocitable</code> and cannot be specified with <code>citable</code> or <code>dftable</code>
† <code>nowarning</code>	suppress the warning about varying estimation samples
† <code>noerrnotes</code>	suppress error notes associated with failed estimation results in <code>miestfile.ster</code>
† <code>showimputations</code>	show imputations saved in <code>miestfile.ster</code>
† <code>eform_option</code>	display coefficient table in exponentiated form
† <code>post</code>	post estimated coefficients and VCE to <code>e(b)</code> and <code>e(V)</code>

† `coeflegend`, `nowarning`, `noerrnotes`, `showimputations`, `eform_option`, and `post` do not appear in the dialog box.

<i>table_options</i>	description
<code>noheader</code>	suppress table header(s)
<code>notable</code>	suppress table(s)
<code>nocoeff</code>	suppress table output related to coefficients
<code>nocmdlegend</code>	suppress command legend that appears in the presence of transformed coefficients when <code>nocoeff</code> is used
<code>notrcoef</code>	suppress table output related to transformed coefficients
<code>nolegend</code>	suppress table legend(s)
<code>nocnsreport</code>	do not display constraints

See [MI] **mi estimate postestimation** for features available after estimation. To replay results, type `mi estimate` without arguments.

Menu

Statistics > Multiple imputation

Description

`mi estimate using miestfile` is for use after `mi estimate, saving(miestfile): ...` It allows obtaining multiple-imputation (MI) estimates, including standard errors and confidence intervals, for transformed coefficients or the original coefficients, this time calculated on a subset of the imputations. The transformation can be linear or nonlinear.

Options

Options

`nimputations(#)` specifies that the first `#` imputations be used; `#` must be $2 \leq \# \leq M$. The default is to use all imputations, `M`. Only one of `nimputations()`, `imputations()`, or `estimations()` may be specified.

`imputations(numlist)` specifies which imputations to use. The default is to use all of them. *numlist* must contain at least two numbers corresponding to the imputations saved in *miestfile.ster*. You can use the `showimputations` option to display imputations currently saved in *miestfile.ster*. Only one of `nimputations()`, `imputations()`, or `estimations()` may be specified.

`estimations(numlist)` does the same thing as `imputations(numlist)`, but this time the imputations are numbered differently. Say that *miestfile.ster* was created by `mi estimate` and `mi estimate` was told to limit itself to imputations 1, 3, 5, and 9. With `imputations()`, the imputations are still numbered 1, 3, 5, and 9. With `estimations()`, they are numbered 1, 2, 3, and 4. Usually, one does not specify a subset of imputations when using `mi estimate`, and so usually, the `imputations()` and `estimations()` options are identical. The specified *numlist* must contain at least two numbers. Only one of `nimputations()`, `imputations()`, or `estimations()` may be specified.

`ufmitest` specifies that the unrestricted FMI (fraction missing information) model test be used. The default test performed assumes equal fractions of information missing due to nonresponse for all coefficients. This is equivalent to the assumption that the between-imputation and within-imputation variances are proportional. The unrestricted test may be preferable when this assumption is suspect provided that the number of imputations is large relative to the number of estimated coefficients.

`nosmall` specifies that no small-sample adjustment be made to the degrees of freedom. By default, individual tests of coefficients (and transformed coefficients) use the small-sample adjustment of Barnard and Rubin (1999), and the overall model test uses the small-sample adjustment of Reiter (2007).

Tables

All table options below may be specified at estimation time or when redisplaying previously estimated results.

`citable` and `nocitable` specify whether the standard estimation table containing parameter-specific confidence intervals be displayed. The default is `citable`. `nocitable` can be used with `varable` to suppress the confidence-interval table.

`dftable` displays a table containing parameter-specific degrees of freedom and percentages of increase in standard errors due to nonresponse. `dftable` implies `nocitable`.

`varable` displays a table reporting variance information about MI estimates. The table contains estimates of within-imputation variances, between-imputation variances, total variances, relative increases in variance due to nonresponse, fractions of information about parameter estimates missing due to nonresponse, and relative efficiencies for using finite M rather than a hypothetically infinite number of imputations. `varable` implies `citable`.

table_options control the appearance of all displayed table output:

`noheader` suppresses all header information from the output. The table output is still displayed.

`notable` suppresses all tables from the output. The header information is still displayed.

`nocoeff` suppresses the display of tables containing coefficient estimates. This option affects the table output produced by `citable`, `dftable`, and `varable`.

`nocmdlegend` suppresses the table legend showing the command line, used to produce results in *miestfile.ster*, from the output. This legend appears above the tables containing transformed coefficients (or above the variance-information table if `varable` is used) when `nocoeff` is specified.

`notrcoef` suppresses the display of tables containing estimates of transformed coefficients (if specified). This option affects the table output produced by `citable`, `dftable`, and `varable`.

