

legend_options — Options for specifying legends

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Syntax

<i>legend_options</i>	Description
<code>legend([<i>contents</i>] [<i>location</i>])</code>	standard legend, contents and location
<code>plegend([<i>contents</i>] [<i>location</i>])</code>	contourline legend, contents and location
<code>clegend([<i>suboptions</i>])</code>	contour plot legend; see [G-3] <i>clegend_option</i>

`legend()`, `plegend()`, and `clegend()` are *merged-implicit*; see [G-4] **concept: repeated options**.

where *contents* and *location* specify the contents and the location of the legends.

<i>contents</i>	Description
<code>order(<i>orderinfo</i>)</code>	which keys appear and their order
<code>label(<i>labelinfo</i>)</code>	override text for a key
<code>holes(<i>numlist</i>)</code>	positions in legend to leave blank
<code>all</code>	generate keys for all symbols
<code>style(<i>legendstyle</i>)</code>	overall style of legend
<code>cols(#)</code>	# of keys per line
<code>rows(#)</code>	or # of rows
<code>[no]colfirst</code>	“1, 2, 3” in row 1 or in column 1?
<code>[no]textfirst</code>	symbol-text or text-symbol?
<code>stack</code>	symbol/text vertically stacked
<code>rowgap(<i>relativesize</i>)</code>	gap between lines
<code>colgap(<i>relativesize</i>)</code>	gap between columns
<code>symplacement(<i>compassdirstyle</i>)</code>	alignment/justification of key’s symbol
<code>keygap(<i>relativesize</i>)</code>	gap between symbol-text
<code>symysize(<i>relativesize</i>)</code>	height for key’s symbol
<code>symysize(<i>relativesize</i>)</code>	width for key’s symbol
<code>textwidth(<i>relativesize</i>)</code>	width for key’s descriptive text
<code>forcesize</code>	always respect <code>symysize()</code> , <code>symysize()</code> , and <code>textwidth()</code>
<code>margin(<i>marginstyle</i>)</code>	outer margin around legend
<code>textbox_options</code>	other text characteristics
<code>title_options</code>	titles, subtitles, notes, captions
<code>region(<i>options</i>)</code>	borders and background shading

`order()`, `labels()`, `holes()`, and `all` have no effect on `plegend()`.

See [G-4] ***legendstyle***, [G-4] ***relativesize***, [G-4] ***compassdirstyle***, [G-4] ***marginstyle***, [G-3] ***textbox_options***, and [G-3] ***title_options***.

<i>location</i>	Description
<code>off</code> or <code>on</code>	suppress or force display of legend
<code>position(<i>clockposstyle</i>)</code>	where legend appears
<code>ring(<i>ringposstyle</i>)</code>	where legend appears (detail)
<code>bplacement(<i>compassdirstyle</i>)</code>	placement of legend when positioned in the plotregion
<code>span</code>	“centering” of legend
<code>at(#)</code>	allowed with <code>by()</code> only

See *Where legends appear* under *Remarks and examples* below, and see *Positioning of titles* in [G-3] *titles* for definitions of *clockposstyle* and *ringposstyle*.

orderinfo, the argument allowed by `legend(order())`, is defined as

```
{ # | - } [ "text" [ "text" ... ] ]
```

labelinfo, the argument allowed by `legend(label())`, is defined as

```
# "text" [ "text" ... ]
```

roptions, the arguments allowed by `legend(region())`, include

<i>roptions</i>	Description
<code>style(<i>areastyle</i>)</code>	overall style of region
<code>color(<i>colorstyle</i>)</code>	line + fill color of region
<code>fcolor(<i>colorstyle</i>)</code>	fill color of region
<code>lstyle(<i>linestyle</i>)</code>	overall style of border
<code>lcolor(<i>colorstyle</i>)</code>	color of border
<code>lwidth(<i>linewidthstyle</i>)</code>	thickness of border
<code>lpattern(<i>linepatternstyle</i>)</code>	border pattern (solid, dashed, etc.)
<code>margin(<i>marginstyle</i>)</code>	margin between border and contents of legend

See [G-4] *areastyle*, [G-4] *colorstyle*, [G-4] *linestyle*, [G-4] *linewidthstyle*, [G-4] *linepatternstyle*, and [G-4] *marginstyle*.

Description

The `legend()` option allows you to control the look, contents, and placement of the legend. A sample legend is

o	Observed
————	Linear fit
- - - -	Quadratic fit

The above legend has three *keys*. Each key is composed of a *symbol* and *descriptive text* describing the symbol (whatever the symbol might be, be it a marker, a line, or a color swatch).

`contourline` and `contour` plots have their own legends and do not place keys in the standard legend—`legend()`; see [G-2] **graph twoway contourline** and [G-2] **graph twoway contour**. `contourline` plots place their keys in the `pllegend()` and `contour` plots place their keys in the `clegend()`. The `pllegend()` is similar to the `legend()` and is documented here. The `clegend()` is documented in [G-3] *clegend_option*.

The legend options (more correctly suboptions) are discussed using the `legend()` option, but most apply equally to the `plegend()` option.

Options

`legend(contents, location)` defines the contents of the standard legend, along with how it is to look, and whether and where it is to be displayed.

`plegend(contents, location)` defines the contents of the `contourline` plot legend, along with how it is to look, and whether and where it is to be displayed.

