

**bicplot** — Plot Bayesian information criterion function after lasso

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## Description

`bicplot` graphs the Bayesian information criterion (BIC) function after a lasso fit.

`bicplot` can be used after `lasso`, `elasticnet`, `sqrtlasso`, `telasso`, or any of the lasso inference commands.

## Quick start

Graph the BIC function after `lasso`, `sqrtlasso`, or `elasticnet`

```
bicplot
```

Graph the BIC function after `elasticnet` for  $\alpha = 0.5$

```
bicplot, alpha(.5)
```

After any of the `ds` or `po` commands, graph the BIC function for the dependent variable `y`

```
bicplot, for(y)
```

After an `xpo` command without option `resample`, graph the BIC function for `x` in cross-fit fold 2

```
bicplot, for(x) xfold(2)
```

After an `xpo` command with `resample`, graph the BIC function for `x` in cross-fit fold 2 for the first resample

```
bicplot, for(x) xfold(2) resample(1)
```

Same as above, but graph the BIC function as a function of the  $\ell_1$ -norm of the standardized coefficient vector

```
bicplot, for(x) xfold(2) resample(1) xunits(l1norm)
```

After `telasso`, graph the BIC function for the outcome variable `y` at treatment level 1

```
bicplot, for(y) tlevel(1)
```

## Menu

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## Syntax

After `lasso`, `sqrlasso`, and `elasticnet`

```
bicplot [ , options ]
```

After `ds` and `po` commands

```
bicplot, for(varspec) [ options ]
```

After `xpo` commands without `resample`

```
bicplot, for(varspec) xfold(#) [ options ]
```

After `xpo` commands with `resample`

```
bicplot, for(varspec) xfold(#) resample(#) [ options ]
```

After `telasso` for the outcome variable

```
bicplot, for(varspec) tlevel(#) [ options ]
```

After `telasso` for the treatment variable

```
bicplot, for(varspec) [ options ]
```

After `telasso` for the outcome variable with cross-fitting but without `resample`

```
bicplot, for(varspec) tlevel(#) xfold(#) [ options ]
```

After `telasso` for the treatment variable with cross-fitting but without `resample`

```
bicplot, for(varspec) xfold(#) [ options ]
```

After `telasso` for the outcome variable with cross-fitting and `resample`

```
bicplot, for(varspec) tlevel(#) xfold(#) resample(#) [ options ]
```

After `telasso` for the treatment variable with cross-fitting and `resample`

```
bicplot, for(varspec) xfold(#) resample(#) [ options ]
```

*varspec* is *varname*, except after `poivregress` and `xpoivregress`, when it is either *varname* or `pred(varname)`.

<i>options</i>	Description
Main	
<code>xunits(<i>x_unit_spec</i>)</code>	<i>x</i> -axis units (scale); default is <code>xunits(rlnlambda)</code> , where <code>rlnlambda</code> denotes $\lambda$ on a reverse logarithmic scale
<code>minmax</code>	add labels for the minimum and maximum <i>x</i> -axis units
<code>*for(<i>varspec</i>)</code>	lasso for <i>varspec</i> ; <code>telasso</code> , <code>ds</code> , <code>po</code> , and <code>xpo</code> commands only
<code>*xfold(#)</code>	lasso for the <i>#</i> th cross-fit fold; <code>xpo</code> commands and <code>telasso</code> with <code>xfolds</code> only
<code>*resample(#)</code>	lasso for the <i>#</i> th resample; <code>xpo</code> commands and <code>telasso</code> with <code>resample</code> only
<code>*tlevel(#)</code>	lasso for the outcome model with the treatment level <i>#</i> ; <code>telasso</code> only
<code>alpha(#)</code>	graph BIC function for $\alpha = \#$ ; default is the selected value $\alpha^*$ ; allowed after <code>elasticnet</code> only
<code>lineopts(<i>cline_options</i>)</code>	affect rendition of the plotted lines
Reference lines	
<code>biclineopts(<i>xline_options</i>)</code>	affect rendition of reference line identifying the minimum of the BIC function or other stopping rule
<code>nobicline</code>	suppress reference line identifying the minimum of the BIC function or other stopping rule
<code>lslineopts(<i>xline_options</i>)</code>	affect rendition of reference line identifying the value selected using <code>lassoselect</code>
<code>nolsline</code>	suppress reference line identifying the value selected using <code>lassoselect</code>
<code>rlabelopts(<i>r_label_opts</i>)</code>	change look of labels for reference line
Data	
<code>data(<i>filename</i> [, <i>replace</i>])</code>	save plot data to <i>filename</i>
Y axis, X axis, Titles, Legend, Overall	
<code>twoway_options</code>	any options other than <code>by()</code> documented in <a href="#">[G-3] twoway_options</a>

