Statistics/Data Analysis

Title

rdsensitivity —— Sensitivity analysis for RD designs under local randomization.

Syntax

rdsensitivity *outvar runvar* [*if*] [*in*] [**, cutoff(***#***) wlist(***numlist***) tlist(***numlist***) saving(***filename***) nodots nodraw verbose ci(***window [level]***) statistic(***stat_name***) p(***#***) evalat(***point***) kernel(***kerneltype***) fuzzy(***fuzzy_var [fuzzy_stat]***) reps(***#***) seed(***#***)**]

Description

rdsensitivity performs sensitivity analysis for regression discontinuity designs (RD) under local randomization. See Cattaneo, Frandsen and Titiunik (2015) and Cattaneo, Titiunik and Vazquez-Bare (2017) for an introduction to this methodology.

A detailed introduction to this command is given in Cattaneo, Titiunik and Vazquez-Bare (2016).
Companion R functions are also available here.

Companion functions are rdrandinf, rdwinselect and rdrbounds.

Related Stata and R packages useful for inference in RD designs are described in the following website:

https://sites.google.com/site/rdpackages/

Options

cutoff(*#***)** specifies the RD cutoff for the running variable *runvar*. Default is **cutoff(0)**.

wlist(*#***)** specifies the list of window lengths to be evaluated. By default the program constructs 10 windows around the cutoff, the first one including 10 treated and control observations and then adding 5 observations to each group in subsequent windows.

tlist(*#***)** specifies the list of null values for the treatment effect. By default the program employs ten evenly spaced points within the asymptotic confidence interval for a constant treatment effect in the smallest window to be employed.

saving(*filename***)** saves the dataset containing the data for the contour plot in *filename*. This allows the user to replicate and modify the appearance of the plot, and also conduct further sensitivity analysis.

nodots suppresses replication dots.

nodraw suppresses contour plot.

verbose displays matrix of results.

ci(*window [level]***)** returns the confidence interval corresponding to the window length indicated in *window*. The value in **ci** needs to be one of the values in **wlist**. The level of the confidence interval can be specified with the *level* option. Default level is 0.05, corresponding to a 95 percent confidence interval.

statistic(*stat_name***)** specifies the statistic to be used. Options are:
ttest for difference in means statistic. This is the default option.
ksmirnov for Kolmogorov-Smirnov statistic.
ranksum for Wilcoxon-Mann-Whitney studentized statistic.
The option **ttest** is equivalent to **diffmeans** and included for backward compatibility.

p(*#*) specifies the order of the polynomial for outcome adjustment model. Default is **p(0)**.

evalat(*point*) specifies the point at which the adjusted variable is evaluated. Allowed options are **cutoff** and **means**. Default is **evalat(cutoff)**.

kernel(*kerneltype*) specifies the type of kernel to use as weighting scheme. Allowed kernel types are **uniform** (uniform kernel), **triangular** (triangular kernel) and **epan** (Epanechnikov kernel). Default is **kernel(uniform)**.

fuzzy(*fuzzy_var [fuzzy_stat]*) name of the endogenous treatment variable in fuzzy design. This option uses an Anderson−Rubin−type statistic.

reps(*#*) specifies the number of replications. Default is **reps(1000)**.

seed(*#*) sets the seed for the randomization test. With this option, the user can manually set the desired seed, or can enter the value −1 to use the system seed. Default is **seed(666)**.

Example: Cattaneo, Frandsen and Titiunik (2015) Incumbency Data

Setup
```
. use rdlocrand_senate.dta, clear
```

Sensitivity analysis using 1000 replications
```
. rdsensitivity demvoteshfor2 demmv, wlist(.75(.25)2) tlist(0(1)20) reps(1000)
```

Obtain confidence interval for window [−.75;.75]
```
. rdsensitivity demvoteshfor2 demmv, wlist(.75(.25)2) tlist(0(1)20) reps(1000)
ci(.75)
```

Replicate contour graph using saved dataset
```
. rdsensitivity demvoteshfor2 demmv, wlist(.75(.25)2) tlist(0(1)20) reps(1000)
saving(graphdata)
. use graphdata, clear
. twoway contour pvalue t w, ccuts(0(0.05)1)
```

Saved results

rdsensitivity saves the following in **r()**:

Scalars

r(ci_lb)	lower limit of confidence interval.
r(ci_ub)	upper limit of confidence interval.

Matrices

r(results)	matrix of p−values.

References

Cattaneo, M. D., Frandsen, B., and R. Titiunik. 2015. Randomization Inference in the Regression Discontinuity Design: An Application to Party Advantages in the U.S. Senate.
Journal of Causal Inference 3(1): 1−24.

Cattaneo, M.D., Titiunik, R. and G. Vazquez−Bare. 2016. Inference in Regression Discontinuity Designs under Local Randomization.
Stata Journal 16(2): 331−367.

Cattaneo, M. D., Titiunik, R. and G. Vazquez−Bare. 2017. Comparing Inference Approaches for RD Designs: A Reexamination of the Effect of Head Start on Child Mortality.
Journal of Policy Analysis and Management 36(3): 643−681.

Authors

Matias D. Cattaneo, University of Michigan, Ann Arbor, MI. cattaneo@umich.edu.

Rocio Titiunik, University of Michigan, Ann Arbor, MI. titiunik@umich.edu.

Gonzalo Vazquez−Bare, University of Michigan, Ann Arbor, MI. gvazquez@umich.edu.