Content suboptions for use with `legend()` and `plegend()`

`order(orderinfo)` specifies which keys are to appear in the legend and the order in which they are to appear.

`order(##...)` is the usual syntax. `order(1 2 3)` would specify that key 1 is to appear first in the legend, followed by key 2, followed by key 3. `order(1 2 3)` is the default if there are three keys. If there were four keys, `order(1 2 3 4)` would be the default, and so on. If there were four keys and you specified `order(1 2 3)`, the fourth key would not appear in the legend. If you specified `order(2 1 3)`, first key 2 would appear, followed by key 1, followed by key 3.

A dash specifies that text be inserted into the legend. For instance, `order(1 2 - "text" 3)` specifies key 1 appear first, followed by key 2, followed by the text `text`, followed by key 3. Imagine that the default key were

o	Observed
————	Linear
-----	Quadratic

Specifying `order(1 - "Predicted:" 2 3)` would produce

o	Observed
	Predicted:
————	Linear
-----	Quadratic

and specifying `order(1 - " " "Predicted:" 2 3)` would produce

o	Observed
	Predicted:
————	Linear
-----	Quadratic

Note carefully the specification of a blank for the first line of the text insertion; we typed " " and not "". Typing "" would insert nothing.

You may also specify quoted text after `#` to override the descriptive text associated with a symbol. Specifying `order(1 "Observed 1992" - " " "Predicted" 2 3)` would change “Observed” in the above to “Observed 1992”. It is considered better style, however, to use the `label()` suboption to relabel symbols.

`order()` has no effect on `plegend()`.

`label(# "text" ["text" ...])` specifies the descriptive text to be displayed next to the `#`th key. Multiline text is allowed. Specifying `label(1 "Observed 1992")` would change the descriptive text associated with the first key to be “Observed 1992”. Specifying `label(1 "Observed" "1992-1993")` would change the descriptive text to contain two lines, “Observed” followed by “1992-1993”.

The descriptive text of only one key may be changed per `label()` suboption. Specify multiple `label()` suboptions when you wish to change the text of multiple keys.

`label()` has no effect on `plegend()`.

`holes(numlist)` specifies where gaps appear in the presentation of the keys. `holes()` has an effect only if the keys are being presented in more than one row and more than one column.

Consider a case in which the default key is

o	Observed	————	Linear fit
— — —	Quadratic fit		

Specifying `holes(2)` would result in

o	Observed		
————	Linear fit	— — —	Quadratic fit

Here `holes(2)` would have the same effect as specifying `order(1 - " " 2 3)`, and as a matter of fact, there is always an `order()` command that will achieve the same result as `holes()`. `order()` has the added advantage of working in all cases.

`holes()` has no effect on `plegend()`.

`all` specifies that keys be generated for all the plots of the graph, even when the same symbol is repeated. The default is to generate keys only when the symbols are different, which is determined by the overall style. For example, in

```
. scatter ylow yhigh x, pstyle(p1 p1) || ...
```

there would be only one key generated for the variables `ylow` and `yhigh` because they share the style `p1`. That single key’s descriptive text would indicate that the symbol corresponded to both variables. If, on the other hand, you typed

```
. scatter ylow yhigh x, pstyle(p1 p1) legend(all) || ...
```

then separate keys would be generated for `ylow` and `yhigh`.

In the above example, do not confuse our use of `scatter`’s option `pstyle()` with `legend()`’s suboption `legend(style())`. The `pstyle()` option sets the overall style for the rendition of the points. `legend()`’s `style()` suboption is documented directly below.

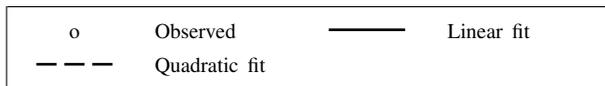
`all` has no effect on `plegend()`.

`style(legendstyle)` specifies the overall look of the legend—whether it is presented horizontally or vertically, how many keys appear across the legend if it is presented horizontally, etc. The options listed below allow you to change each attribute of the legend, but `style()` is the starting point.

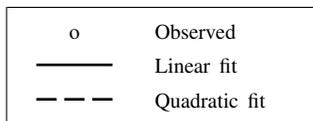
You need not specify `style()` just because there is something you want to change. You specify `style()` when another style exists that is exactly what you desire or when another style would allow you to specify fewer changes to obtain what you want.

See [G-4] *legendstyle* for a list of available legend styles.

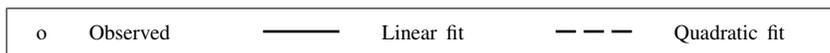
`cols(#)` and `rows(#)` are alternatives; they specify in how many columns or rows (lines) the keys are to be presented. The usual default is `cols(2)`, which means that legends are to take two columns:



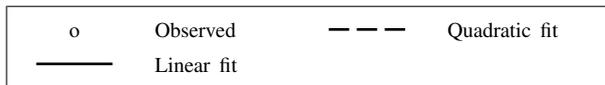
`cols(1)` would force a vertical arrangement,



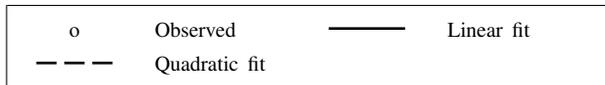
and `rows(1)` would force a horizontal arrangement:



`colfirst` and `nocolfirst` determine whether, when the keys are presented in multiple columns, keys are to read down or to read across, resulting in this



or this

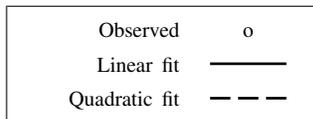


The usual default is `nocolfirst`, so `colfirst` is the option.