`nolegend` suppresses all table legends from the output.

`nocnsreport`; see [R] **estimation options**.

display_options: `noomitted`, `vsquish`, `noemptycells`, `baselevels`, `allbaselevels`; see [R] **estimation options**.

Reporting

`level(#)`; see [R] **estimation options**.

`dots` specifies that dots be displayed as estimations of transformed coefficients are successfully completed. An `x` is displayed if `nlcom` fails to estimate one of the transformed coefficients specified in *spec*. This option is relevant only if transformations are specified.

`noisily` specifies that any output from `nlcom`, used to obtain the estimates of transformed coefficients, be displayed. This option is relevant only if transformations are specified.

`trace` traces the execution of `nlcom`. `trace` implies `noisily` and is relevant only if transformations are specified.

`replay` replays estimation results from *miestfile.ster*, previously saved by `mi estimate, saving(miestfile)`. This option implies `noisily`.

`cmdlegend` requests that the command line corresponding to the estimation command used to produce the estimation results saved in *miestfile.ster* be displayed. `cmdlegend` may be specified at run time or when redisplaying results.

`nogroup` suppresses the display of group summary information (number of groups, average group size, minimum, and maximum) as well as other command-specific information displayed for `xt` commands.

xtme_options: `variance`, `norettable`, `nofetable`, `estmetric`; see, for example, [XT] **xtmixed**. These options are relevant only with the mixed-effects commands such as `xtmixed`, `xtmelogit` (see [XT] **xtmelogit**), and `xtmepoisson` (see [XT] **xtmepoisson**). The `estmetric` option is implied when `var` or `dftable` is used.

Advanced

`errorok` specifies that estimations of transformed coefficients that fail be skipped and the combined results be based on the successful estimation results. The default is that `mi estimate` stops if an individual estimation fails. If the *miestfile.ster* file contains failed estimation results, `mi estimate using` does not error out; it issues notes about which estimation results failed and discards these estimation results in the computation. You can use the `noerrnotes` option to suppress the display of the notes.

The following options are available with `mi estimate using` but are not shown in the dialog box:

`coeflegend`; see [R] **estimation options**. `coeflegend` implies `nocitable` and cannot be combined with `citable` or `dftable`.

`nowarning` suppresses the warning message at the bottom of table output that occurs if the estimation sample varies and `esampvaryok` is specified. See *Potential problems that can arise when using mi estimate* in [MI] **mi estimate** for details.

`noerrnotes` suppresses notes about failed estimation results. These notes appear when *miestfile.ster* contains estimation results, previously saved by `mi estimate, saving(miestfile)`, from imputations for which the estimation command used with `mi estimate` failed to estimate parameters.

`showimputations` displays imputation numbers corresponding to the estimation results saved in *miestfile.ster*. `showimputations` may be specified at run time or when redisplaying results.

eform_option; see [R] *eform_option*. `mi estimate using` reports results in the coefficient metric under which the combination rules are applied. You may use the appropriate *eform_option* to redisplay results in exponentiated form, if desired. If `dftable` is also specified, the reported degrees of freedom and percentage increases in standard errors are not adjusted and correspond to the original coefficient metric.

`post` requests that MI estimates of coefficients and their respective VCEs be posted in the usual way. This allows the use of *estimation_command*-specific postestimation tools with MI estimates. There are issues; see *Using the command-specific postestimation tools* in [MI] **mi estimate postestimation**. `post` may be specified at estimation time or when redisplaying previously estimated results.

Remarks

`mi estimate using` is convenient when refitting models using `mi estimate` would be tedious or time consuming. In such cases, you can perform estimation once and save the uncombined, individual results by specifying `mi estimate's saving(miestfile)` option. After that, you can repeatedly use `mi estimate using miestfile` to estimate linear and nonlinear transformations of coefficients or to obtain MI estimates using a subset of saved imputations.

`mi estimate using` performs the pooling step of the MI procedure; see [MI] **intro substantive**. That is, it combines completed-data estimates from the *miestfile.ster* file by applying Rubin's combination rules (Rubin 1987, 77).

► Example 1

Recall the analysis of house resale prices from *Example 2: Completed-data regression analysis* in [MI] **mi estimate**:

```
. use http://www.stata-press.com/data/r11/mhouses1993s30
(Albuquerque Home Prices Feb15-Apr30, 1993)
. mi estimate, saving(miest): regress price tax sqft age nfeatures ne custom corner

Multiple-imputation estimates          Imputations      =          30
Linear regression                      Number of obs    =          117
                                       Average RVI      =          0.5415
                                       Complete DF     =          109
DF adjustment:  Small sample          DF:      min     =          16.42
                                       avg           =          72.83
                                       max           =          101.18
Model F test:      Equal FMI          F( 7, 96.3)     =          45.63
Within VCE type:  OLS                 Prob > F        =          0.0000
```

price	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
tax	.5516444	.1443319	3.82	0.000	.2612817	.842007
sqft	.2900879	.0904748	3.21	0.003	.1073624	.4728134
age	-.7524605	1.097246	-0.69	0.502	-3.073675	1.568754
nfeatures	4.361055	13.59917	0.32	0.749	-22.67719	31.3993
ne	5.495913	34.97562	0.16	0.875	-63.95148	74.94331
custom	132.3453	43.26507	3.06	0.003	46.52087	218.1697
corner	-66.95606	40.55801	-1.65	0.102	-147.4264	13.51429
_cons	130.3491	64.03837	2.04	0.044	3.277868	257.4203

