Statistics/Data analysis

Title

kdbwselect —— Bandwidth Selection Procedures for Kernel Density Estimation and Inference.

Syntax

kdbwselect *varname* [*if*] [*in*] [, **eval(***gridvar***) neval(***#***) rho(***#***) kernel(***kernelfn***) bwselect(***bwmethod***) bwcheck(***#***) imsegrid(***#***) separator(***#***)**]

Description

kdbwselect implements bandwidth selectors for kernel density point estimators and inference procedures developed in Calonico, Cattaneo and Farrell (2018). See also Calonico, Cattaneo and Farrell (2020) for related optimality results. It also implements other bandwidth selectors available in the literature. See Wand and Jones (1995) and Fan and Gijbels (1996) for background references.

A detailed introduction to this command is given in Calonico, Cattaneo and Farrell (2019).

Companion command is: kdrobust for point estimation and inference procedures.

Related Stata and R packages useful for empirical analysis are described in the following website:

https://nppackages.github.io/

Options

eval(*gridvar*) specifies the grid of evaluation points for *xvar*. By default it uses 30 equally spaced points over to support of *xvar*.

neval(#) specifies the number of evaluation points to estimate the regression functions. Default is 30 evaluation points.

rho(#) specifies the value of *rho*, so that the bias bandwidth *b* equals *b=h/rho*. Default is **rho(***1***)** if *h* is specified but *b* is not.

kernel(*kernelfn*) specifies the kernel function used. Options are: **epanechnikov**, and **uniform**. Default is **kernel(***epanechnikov***)**.

bwselect(*bwmethod*) bandwidth selection procedure to be used. By default it computes both h and b, unless rho is specified, in which case it only computes h and sets b=h/rho. Options are:
mse-dpi second-generation DPI implementation of MSE-optimal bandwidth. Default choice.
mse-rot ROT implementation of MSE-optimal bandwidth.
imse-dpi second-generation DPI implementation of IMSE-optimal bandwidth.
imse-rot ROT implementation of IMSE-optimal bandwidth.
ce-dpi second generation DPI implementation of CE-optimal bandwidth.
ce-rot ROT implementation of CE-optimal bandwidth.
Note: MSE = Mean Square Error; IMSE = Integrated Mean Squared Error; CE = Coverage Error; DPI = Direct Plug-in; ROT = Rule-of-Thumb.
Default is **bwselect(***mse-dpi***)**. For details on implementation see Calonico, Cattaneo and Farrrell (2019).

bwcheck(#) specifies an optional positive integer so that the selected bandwidth is enlarged to have at least # effective observations available at each evaluation point.

imsegrid(#) number of evaluations points used to compute the IMSE bandwidth selector. Default is 30 points.

separator(#) draws separator line after every # variables; default is separator(5).

Example:

Setup
```
. sysuse auto
```

MSE bandwidth selection procedure
```
. kdbwselect length
```

Saved results

kdbwselect saves the following in **e()**:

Scalars

e(N)	original number of observations

Macros

e(varname)	name of variable
e(bwselect)	bandwidth selection choice
e(kernel)	kernel choice

Matrices

e(bws)	estimation result

References

Calonico, S., M. D. Cattaneo, and M. H. Farrell. 2018. On the Effect of Bias Estimation on Coverage Accuracy in Nonparametric Inference. *Journal of the American Statistical Association*, 113(522): 767–779.

Calonico, S., M. D. Cattaneo, and M. H. Farrell. 2019. nprobust: Nonparametric Kernel-Based Estimation and Robust Bias-Corrected Inference. *Journal of Statistical Software*, 91(8): 1–33. doi: 10.18637/jss.v091.i08.

Calonico, S., M. D. Cattaneo, and M. H. Farrell. 2020. Coverage Error Optimal Confidence Intervals for Local Polynomial Regression, working paper.

Fan, J., and Gijbels, I. 1996. Local Polynomial Modelling and Its Applications, London: Chapman and Hall.

Wand, M., and Jones, M. 1995. Kernel Smoothing, Florida: Chapman & Hall/CRC.

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