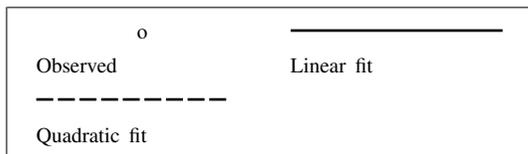
`textfirst` and `notextfirst` specify whether the keys are to be presented as descriptive text followed by the symbol or the symbol followed by descriptive text. The usual default is `notextfirst`, so `textfirst` is the option. `textfirst` produces keys that look like this



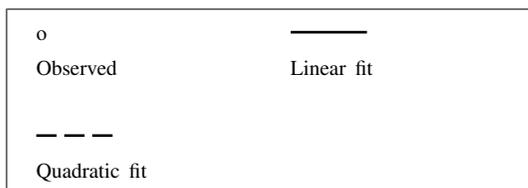
and `textfirst cols(1)` produces



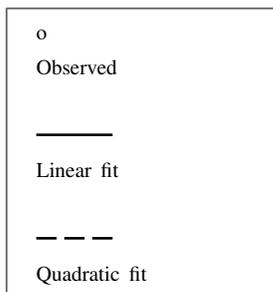
`stack` specifies that the symbol-text be presented vertically with the symbol on top (or with the descriptive text on top if `textfirst` is also specified). `legend(stack)` would produce



`legend(stack symplacement(left) symxsize(13) forcesize rowgap(4))` would produce



`stack` tends to be used to produce single-column keys. `legend(cols(1) stack symplacement(left) symxsize(13) forcesize rowgap(4))` produces

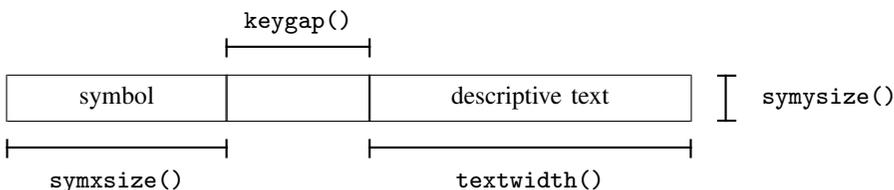


This is the real use of `stack`: to produce narrow, vertical keys.

`rowgap(relativesize)` and `colgap(relativesize)` specify the distance between lines and the distance between columns. The defaults are `rowgap(1.4)` and `colgap(4.9)`. See [G-4] *relativesize*.

`symplacement(compassdirstyle)` specifies how symbols are justified in the key. The default is `symplacement(center)`, meaning that they are vertically and horizontally centered. The two most commonly specified alternatives are `symplacement(right)` (right alignment) and `symplacement(left)` (left alignment). See [G-4] *compassdirstyle* for other alignment choices.

`keygap(relativesize)`, `symysize(relativesize)`, `symxsize(relativesize)`, and `textwidth(relativesize)` specify the height and width to be allocated for the key and the key's symbols and descriptive text:



The defaults are

<code>symxsize()</code>	13
<code>keygap()</code>	2
<code>textwidth()</code>	according to longest descriptive text line
<code>symysize()</code>	according to height of font (*)

(*) The size of the font is set by the `textbox_option size(relativesize)`; see [textbox_options](#) below.

Markers are placed in the symbol area, centered according to `symplacement()`.

Lines are placed in the symbol area vertically according to `symplacement()` and horizontally are drawn to length `symxsize()`.

Color swatches fill the `symysize() × symxsize()` area.

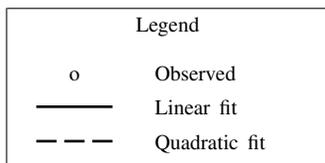
See [G-4] [relativesize](#) for information on specifying relative sizes.

`forcesize` causes the sizes specified by `symysize()` and `symxsize()` to be respected. If `forcesize` is not specified, once all the symbols have been placed for all the keys, the symbol area is compressed (or expanded) to be no larger than necessary to contain the symbols.

`margin(marginstyle)` specifies the outer margin around the legend. That is, it specifies how close other things appearing near to the legend can get. Also see `suboption margin()` under [Suboptions for use with legend\(region\(\)\)](#) below for specifying the inner margin between the border and contents. See [G-4] [marginstyle](#) for a list of margin choices.

`textbox_options` affect the rendition of the descriptive text associated with the keys. These are described in [G-3] [textbox_options](#). One of the most commonly specified `textbox_options` is `size(relativesize)`, which specifies the size of font to be used for the descriptive text.

`title_options` allow placing titles, subtitles, notes, and captions on legends. For instance, `legend(col(1) subtitle("Legend"))` produces



Note our use of `subtitle()` and not `title()`; `title()`s are nearly always too big. See [G-3] [title_options](#).

