

axis_choice_options — Options for specifying the axes on which a plot appears

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Description

The *axis_choice_options* determine the *y* and *x* axis (or axes) on which the plot is to appear.

Syntax

<i>axis_choice_options</i>	Description
<u>y</u> axis(# [# ...])	which <i>y</i> axis to use, $1 \leq \# \leq 9$
<u>x</u> axis(# [# ...])	which <i>x</i> axis to use, $1 \leq \# \leq 9$

`yaxis()` and `xaxis()` are *unique*; see [G-4] **Concept: repeated options**.

These options are allowed with any of the *plottypes* (`scatter`, `line`, etc.) allowed by `graph twoway`; see [G-2] **graph twoway**.

Options

`yaxis(# [# ...])` and `xaxis(# [# ...])` specify the *y* or *x* axis to be used. The default is `yaxis(1)` and `xaxis(1)`.

Typically, `yaxis()` and `xaxis()` are treated as if their syntax is `yaxis(#)` and `xaxis(#)`—that is, just one number is specified. In fact, however, more than one number may be specified, and specifying a second is sometimes useful with `yaxis()`. The first *y* axis appears on the left, and the second (if there is a second) appears on the right. Specifying `yaxis(1 2)` allows you to force there to be two identical *y* axes. You could use the one on the left in the usual way and the one on the right to label special values.

Remarks and examples

Options `yaxis()` and `xaxis()` are used when you wish to create one graph with multiple axes. These options are specified with `twoway's` `scatter`, `line`, etc., to specify which axis is to be used for each individual plot.

Remarks are presented under the following headings:

Usual case: one set of axes
Special case: multiple axes due to multiple scales
yaxis(1) and xaxis(1) are the defaults
Notation style is irrelevant
yaxis() and xaxis() are plot options
Specifying the other axes options with multiple axes
Each plot may have at most one x scale and one y scale
Special case: Multiple axes with a shared scale

Usual case: one set of axes

Normally, when you construct a `twoway` graph with more than one plot, as in

```
. scatter y1 y2 x
```

or equivalently,

```
. twoway (scatter y1 x) (scatter y2 x)
```

the two plots share common axes for y and for x .

Special case: multiple axes due to multiple scales

Sometimes you want the two y plots graphed on separate scales. Then you type

```
. twoway (scatter gnp year, c(1) yaxis(1))  
        (scatter r year, c(1) yaxis(2))
```

`yaxis(1)` specified on the first `scatter` says, “This scatter is to appear on the first y axis.” `yaxis(2)` specified on the second `scatter` says, “This scatter is to appear on the second y axis.”

The result is that two y axes will be constructed. The one on the left will correspond to `gnp` and the one on the right to `r`. If we had two x axes instead, one would appear on the bottom and one on the top:

```
. twoway (scatter year gnp, c(1) xaxis(1))  
        (scatter year r, c(1) xaxis(2))
```

You are not limited to having just two y axes or two x axes. You could have two of each:

```
. twoway (scatter y1var x1var, c(1) yaxis(1) xaxis(1))  
        (scatter y2var x2var, c(1) yaxis(2) xaxis(2))
```

You may have up to nine y axes and nine x axes, although graphs become pretty well unreadable by that point. When there are three or more y axes (or x axes), the axes are stacked up on the left (on the bottom). In any case, you specify `yaxis(#)` and `xaxis(#)` to specify which axis applies to which plot.

Also, you may reuse axes:

```
. twoway (scatter gnp year, c(1) yaxis(1))  
        (scatter nnp year, c(1) yaxis(1))  
        (scatter r year, c(1) yaxis(2))  
        (scatter r2 year, c(1) yaxis(2))
```

The above graph has two y axes, one on the left and one on the right. The left axis is used for `gnp` and `nnp`; the right axis is used for `r` and `r2`.

The order in which we type the plots is not significant; the following would result in the same graph,

```
. twoway (scatter gnp year, c(1) yaxis(1))  
        (scatter r year, c(1) yaxis(2))  
        (scatter nnp year, c(1) yaxis(1))  
        (scatter r2 year, c(1) yaxis(2))
```

except that the symbols, colors, and *linestyles* associated with each plot would change.

yaxis(1) and xaxis(1) are the defaults

In the first multiple-axis example,

```
. twoway (scatter gnp year, c(1) yaxis(1))
         (scatter r   year, c(1) yaxis(2))
```

`yaxis(1)` is assumed because we did not specify otherwise. The command is interpreted as if we had typed

```
. twoway (scatter gnp year, c(1) yaxis(1) xaxis(1))
         (scatter r   year, c(1) yaxis(2) xaxis(1))
```

Because `yaxis(1)` is the default, you need not bother to type it. Similarly, because `xaxis(1)` is the default, you could omit typing it, too:

```
. twoway (scatter gnp year, c(1))
         (scatter r   year, c(1) yaxis(2))
```

Notation style is irrelevant

Whether you use the `()`-binding notation or the `||`-separator notation never matters. You could just as well type

```
. scatter gnp year, c(1) || scatter r year, c(1) yaxis(2)
```

yaxis() and xaxis() are plot options

Unlike all the other axis options, `yaxis()` and `xaxis()` are options of the individual plots and not of `twoway` itself. You may not type

```
. scatter gnp year, c(1) || scatter r year, c(1) ||, yaxis(2)
```

because `twoway` would have no way of knowing whether you wanted `yaxis(2)` to apply to the first or to the second `scatter`. Although it is true that how the axes appear is a property of `twoway`—see [G-3] [axis_options](#)—which axes are used for which plots is a property of the plots themselves.