\*`for(varspec)` is required for all `ds`, `po`, and `xpo` commands and for `telasso`.  
`xfold(#)` is required for all `xpo` commands and for `telasso` when the option `xfolds(#)` was specified.  
`resample(#)` is required for `xpo` and for `telasso` when the option `resample(#)` was specified.  
`tlevel(#)` is required for the outcome model in `telasso`.

<i>x_unit_spec</i>	Description
<code>rlnlambda</code>	$\lambda$ on a reverse logarithmic scale; the default
<code>lnlambda</code>	$\lambda$ on a logarithmic scale
<code>l1norm</code>	$\ell_1$ -norm of standardized coefficient vector
<code>l1normraw</code>	$\ell_1$ -norm of unstandardized coefficient vector

<i>xline_options</i>	Description
<code>style(<i>addedlinestyle</i>)</code>	overall style of added line
<code>[no]extend</code>	[do not] extend line through plot region's margins
<code>lstyle(<i>linestyle</i>)</code>	overall style of line
<code>lpattern(<i>linepatternstyle</i>)</code>	line pattern (solid, dashed, etc.)
<code>lwidth(<i>linewidthstyle</i>)</code>	thickness of line
<code>lcolor(<i>colorstyle</i>)</code>	color and opacity of line

  

<i>r_label_opts</i>	Description
<code>labgap(<i>size</i>)</code>	margin between tick and label
<code>labstyle(<i>textstyle</i>)</code>	overall style of label
<code>labsize(<i>textsizestyle</i>)</code>	size of label
<code>labcolor(<i>colorstyle</i>)</code>	color and opacity of label

## Options

### Main

`xunits(x_unit_spec)` specifies the  $x$ -axis units used for graphing the BIC function. The following *x\_unit\_specs* are available:

`rlnlambda` specifies  $x$ -axis units  $\lambda$  on a reverse logarithmic scale. This is the default.

`lnlambda` specifies  $x$ -axis units  $\lambda$  on a logarithmic scale.

`l1norm` specifies  $x$ -axis units  $\ell_1$ -norm of the standardized coefficient vector.

`l1normraw` specifies  $x$ -axis units  $\ell_1$ -norm of the unstandardized coefficient vector.

`minmax` adds labels for the minimum and maximum  $x$ -axis units to the graph of the BIC function.

`for(varspec)` specifies a particular lasso after `telasso` or a `ds`, `po`, or `xpo` estimation command fit using the option `selection(bic)`. For all commands except `poivregr` and `xpoivregr`, *varspec* is always *varname*; it is either *depvar*, the dependent variable, or one of *varsofinterest* for which inference is done.

For `poivregr` and `xpoivregr`, *varspec* is either *varname* or `pred(varname)`. The lasso for *depvar* is specified with its *varname*. For the endogenous variable *varname*, there are two lassos, which can be identified by *varname* and `pred(varname)`. The exogenous variables of interest each have only one lasso, and it is specified by `pred(varname)`.

This option is required after `ds`, `po`, and `xpo` commands.

`xfold(#)` specifies a particular lasso after an `xpo` estimation command. For each variable to be fit with a lasso,  $K$  lassos are done, one for each cross-fit fold, where  $K$  is the number of folds. This option specifies which fold, where  $\# = 1, 2, \dots, K$ . `xfold(#)` is required after an `xpo` command.

`resample(#)` specifies a particular lasso after an `xpo` estimation command fit using the option `resample(#)`. For each variable to be fit with a lasso,  $R \times K$  lassos are done, where  $R$  is the number of resamples and  $K$  is the number of cross-fitting folds. This option specifies which resample, where  $\# = 1, 2, \dots, R$ . `resample(#)`, along with `xfold(#)`, is required after an `xpo` command with resampling.