`region(roptions)` specifies the border and shading of the legend. You could remove the border around the legend by specifying `legend(region(lstyle(none)))` (thus doing away with the line) or `legend(region(lcolor(none)))` (thus making the line invisible). You could also give the legend a gray background tint by specifying `legend(region(fcolor(gs5)))`. See [Suboptions for use with legend\(region\(\)\)](#) below.

Suboptions for use with legend(region())

`style(areastyle)` specifies the overall style of the region in which the legend appears. The other suboptions allow you to change the region's attributes individually, but `style()` provides the starting point. See [G-4] [areastyle](#) for a list of choices.

`color(colorstyle)` specifies the color of the background of the legend and the line used to outline it. See [G-4] *colorstyle* for a list of color choices.

`fill(colorstyle)` specifies the background (fill) color for the legend. See [G-4] *colorstyle* for a list of color choices.

`lstyle(linestyle)` specifies the overall style of the line used to outline the legend, which includes its pattern (solid, dashed, etc.), its thickness, and its color. The other suboptions listed below allow you to change the line's attributes individually, but `lstyle()` is the starting point. See [G-4] *linestyle* for a list of choices.

`lcolor(colorstyle)` specifies the color of the line used to outline the legend. See [G-4] *colorstyle* for a list of color choices.

`linewidth(linewidthstyle)` specifies the thickness of the line used to outline the legend. See [G-4] *linewidthstyle* for a list of choices.

`lpattern(linepatternstyle)` specifies whether the line used to outline the legend is solid, dashed, etc. See [G-4] *linepatternstyle* for a list of choices.

`margin(marginstyle)` specifies the inner margin between the border and the contents of the legend. Also see `bmargin()` under *Content suboptions for use with legend() and plegend()* above for specifying the outer margin around the legend. See [G-4] *marginstyle* for a list of margin choices.

Location suboptions for use with legend()

`off` and `on` determine whether the legend appears. The default is `on` when more than one symbol (meaning marker, line style, or color swatch) appears in the legend. In those cases, `legend(off)` will suppress the display of the legend.

`position(clockposstyle)`, `ring(ringposstyle)`, and `bplacement(compassdirstyle)` override the default location of the legend, which is usually centered below the plot region. `position()` specifies a direction [*sic*] according to the hours on the dial of a 12-hour clock, and `ring()` specifies the distance from the plot region.

`ring(0)` is defined as being inside the plot region itself and allows you to place the legend inside the plot. `ring(k)`, $k > 0$, specifies positions outside the plot region; the larger the `ring()` value, the farther away from the plot region the legend is. `ring()` values may be integers or nonintegers and are treated ordinally.

When `ring(0)` is specified, `bplacement()` further specifies where in the plot region the legend is placed. `bplacement(seast)` places the legend in the southeast (lower-right) corner of the plot region.

`position(12)` puts the legend directly above the plot region (assuming `ring() > 0`), `position(3)` directly to the right of the plot region, and so on.

See *Where legends appear* under *Remarks and examples* below and *Positioning of titles* in [G-3] *title_options* for more information on the `position()` and `ring()` suboptions.

`span` specifies that the legend be placed in an area spanning the entire width (or height) of the graph rather than an area spanning the plot region. This affects whether the legend is centered with respect to the plot region or the entire graph. See *Spanning* in [G-3] *title_options* for more information on `span`.

`at(#)` is for use only when the *twoway_option* `by()` is also specified. It specifies that the legend appear in the `#`th position of the $R \times C$ array of plots, using the same coding as `by(..., holes())`. See *Use of legends with by()* under *Remarks and examples* below, and see [G-3] *by_option*.

Remarks and examples

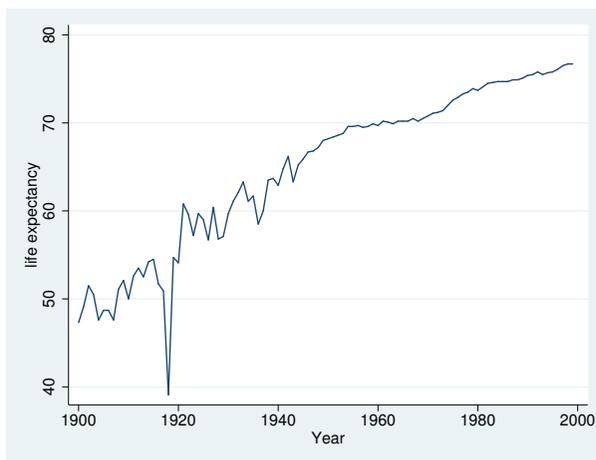
Remarks are presented under the following headings:

When legends appear
The contents of legends
Where legends appear
Putting titles on legends
Use of legends with by()
Problems arising with or because of legends

When legends appear

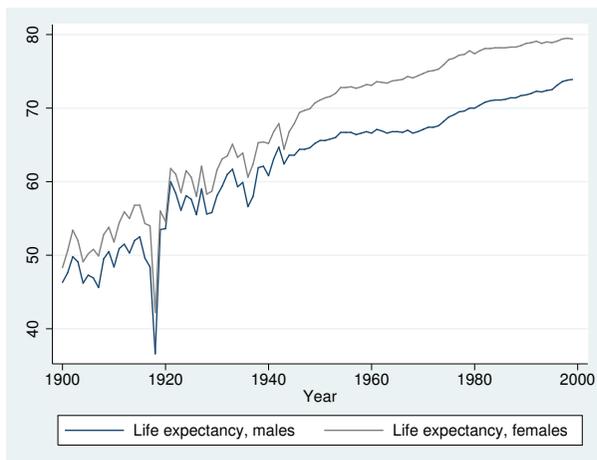
Standard legends appear on the graph whenever more than one symbol is used, where symbol is broadly defined to include markers, lines, and color swatches (such as those used to fill bars). When you draw a graph with only one symbol on it, such as

```
. use http://www.stata-press.com/data/r13/uslifeexp
(U.S. life expectancy, 1900-1999)
. line le year
```