For instance, options `ylabel()` and `xlabel()` are options that specify the major ticking and labeling of an axis (see [G-3] [axis_Label_options](#)). If you want the x axis to have 10 ticks with labels, you can type

```
. scatter gnp year, c(1) ||
   scatter r   year, c(1) yaxis(2) ||, xlabel(#10)
```

and indeed you are “supposed” to type it that way to illustrate your deep understanding that `xlabel()` is a `twoway` option. Nonetheless, you may type

```
. scatter gnp year, c(1) ||
   scatter r   year, c(1) yaxis(2) xlabel(#10)
```

or

```
. scatter gnp year, c(1) xlabel(#10) ||
   scatter r   year, c(1) yaxis(2)
```

because `twoway` can reach inside the individual plots and pull out options intended for it. What `twoway` cannot do is redistribute options specified explicitly as `twoway` back to the individual plots.

Specifying the other axes options with multiple axes

Continuing with our example,

```
. scatter gnp year, c(1) ||
  scatter r   year, c(1) yaxis(2) ||
    , xlabel(#10)
```

say that you also wanted 10 ticks with labels on the first *y* axis and 8 ticks with labels on the second *y* axis. You type

```
. scatter gnp year, c(1) ||
  scatter r   year, c(1) yaxis(2) ||
    , xlabel(#10) ylabel(#10, axis(1)) ylabel(#8, axis(2))
```

Each of the other axis options (see [G-3] *axis_options*) has an `axis(#)` suboption that specifies to which axis the option applies. When you do not specify the suboption, `axis(1)` is assumed.

As always, even though the other axis options are options of `twoway`, you can let them run together with the options of individual plots:

```
. scatter gnp year, c(1) ||
  scatter r   year, c(1) yaxis(2) xlabel(#10) ylabel(#10, axis(1))
    ylabel(#8, axis(2))
```

Each plot may have at most one x scale and one y scale

Each `scatter`, `line`, `connected`, etc.—that is, each plot—may have only one *y* scale and one *x* scale, so you may not type the shorthand

```
. scatter gnp r year, c(1 1) yaxis(1 2)
```

to put `gnp` on one axis and `r` on another. In fact, `yaxis(1 2)` is not an error—we will get to that in the next section—but it will not put `gnp` on one axis and `r` on another. To do that, you must type

```
. twoway (scatter gnp year, c(1) yaxis(1))
  (scatter r   year, c(1) yaxis(2))
```

which, of course, you may type as

```
. scatter gnp year, c(1) yaxis(1) || scatter r year, c(1) yaxis(2)
```

The overall graph may have multiple scales, but the individual plots that appear in it may not.

Special case: Multiple axes with a shared scale

It is sometimes useful to have multiple axes just so that you have extra places to label special values. Consider graphing blood pressure versus concentration of some drug:

```
. scatter bp concentration
```

Perhaps you would like to add a line at `bp = 120` and label that value specially. One thing you might do is

```
. scatter bp concentration, yaxis(1 2) ylabel(120, axis(2))
```

The `ylabel(120, axis(2))` part is explained in [G-3] *axis_Label_options*; it caused the second axis to have the value 120 labeled. The option `yaxis(1 2)` caused there to be a second axis, which you could label. When you specify `yaxis()` (or `xaxis()`) with more than one number, you are specifying that the axes be created sharing the same scale.

To better understand what `yaxis(1 2)` does, compare the results of

```
. scatter bp concentration
```

with

```
. scatter bp concentration, yaxis(1 2)
```

In the first graph, there is one y axis on the left. In the second graph, there are two y axes, one on the left and one on the right, and they are labeled identically.

Now compare

```
. scatter bp concentration
```

with

```
. scatter bp concentration, xaxis(1 2)
```

In the first graph, there is one x axis on the bottom. In the second graph, there are two x axes, one on the bottom and one on the top, and they are labeled identically.

Finally, try

```
. scatter bp concentration, yaxis(1 2) xaxis(1 2)
```

In this graph, there are two y axes and two x axes: left and right, and top and bottom.

Reference

Wiggins, V. L. 2010. [Stata tip 93: Handling multiple y axes on twoway graphs](#). *Stata Journal* 10: 689–690.

Also see

[G-3] [axis_label_options](#) — Options for specifying axis labels

[G-3] [axis_options](#) — Options for specifying numeric axes

[G-3] [axis_scale_options](#) — Options for specifying axis scale, range, and look

[G-3] [axis_title_options](#) — Options for specifying axis titles