

Package ‘rdmulti’

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Type Package

Title Analysis of RD Designs with Multiple Cutoffs or Scores

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Author Matias D. Cattaneo, Rocio Titiunik, Gonzalo Vazquez-Bare

Maintainer Gonzalo Vazquez-Bare <gvazquez@umich.edu>

Description The regression discontinuity (RD) design is a popular quasi-experimental design for causal inference and policy evaluation. The 'rdmulti' package provides tools to analyze RD designs with multiple cutoffs or scores: `rdmc()` estimates pooled and cutoff specific effects for multi-cutoff designs, `rdmplot()` draws RD plots for multi-cutoff designs and `rdms()` estimates effects in cumulative cutoffs or multi-score designs. See Cattaneo, Titiunik and Vazquez-Bare (2018) <https://sites.google.com/site/rdpackages/rdmulti/Cattaneo-Titiunik-VazquezBare_2018_rdmulti.pdf> for further methodological details.

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 rdmulti-package

rdmulti: analysis of RD Designs with multiple cutoffs or scores

Description

The regression discontinuity (RD) design is a popular quasi-experimental design for causal inference and policy evaluation. The 'rdmulti' package provides tools to analyze RD designs with multiple cutoffs or scores: `rdmc()` estimates pooled and cutoff-specific effects in multi-cutoff designs, `rdmcplot()` draws RD plots for multi-cutoff RD designs and `rdms()` estimates effects in cumulative cutoffs or multi-score designs. For more details, and related Stata and R packages useful for analysis of RD designs, visit <https://sites.google.com/site/rdpackages>.

Author(s)

Matias Cattaneo, University of Michigan. <cattaneo@umich.edu>

Rocio Titiunik, University of Michigan. <titiunik@umich.edu>

Gonzalo Vazquez-Bare, University of Michigan. <gvazquez@umich.edu>

References

M.D. Cattaneo, R. Titiunik and G. Vazquez-Bare. (2018). *Analysis of Regression Discontinuity Designs with Multiple Cutoffs or Multiple Scores*. Working paper, University of Michigan.

 rdmc

Analysis of RD designs with multiple cutoffs

Description

`rdmc()` analyzes RD designs with multiple cutoffs.

Usage

```
rdmc(Y, X, C, pooled.opt = NULL, hvec = NULL, bvec = NULL, pvec = NULL,
     kernelvec = NULL, fuzzy = NULL, plot = FALSE, verbose = FALSE)
```

Arguments

Y	outcome variable.
X	running variable.
C	cutoff variable.
pooled.opt	options to be passed to <code>rdrobust()</code> to calculate pooled estimand.
hvec	bandwidths to be passed to <code>rdrobust()</code> to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.

bvec	bandwidths for the bias to be passed to <code>rdrobust()</code> to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
pvec	order of the polynomials to be passed to <code>rdrobust()</code> to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
kernelvec	kernels to be passed to <code>rdrobust()</code> to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
fuzzy	specifies a fuzzy design.
plot	plots cutoff-specific estimates and weights.
verbose	displays the output from <code>rdrobust</code> for estimating the pooled estimand.

Value

tau	pooled estimate
se.rb	robust bias corrected standard error for pooled estimate
pv.rb	robust bias corrected p-value for pooled estimate
ci.rb.l	left limit of robust bias corrected CI for pooled estimate
ci.rb.r	right limit of robust bias corrected CI for pooled estimate
hl	bandwidth to the left of the cutoff for pooled estimate
hr	bandwidth to the right of the cutoff for pooled estimate
Nhl	sample size within bandwidth to the left of the cutoff for pooled estimate
Nhr	sample size within bandwidth to the right of the cutoff for pooled estimate
B	vector of bias-corrected coefficients
V	variance-covariance matrix of the estimators
Coefs	vector of conventional coefficients
W	vector of weights for each cutoff-specific estimate
Nh	vector of sample sizes within bandwidth at each cutoff
CI	bias corrected confidence intervals
H	bandwidth used at each cutoff
rdrobust.results	results from <code>rdrobust</code> for pooled estimate