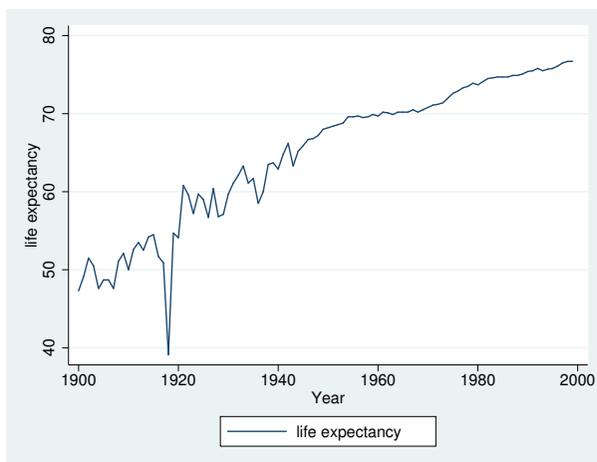
no legend appears. When there is more than one symbol, a legend is added:

```
. line le_m le_f year
```



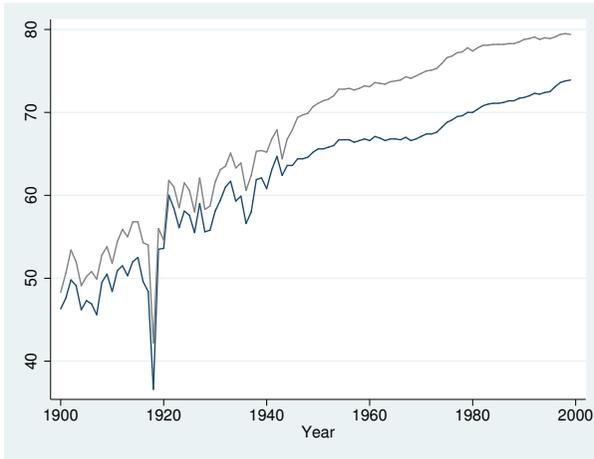
Even when there is only one symbol, a legend is constructed. It is merely not displayed. Specifying `legend(on)` forces the display of the legend:

```
. line le year, legend(on)
```



Similarly, when there is more than one symbol and you do not want the legend, you can specify `legend(off)` to suppress it:

```
. line le_m le_f year, legend(off)
```



A `pllegend()` appears on any graph that includes a `contourline` plot.

The contents of legends

By default, the descriptive text for legends is obtained from the variable's variable label; see [\[D\] label](#). If the variable has no variable label, the variable's name is used. In

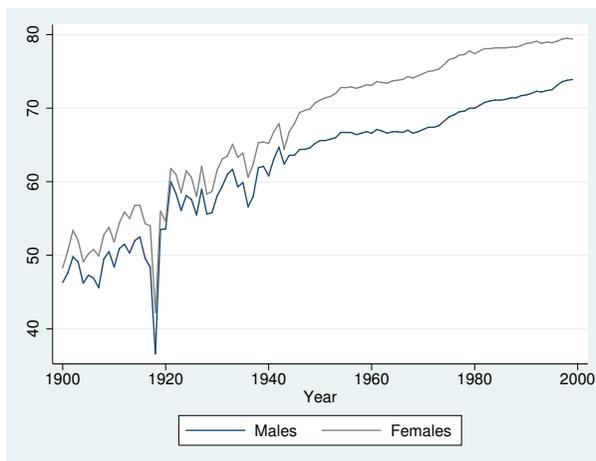
```
. line le_m le_f year
```

the variable `le_m` had previously been labeled "Life expectancy, males", and the variable `le_f` had been labeled "Life expectancy, females". In the legend of this graph, repeating "life expectancy" is unnecessary. The graph would be improved if we changed the labels on the variables:

```
. label var le_m "Males"
. label var le_f "Females"
. line le_m le_f year
```

We can also specify the `label()` suboption to change the descriptive text. We obtain the same visual result without relabeling our variables:

```
. line le_m le_f year, legend(label(1 "Males") label(2 "Females"))
```



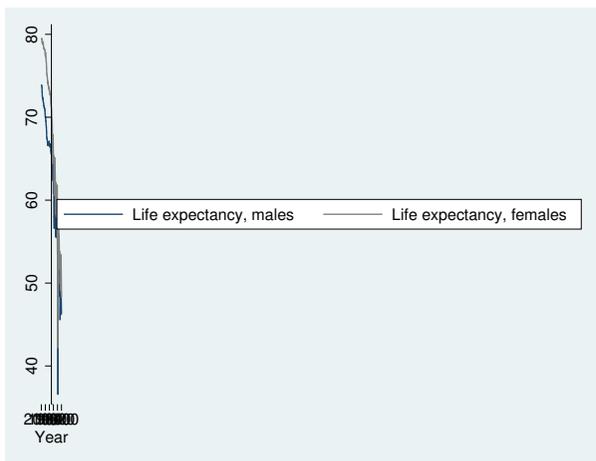
The descriptive text for `contourline` legends is the values for the contour lines of the z variable.

