

## graph twoway mspline — Twoway median-spline plots

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## Description

`twoway mspline` calculates cross medians and then uses the cross medians as knots to fit a cubic spline. The resulting spline is graphed as a line plot.

## Quick start

Median-spline plot of  $y$  versus  $x$

```
twoway mspline y x
```

As above, and overlay the median-spline plot on a scatterplot of the observed data

```
twoway scatter y x || mspline y x
```

As above, but specify 10 cross-median knots

```
twoway scatter y x || mspline y x, bands(10)
```

Specify 5 points between knots

```
twoway scatter y x || mspline y x, n(5)
```

Separate graph areas for each level of `catvar`

```
twoway scatter y x || mspline y x, n(5) by(catvar)
```

Label the  $y$  axis from 0 to 10 in increments of 2

```
twoway scatter y x || mspline y x, n(5) ylabel(0(2)10)
```

Specify “My X Variable” as the title for the  $x$  axis

```
twoway scatter y x || mspline y x, xtitle("My X Variable")
```

As above, but suppress the legend

```
twoway scatter y x || mspline y x, xtitle("My X Variable") ///  
legend(off)
```

## Menu

Graphics > Twoway graph (scatter, line, etc.)

## Syntax

```
twoway mspline yvar xvar [if] [in] [, options]
```

<i>options</i>	Description
<code>bands(#)</code>	number of cross-median knots
<code>n(#)</code>	number of points between knots
<i>cline_options</i>	change look of the line
<i>axis_choice_options</i>	associate plot with alternative axis
<i>twoway_options</i>	titles, legends, axes, added lines and text, by, regions, name, aspect ratio, etc.

All options are *rightmost*; see [\[G-4\] Concept: repeated options](#).

## Options

`bands(#)` specifies the number of bands for which cross medians should be calculated. The default is  $\max\{\min(b_1, b_2), b_3\}$ , where  $b_1$  is  $\text{round}\{10 * \log_{10}(N)\}$ ,  $b_2$  is  $\text{round}(\sqrt{N})$ ,  $b_3$  is  $\min(2, N)$ , and  $N$  is the number of observations.

The  $x$  axis is divided into  $\#$  equal-width intervals and then the median of  $y$  and the median of  $x$  are calculated in each interval. It is these cross medians to which a cubic spline is then fit.

`n(#)` specifies the number of points between the knots for which the cubic spline should be evaluated. `n(10)` is the default. `n()` does not affect the result that is calculated, but it does affect how smooth the result appears.

*cline\_options* specify how the median-spline line is rendered and its appearance; see [\[G-3\] \*cline\\_options\*](#).

*axis\_choice\_options* associate the plot with a particular  $y$  or  $x$  axis on the graph; see [\[G-3\] \*axis\\_choice\\_options\*](#).

*twoway\_options* are a set of common options supported by all `twoway` graphs. These options allow you to title graphs, name graphs, control axes and legends, add lines and text, set aspect ratios, create graphs over `by()` groups, and change some advanced settings. See [\[G-3\] \*twoway\\_options\*](#).

## Remarks and examples

[stata.com](#)

Remarks are presented under the following headings:

*Typical use*

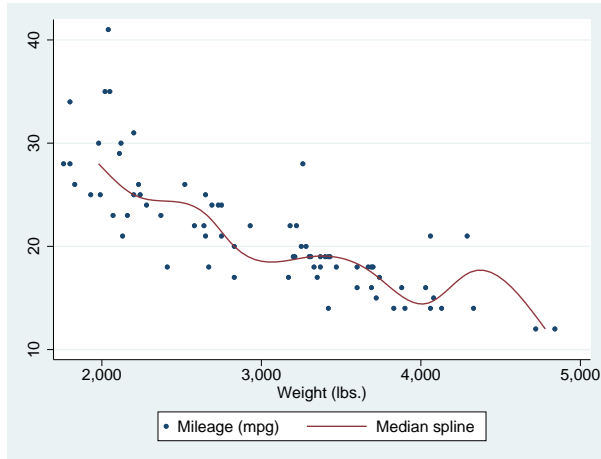
*Cautions*

*Use with `by()`*

## Typical use

Median splines provide a convenient way to show the relationship between  $y$  and  $x$ :

```
. use https://www.stata-press.com/data/r17/auto
(1978 automobile data)
. scatter mpg weight, msize(*.5) || mspline mpg weight
```

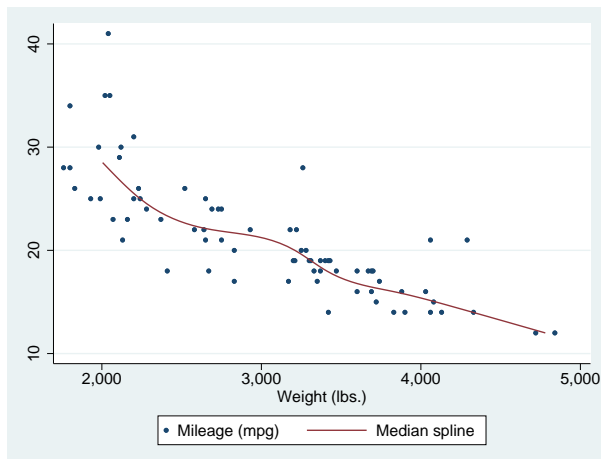


The important part of the above command is `mspline mpg weight`. On the `scatter`, we specified `msize(*.5)` to make the marker symbols half their normal size; see [G-4] *size*.

## Cautions

The graph shown above illustrates a common problem with this technique: it tracks wiggles that may not be real and can introduce wiggles if too many bands are chosen. An improved version of the graph above would be

```
. scatter mpg weight, msize(*.5) || mspline mpg weight, bands(8)
```



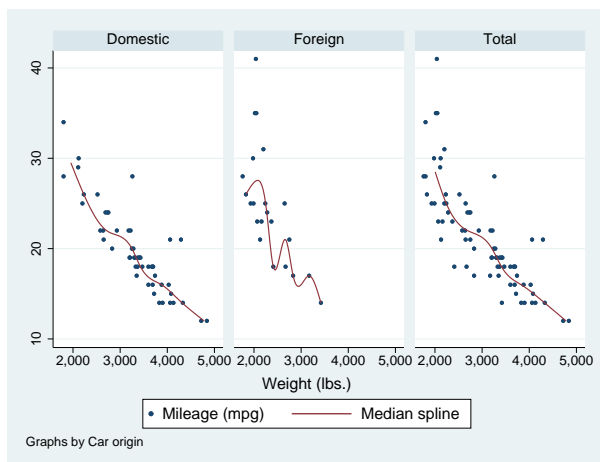
## Use with by()

`mspline` may be used with `by()` (as can all the `twoway` plot commands):

```

. scatter mpg weight, msize(*.5) ||
  mspline mpg weight, bands(8) ||, by(foreign, total row(1))

```



## Also see

[R] [mkspline](#) — Linear and restricted cubic spline construction

[G-2] [graph twoway ffit](#) — Twoway fractional-polynomial prediction plots

[G-2] [graph twoway lfit](#) — Twoway linear prediction plots

[G-2] [graph twoway line](#) — Twoway line plots

[G-2] [graph twoway mband](#) — Twoway median-band plots

[G-2] [graph twoway qfit](#) — Twoway quadratic prediction plots