Author(s)

Matias Cattaneo, University of Michigan. <cattaneo@umich.edu>

Rocio Titiunik, University of Michigan. <titiunik@umich.edu>

Gonzalo Vazquez-Bare, University of Michigan. <gvazquez@umich.edu>

References

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Examples

```
# Toy dataset
X <- runif(1000,0,100)
C <- c(rep(33,500),rep(66,500))
Y <- (1 + X + (X>=C))*(C==33)+(.5 + .5*X + .8*(X>=C))*(C==66) + rnorm(1000)
# rdmc with standard syntax
tmp <- rdmc(Y,X,C)
# rdmc with cutoff-specific bandwidths
tmp <- rdmc(Y,X,C,hvec=c(9,13))
```

rdmcplot

*RD plots with multiple cutoffs.***Description**

rdmc() RD plots with multiple cutoffs.

Usage

```
rdmcplot(Y, X, C, hvec = NULL, pvec = NULL, noscatter = FALSE,
         nodraw = FALSE)
```

Arguments

Y	outcome variable.
X	running variable.
C	cutoff variable.
hvec	bandwidths to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
pvec	order of the polynomials to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
noscatter	omits scatter plot.
nodraw	omits plot.

Value

clist	list of cutoffs
cnum	number of cutoffs
X0	matrix of X values for control units
X1	matrix of X values for treated units
Yhat0	estimated polynomial for control units
Yhat1	estimated polynomial for treated units
Xmean	bin average of X values
Ymean	bin average for Y values

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References

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Examples

```
# Toy dataset
X <- runif(1000,0,100)
C <- c(rep(33,500),rep(66,500))
Y <- (1 + X + (X>=C))*(C==33)+(.5 + .5*X + .8*(X>=C))*(C==66) + rnorm(1000)
# rdmcplot with standard syntax
tmp <- rdmcplot(Y,X,C)
```

rdms	<i>Analysis of RD designs with cumulative cutoffs or two running variables</i>
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Description

rdms() analyzes RD designs with cumulative cutoffs or two running variables.

Usage

```
rdms(Y, X, C, X2 = NULL, zvar = NULL, C2 = NULL, range.l = NULL,
     range.r = NULL, xnorm = NULL, pooled.opt = NULL, hvec = NULL,
     bvec = NULL, pvec = NULL, kernelvec = NULL, fuzzy = NULL,
     plot = FALSE)
```

Arguments

Y	outcome variable.
X	running variable.
C	vector of cutoffs.
X2	if specified, second running variable.
zvar	if X2 is specified, treatment indicator.
C2	if specified, second vector of cutoffs.
range.l	range of the running variable to be used for estimation around the cutoff from the left.

range.r	range of the running variable to be used for estimation around the cutoff from the right.
xnorm	normalized running variable to estimate pooled effect.
pooled.opt	options to be passed to rdrobust() to calculate pooled estimand.
hvec	bandwidths to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
bvec	bandwidths for the bias to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
pvec	order of the polynomials to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
kernelvec	kernels to be passed to rdrobust() to calculate cutoff-specific estimates. Should be a vector of length equal to the number of different cutoffs.
fuzzy	specifies a fuzzy design.
plot	plots cutoff-specific estimates and weights.

Value

B	vector of bias-corrected coefficients
V	variance-covariance matrix of the estimators
Coefs	vector of conventional coefficients
Nh	vector of sample sizes within bandwidth at each cutoff
CI	bias corrected confidence intervals
H	bandwidth used at each cutoff

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References

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Examples

```
# Toy dataset: cumulative cutoffs
X <- runif(1000,0,100)
C <- c(33,66)
Y <- (1+X)*(X<C[1])+(0.8+0.8*X)*(X>=C[1]&X<C[2])+(1.2+1.2*X)*(X>=C[2]) + rnorm(1000)
# rdms: basic syntax
tmp <- rdms(Y,X,C)
```

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