Where legends appear

By default, standard legends appear beneath the plot, centered, at what is technically referred to as `position(6) ring(3)`. By default, `plegends()` appear to the right of the plot region at `position(3) ring(4)`. Suboptions `position()` and `ring()` specify the location of the legend. `position()` specifies on which side of the plot region the legend appears—`position(6)` means 6 o'clock—and `ring()` specifies the distance from the plot region—`ring(3)` means farther out than the `title_option b2title()` but inside the `title_option note()`; see [G-3] [title_options](#).

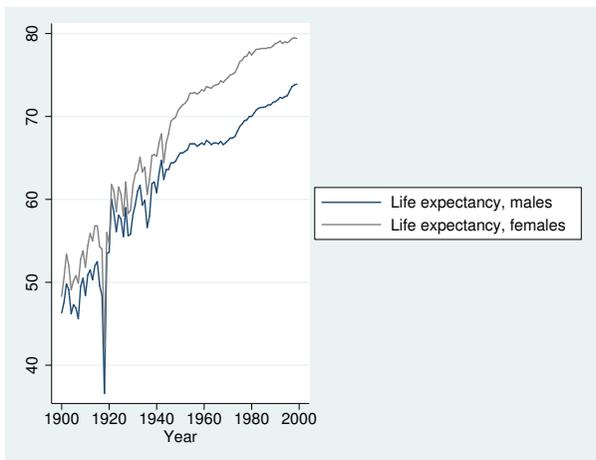
If we specify `legend(position(3))`, the legend will be moved to the 3 o'clock position:

```
. line le_m le_f year, legend(pos(3))
```



This may not be what we desired, but it is what we asked for. The legend was moved to the right of the graph and, given the size of the legend, the graph was squeezed to fit. When you move legends to the side, you invariably also want to specify the `col(1)` option:

```
. line le_m le_f year, legend(pos(3) col(1))
```



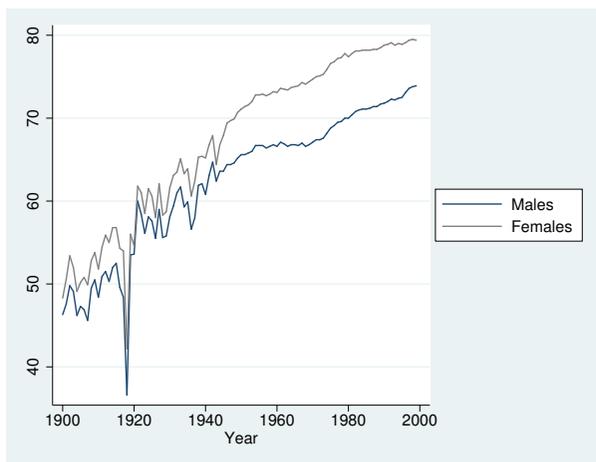
As a matter of syntax, we could have typed the above command with two `legend()` options

```
. line le_m le_f year, legend(pos(3)) legend(col(1))
```

instead of one combined: `legend(pos(3) col(1))`. We would obtain the same results either way.

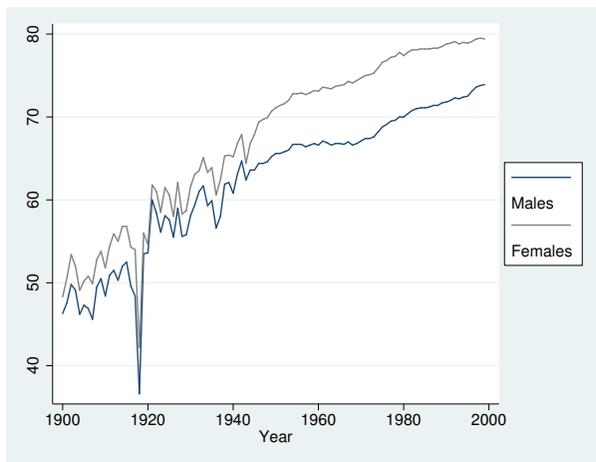
If we ignore the syntax, the above graph would look better with less-descriptive text,

```
. line le_m le_f year, legend(pos(3) col(1)
    lab(1 "Males") lab(2 "Females"))
```



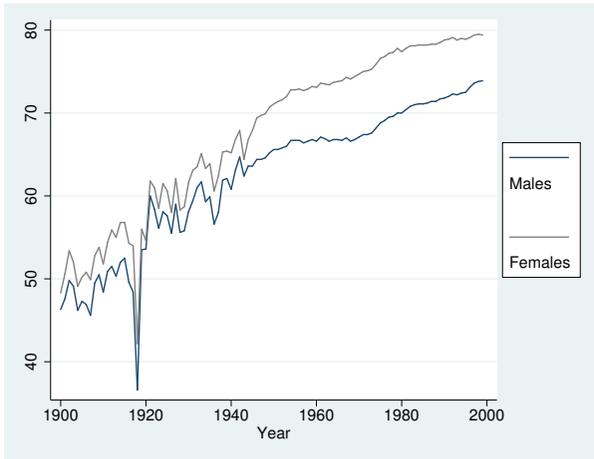
and we can further reduce the width required by the legend by specifying the stack suboption:

```
. line le_m le_f year, legend(pos(3) col(1)
    lab(1 "Males") lab(2 "Females") stack)
```