In the above, we use the `saving()` option to save the individual completed-data estimates from a regression analysis in Stata estimation file *miest.ster*. We can now use `mi estimate using` to recombine the first 5 imputations, and ignoring the remaining 25, without reestimation:

```

. mi estimate using miest, ni(5)
Multiple-imputation estimates      Imputations      =      5
Linear regression                  Number of obs    =     117
                                   Average RVI      =     0.2939
                                   Complete DF     =     109
DF adjustment:  Small sample      DF:      min    =     7.51
                                   avg          =     61.46
                                   max          =     94.51
Model F test:      Equal FMI      F( 7, 79.3) =     53.00
Within VCE type:  OLS              Prob > F       =     0.0000

```

price	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
tax	.5375429	.1399677	3.84	0.001	.2491601	.8259257
sqft	.2940729	.0890706	3.30	0.004	.1066042	.4815415
age	-.7325252	.7605651	-0.96	0.365	-2.506304	1.041254
nfeatures	3.696554	13.69565	0.27	0.788	-23.62366	31.01677
ne	8.303979	34.64444	0.24	0.811	-60.47857	77.08653
custom	129.2014	44.29287	2.92	0.004	41.25603	217.1468
corner	-63.77848	41.48302	-1.54	0.128	-146.1749	18.61793
_cons	135.4265	64.57713	2.10	0.039	7.184164	263.6688

We obtain results identical to those shown in the example in [MI] **mi estimate**.

We can also obtain estimates of transformed coefficients without refitting the models to the imputed dataset. Recall the example from *Example 4: Estimating transformations* in [MI] **mi estimate**, where we estimated the ratio of the coefficients for `age` and `sqft`. We can obtain the same results by using the following:

```

. mi estimate (ratio: _b[age]/_b[sqft]) using miest
Multiple-imputation estimates      Imputations      =     30
Linear regression                  Number of obs    =     117
                                   Average RVI      =     0.5415
                                   Complete DF     =     109
DF adjustment:  Small sample      DF:      min    =     16.42
                                   avg          =     72.83
                                   max          =    101.18
Model F test:      Equal FMI      F( 7, 96.3) =     45.63
Within VCE type:  OLS              Prob > F       =     0.0000

```

price	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
tax	.5516444	.1443319	3.82	0.000	.2612817	.842007
sqft	.2900879	.0904748	3.21	0.003	.1073624	.4728134
age	-.7524605	1.097246	-0.69	0.502	-3.073675	1.568754
nfeatures	4.361055	13.59917	0.32	0.749	-22.67719	31.3993
ne	5.495913	34.97562	0.16	0.875	-63.95148	74.94331
custom	132.3453	43.26507	3.06	0.003	46.52087	218.1697
corner	-66.95606	40.55801	-1.65	0.102	-147.4264	13.51429
_cons	130.3491	64.03837	2.04	0.044	3.277868	257.4203

Transformations	Average RVI	=	2.0039
	Complete DF	=	109
DF adjustment: Small sample	DF: min	=	23.04
	avg	=	23.04
Within VCE type: OLS	max	=	23.04
ratio: <code>_b[age]/_b[sqft]</code>			

price	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ratio	-2.167045	3.460205	-0.63	0.537	-9.324358	4.990268

The results are the same as in the example in [MI] **mi estimate**.



For more examples, see [MI] **mi estimate postestimation**.

Saved results

See *Saved results* in [MI] **mi estimate**.

Methods and formulas

See *Methods and formulas* in [MI] **mi estimate**.

References

- Barnard, J., and D. B. Rubin. 1999. Small-sample degrees of freedom with multiple imputation. *Biometrika* 86: 948–955.
- Reiter, J. P. 2007. Small-sample degrees of freedom for multi-component significance tests with multiple imputation for missing data. *Biometrika* 94: 502–508.
- Rubin, D. B. 1987. *Multiple Imputation for Nonresponse in Surveys*. New York: Wiley.

Also see

- [MI] **mi estimate** — Estimation using multiple imputations
- [MI] **mi estimate postestimation** — Postestimation tools for mi estimate
- [MI] **intro substantive** — Introduction to multiple-imputation analysis
- [MI] **intro** — Introduction to mi
- [MI] **Glossary**