bicplot — Plot Bayesian information criterion function after lasso

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)

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

Statistics > Postestimation
Syntax

After lasso, sqrtlasso, 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).
### Options

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

*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.

### x_unit_spec

<table>
<thead>
<tr>
<th>Description</th>
<th>x_unit_spec</th>
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</thead>
<tbody>
<tr>
<td>( \lambda ) on a reverse logarithmic scale; the default</td>
<td>rlnlambda</td>
</tr>
<tr>
<td>( \lambda ) on a logarithmic scale</td>
<td>lnlambda</td>
</tr>
<tr>
<td>( \ell_1 )-norm of standardized coefficient vector</td>
<td>l1norm</td>
</tr>
<tr>
<td>( \ell_1 )-norm of unstandardized coefficient vector</td>
<td>l1normraw</td>
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xline_options

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
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<tbody>
<tr>
<td><code>style(addedlinestyle)</code></td>
<td>overall style of added line</td>
</tr>
<tr>
<td><code>[no] extend</code></td>
<td>[do not] extend line through plot region’s margins</td>
</tr>
<tr>
<td><code>lstyle(linestyle)</code></td>
<td>overall style of line</td>
</tr>
<tr>
<td><code>lpattern(linepatternstyle)</code></td>
<td>line pattern (solid, dashed, etc.)</td>
</tr>
<tr>
<td><code>lwidth(linepatternstyle)</code></td>
<td>thickness of line</td>
</tr>
<tr>
<td><code>lcolor(colorstyle)</code></td>
<td>color and opacity of line</td>
</tr>
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</table>

r_label_opts

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td><code>labgap(size)</code></td>
<td>margin between tick and label</td>
</tr>
<tr>
<td><code>labstyle(textstyle)</code></td>
<td>overall style of label</td>
</tr>
<tr>
<td><code>labsize(textsizestyle)</code></td>
<td>size of label</td>
</tr>
<tr>
<td><code>labcolor(colorstyle)</code></td>
<td>color and opacity of label</td>
</tr>
</tbody>
</table>

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 `poivregress` and `xpoivregress`, `varspec` is always `varname`; it is either `depvar`, the dependent variable, or one of `varsofinterest` for which inference is done.

For `poivregress` and `xpoivregress`, `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 $# = 1, 2, \ldots, K$. `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 $# = 1, 2, \ldots, R$. `resample(#), along with xfold(#), is required after an xpo command with resampling.
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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`.

`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.


`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`.


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


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

`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

**bicplot** 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 \texttt{lasso}, \texttt{elasticnet}, \texttt{sqrtlasso}, \texttt{telasso}, or any of the 11 lasso inference commands.

Examples that demonstrate how to use \texttt{bicplot} after the \texttt{lasso} command can be found in \textit{BIC} in \cite{llasso} \texttt{lasso examples}.

\section*{Also see}

\begin{itemize}
\item \cite{llasso} \texttt{lasso inference postestimation} — Postestimation tools for lasso inferential models
\item \cite{llasso} \texttt{lasso postestimation} — Postestimation tools for lasso for prediction
\item \cite{telasso} \texttt{telasso postestimation} — Postestimation tools for telasso
\end{itemize}