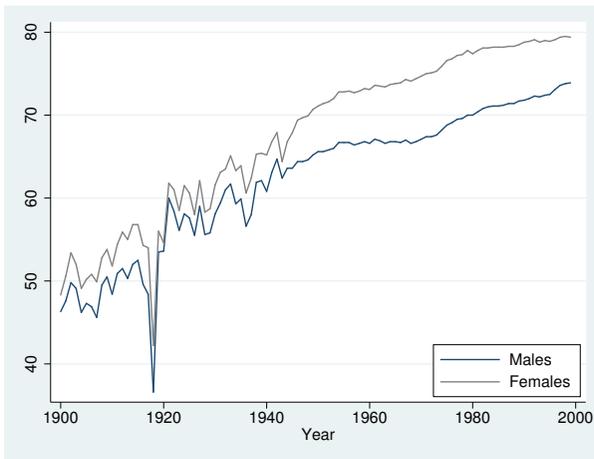
We can make this look better by placing a blank line between the first and second keys:

```
. line le_m le_f year, legend(pos(3) col(1)
    lab(1 "Males") lab(2 "Females") stack
    order(1 - " " 2))
```



`ring()`—the suboption that specifies the distance from the plot region—is seldom specified, but, when it is specified, `ring(0)` is the most useful. `ring(0)` specifies that the legend be moved inside the plot region:

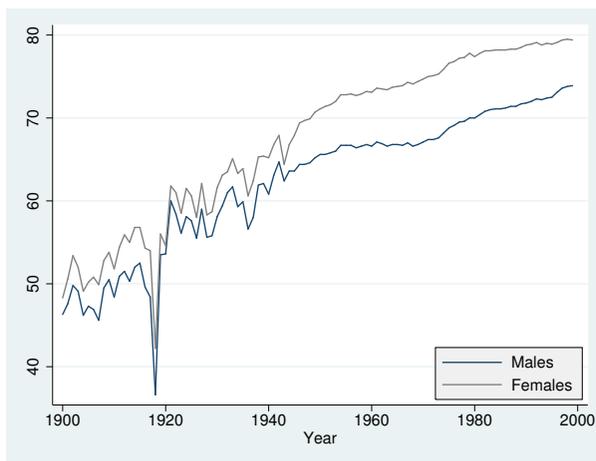
```
. line le_m le_f year, legend(pos(5) ring(0) col(1)
    lab(1 "Males") lab(2 "Females"))
```



Our use of `position(5) ring(0)` put the legend inside the plot region, at 5 o'clock, meaning in the bottom right corner. Had we specified `position(2) ring(0)`, the legend would have appeared in the top left corner.

We might now add some background color to the legend:

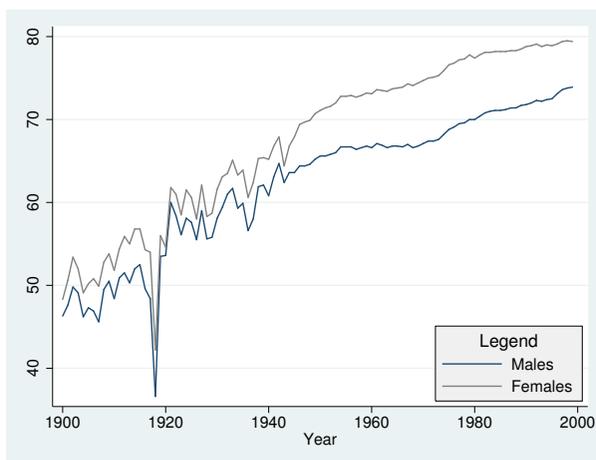
```
. line le_m le_f year, legend(pos(5) ring(0) col(1)
    lab(1 "Males") lab(2 "Females")
    region(fcolor(gs15)))
```



Putting titles on legends

Legends may include titles:

```
. line le_m le_f year, legend(pos(5) ring(0) col(1)
    lab(1 "Males") lab(2 "Females")
    region(fcolor(gs15)))
    legend(subtitle("Legend"))
```



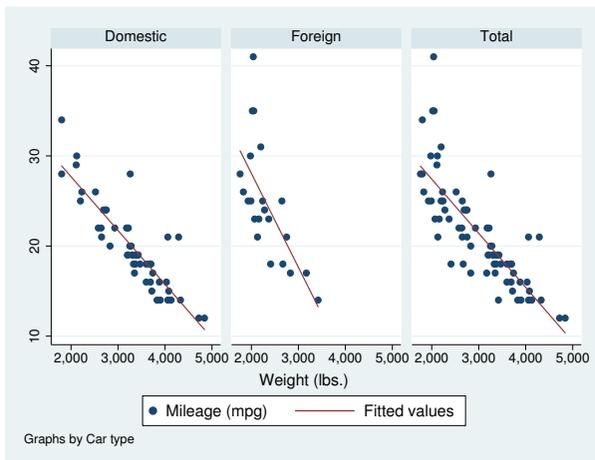
Above we specified `subtitle()` rather than `title()` because, when we tried `title()`, it seemed too big.