`tlevel(#)` specifies the lasso for the outcome variable at the specified treatment level after `telasso`.

This option is required to refer to the outcome model after `telasso`.

`alpha(#)` graphs the BIC function for  $\alpha = \#$ . The default is `alpha( $\alpha^*$ )`, where  $\alpha^*$  is the selected  $\alpha$ . `alpha(#)` may only be specified after `elasticnet`.

`lineopts(cline_options)` affects the rendition of the plotted line. See [G-3] [cline\\_options](#).

#### Reference lines

`biclineopts(xline_options)` affects the rendition of the reference line identifying the minimum BIC value, the value selected when the stopping tolerance is reached, or the grid-minimum value.

*xline\_options* are the following: `style(addedlinestyle)`, `noextend`, `lstyle(linestyle)`, `lpattern(linepatternstyle)`, `lwidth(linewidthstyle)`, and `lcolor(colorstyle)`. They specify how the reference line identifying the minimum BIC value is presented. See [G-4] [addedlinestyle](#), [G-4] [linestyle](#), [G-4] [linepatternstyle](#), [G-4] [linewidthstyle](#), and [G-4] [colorstyle](#).

`nobicline` suppresses the reference line identifying the minimum BIC value, the value selected when either the stopping tolerance or the grid-minimum value is reached.

`lslineopts(xline_options)` affects the rendition of the reference line identifying the value selected using `lassoselect`.

*xline\_options* are the following: `style(addedlinestyle)`, `noextend`, `lstyle(linestyle)`, `lpattern(linepatternstyle)`, `lwidth(linewidthstyle)`, and `lcolor(colorstyle)`. They specify how the reference line identifying the value selected using `lassoselect` is presented. See [G-4] [addedlinestyle](#), [G-4] [linestyle](#), [G-4] [linepatternstyle](#), [G-4] [linewidthstyle](#), and [G-4] [colorstyle](#).

`nolsline` suppresses the reference line identifying the value selected using `lassoselect`.

`rlabelopts(r_label_opts)` changes the look of labels for the reference line. The label options `labgap(relativesize)`, `labstyle(textstyle)`, `labsize(textsizestyle)`, and `labcolor(colorstyle)` specify details about how the labels are presented. See [G-4] [size](#), [G-4] [textstyle](#), [G-4] [textsizestyle](#), and [G-4] [colorstyle](#).

#### Data

`data(filename [, replace])` saves the plot data to a Stata data file.

#### Y axis, X axis, Titles, Legend, Overall

*twoway\_options* are any of the options documented in [G-3] [twoway\\_options](#), excluding `by()`. These include options for titling the graph (see [G-3] [title\\_options](#)) and options for saving the graph to disk (see [G-3] [saving\\_option](#)).

## Remarks and examples

[stata.com](http://www.stata.com)

BIC plots graph the BIC function over the search grid for the lasso penalty parameter  $\lambda$ .

The search grid can be shown as the log of the lasso penalty parameter  $\lambda$ , `xunits(lnlambda)`; the reverse of that scale, `xunits(rlnlambda)`; the  $\ell_1$ -norm of the standardized coefficients, `xunits(l1norm)`; or the  $\ell_1$ -norm of the unstandardized coefficients, `xunits(l1normraw)`. The reverse log of lambda is the default because it represents the BIC search path over  $\lambda$ , with the first  $\lambda$  tried on the left and the last  $\lambda$  tried on the right.

BIC plots can be drawn after any command that directly searches over a grid of  $\lambda$ 's. They can be drawn after the commands `lasso`, `elasticnet`, `sqrtlasso`, `telasso`, or any of the 11 lasso inference commands.

Examples that demonstrate how to use `bicplot` after the `lasso` command can be found in *BIC* in [\[LASSO\] lasso examples](#).

### Also see

[\[LASSO\] lasso inference postestimation](#) — Postestimation tools for lasso inferential models

[\[LASSO\] lasso postestimation](#) — Postestimation tools for lasso for prediction

[\[CAUSAL\] telasso postestimation](#) — Postestimation tools for `telasso`

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