ipolate — Linearly interpolate (extrapolate) values

Syntax

    ipolate yvar xvar [if] [in], generate(newvar) [epolate]

by is allowed; see [D] by.

Menu

Data > Create or change data > Other variable-creation commands > Linearly interpolate/extrapolate values

Description

ipolate creates in newvar a linear interpolation of yvar on xvar for missing values of yvar.

Because interpolation requires that yvar be a function of xvar, yvar is also interpolated for tied values of xvar. When yvar is not missing and xvar is neither missing nor repeated, the value of newvar is just yvar.

Options

generate(newvar) is required and specifies the name of the new variable to be created.

epolate specifies that values be both interpolated and extrapolated. Interpolation only is the default.

Remarks and examples

Example 1

We have data points on y and x, although sometimes the observations on y are missing. We believe that y is a function of x, justifying filling in the missing values by linear interpolation:

```
. use http://www.stata-press.com/data/r13/ipolxmpl1
. list, sep(0)
   +----+-----+-----+
   |   x |   y  |
   +----+-----+-----+
   |  1. |  0   |
   |  2. |  1   |  3  |
   |  3. |  1.5 |      |
   |  4. |  2   |  6  |
   |  5. |  3   |      |
   |  6. |  3.5 |      |
   |  7. |  4   |  18 |
   +----+-----+-----+

. ipolate y x, gen(y1)
(1 missing value generated)
. ipolate y x, gen(y2) epolate
```
Example 2

We have a dataset of circulations for 10 magazines from 1980 through 2003. The identity of the magazines is recorded in `magazine`, circulation is recorded in `circ`, and the year is recorded in `year`. In a few of the years, the circulation is not known, so we want to fill it in by linear interpolation.

```
. use http://www.stata-press.com/data/r13/ipolxmpl2, clear
. by magazine: ipolate circ year, gen(icirc)
```

When the by prefix is specified, interpolation is performed separately for each group.

Methods and formulas

The value $y$ at $x$ is found by finding the closest points $(x_0, y_0)$ and $(x_1, y_1)$, such that $x_0 < x$ and $x_1 > x$ where $y_0$ and $y_1$ are observed, and calculating

\[
y = \frac{y_1 - y_0}{x_1 - x_0} (x - x_0) + y_0
\]

If `epolate` is specified and if $(x_0, y_0)$ and $(x_1, y_1)$ cannot be found on both sides of $x$, the two closest points on the same side of $x$ are found, and the same formula is applied.

If there are multiple observations with the same value for $x_0$, then $y_0$ is taken as the average of the corresponding $y$ values for those observations. $(x_1, y_1)$ is handled in the same way.

Reference


Also see

[MI] `mi impute` — Impute missing values