Legends may also contain `notes()` and `captions()`; see [\[G-3\] *title_options*](#).

Use of legends with by()

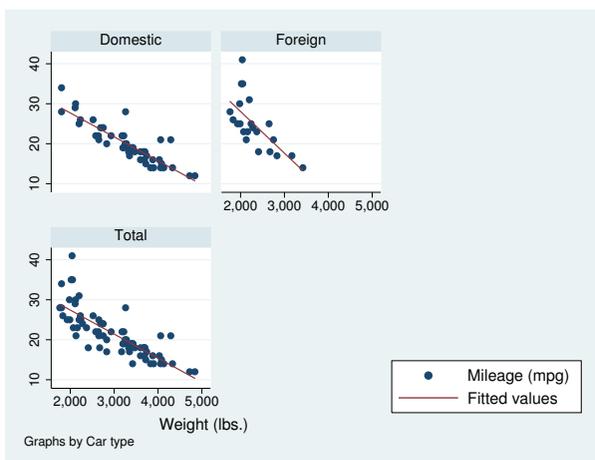
If you want the legend to be located in the default location, no special action need be taken when you use by():

```
. use http://www.stata-press.com/data/r13/auto, clear
(1978 Automobile Data)
. scatter mpg weight || lfit mpg weight ||, by(foreign, total row(1))
```



If, however, you wish to move the legend, you must distinguish between `legend(contents)` and `legend(location)`. The former must appear outside the `by()`. The latter appears inside the `by()`:

```
. scatter mpg weight || lfit mpg weight ||,
  legend(cols(1))
  by(foreign, total legend(pos(4)))
```



`legend(col(1))` was placed in the command just where we would place it had we not specified `by()` but that `legend(pos(4))` was moved to be inside the `by()` option. We did that because the `cols()` suboption is documented under *contents* in the syntax diagram, whereas `position()` is documented under *location*. The logic is that, at the time the individual plots are constructed, they must know what style of key they are producing. The placement of the key, however, is something

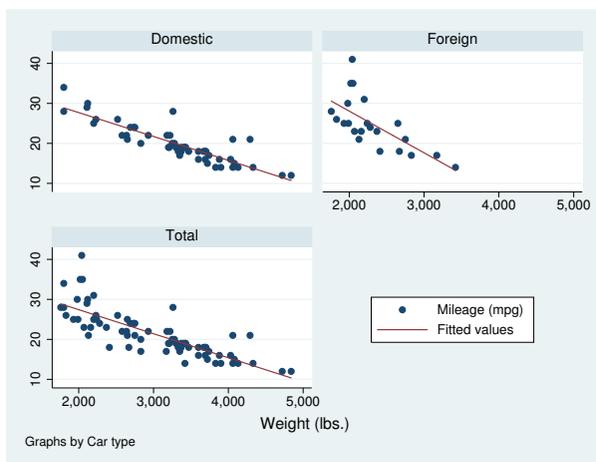
that happens when the overall graph is assembled, so you must indicate to `by()` where the key is to be placed. Were we to forget this distinction and simply to type

```
. scatter mpg weight || lfit mpg weight ||,
    legend(cols(1) pos(4))
    by(foreign, total)
```

the `cols(1)` suboption would have been ignored.

Another *location* suboption is provided for use with `by()`: `at(#)`. You specify this option to tell `by()` to place the legend inside the $R \times C$ array it creates:

```
. scatter mpg weight || lfit mpg weight ||,
    legend(cols(1))
    by(foreign, total legend(at(4) pos(0)))
```



In the above, we specified `at(4)` to mean that the key was to appear in the fourth position of the 2×2 array, and we specified `pos(0)` to move the key to the middle (0 o'clock) position within the cell.

If you wish to suppress the legend, you must specify the `legend(off)` inside the `by()` option:

```
. scatter mpg weight || lfit mpg weight ||,
    by(foreign, total legend(off))
```

Problems arising with or because of legends

There are two potential problems associated with legends:

1. Text may flow outside the border of the legend box.
2. The presence of the legend may cause the title of the y axis to run into the values labeled on the axis.

The first problem arises because Stata uses an approximation to obtain the width of a text line. The solution is to specify the `width(relativesize)` *textbox_option*:

```
. graph ..., ... legend(width(#))
```

See *Use of the `textbox` option `width()`* in [G-3] *added_text_options*.

The second problem arises when the key is in its default `position(6)` (6 o'clock) location and the descriptive text for one or more of the keys is long. In `position(6)`, the borders of the key are supposed to line up with the borders of the plot region. Usually the plot region is wider than the key, so the key is expanded to fit below it. When the key is wider than the plot region, however, it is the plot region that is widened. As the plot region expands, it will eat away at whatever is at its side, namely, the y axis labels and title. Margins will disappear. In extreme cases, the title will be printed on top of the labels, and the labels themselves may end up on top of the axis!

The solution to this problem is to shorten the descriptive text, either by using fewer words or by breaking the long description into multiple lines. Use the `legend(label(# "text"))` option to modify the longest line of the descriptive text.

Also see

[G-3] *title_options* — Options for specifying titles