Statistics/Data analysis

## Title

**rdms** —— Analysis of Regression Discontinuity Designs with Multiple Scores.

## Syntax

**rdms** *depvar runvar1* [*runvar2 treatvar*] [*if*] [*in*], **cvar(***cvar1 [cvar2]***)** [
**range(***range1 [range2]***) xnorm(***string***) fuzzy(***string***) derivvar(***string***)**
**pooled_opt(***string***) pvar(***string***) qvar(***string***) hvar(***string***) hrightvar(***string***)**
**bvar(***string***) brightvar(***string***) rhovar(***string***) covsvar(***string***)**
**covsdropvar(***string***) kernelvar(***string***) weightsvar(***string***) bwselectvar(***string***)**
**scaleparvar(***string***) scaleregulvar(***string***) masspointsvar(***string***)**
**bwcheckvar(***string***) bwrestrictvar(***string***) stdvarsvar(***string***) vcevar(***string***)**
**level(#) plot graph_opt(***string***)** ]

## Description

**rdms** provides tools to analyze regression discontinuity (RD) designs with multiple scores. For methodological background see Keele and Titiunik (2015), Cattaneo, Keele, Titiunik and Vazquez-Bare (2016), and Cattaneo, Keele, Titiunik and Vazquez-Bare (2021). It also computes alternative estimation and inference procedures available in the literature.

If only *runvar1* is specified, **rdms** analyzes an RD design with cumulative cutoffs in which a unit gets different dosages of a treatment depending on the value of *runvar1*. If *runvar1*, *runvar2* and *treatvar* are specified, **rdms** analyzes an RD design with two running variables in which units with *treatvar* equal to one are treated.

Companion commands are: rdmc for multi-cutoff RD estimation and inference, and rdmcplot for multi-cutoff RD plots.

A detailed introduction to this command is given in Cattaneo, Titiunik and Vazquez-Bare (2020).

Companion R functions are also available here.

This command employs the Stata (and R) package rdrobust for underlying calculations. See Calonico, Cattaneo and Titiunik (2014), Calonico, Cattaneo and Titiunik (2015), and Calonico, Cattaneo, Farrell and Titiunik (2017) for more details.

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

https://rdpackages.github.io/

## Options

### Estimand

**cvar(***string***)** specifies the numeric variable *cvar1* containing the RD cutoff for *indepvar* in a cumulative cutoffs setting, or the two scores *cvar1* and *cvar2* in a two-score setting.

**range(***range1 [range2]***)** specifies the range of the running variable to be used for estimation around each cutoff. Specifying only one variable implies using the same range at each side of the cutoff.

**xnorm(***string***)** specifies the normalized running variable to estimate pooled effect.

**fuzzy(***string***)** indicates a fuzzy design. See rdrobust for details.

**derivvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the order of the derivative for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

## rdrobust Options

**pooled_opt(***string***)** specifies the options to be passed to **rdrobust** to calculate pooled estimates. See rdrobust for details.

## Local Polynomial Regression

**pvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the order of the polynomials for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**qvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the order of the polynomials for bias estimation for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**hvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the bandwidths for **rdrobust** to calculate cutoff-specific estimates. When **hrightvar** is specified, **hvar** indicates the bandwidth to the left of the cutoff. When **hrightvar** is not specified, the same bandwidths are used at each side. See rdrobust for details.

**hrightvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the bandwidths to the right of the cutoff for **rdrobust** to calculate cutoff-specific estimates. When **hrightvar** is not specified, the bandwidths in **hvar** are used at each side. See rdrobust for details.

**bvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the bandwidths for bias estimation for **rdrobust** to calculate cutoff-specific estimates. When **brightvar** is specified, **bvar** indicates the bandwidth to the left of the cutoff. When **brightvar** is not specified, the same bandwidths are used at each side. See rdrobust for details.

**brightvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the bandwidths for bias estimation to the right of the cutoff for **rdrobust** to calculate cutoff-specific estimates. When **brightvar** is not specified, the bandwidths in **bvar** are used at each side. See rdrobust for details.

**rhovar(***string***)** a variable of length equal to the number of different cutoffs that specifies the value of rho for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**covsvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the covariates for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**covsdropvar(***string***)** a variable of length equal to the number of different cutoffs that specifies whether collinear covariates should be dropped. See rdrobust for details.

**kernelvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the kernels for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**weightsvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the weights for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

## Bandwidth Selection

**bwselectvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the bandwidth selection method for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**scaleparvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the value of scalepar for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**scaleregulvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the value of scaleregul for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**masspointsvar(***string***)** a variable of length equal to the number of different cutoffs that specifies how to handle repeated values in the running variable. See rdrobust for details.

**bwcheckvar(***string***)** a variable of length equal to the number of different cutoffs that specifies the value of **bwcheck**. See rdrobust for details.

**bwrestrictvar(***string***)** a variable of length equal to the number of different cutoffs that specifies whether computed bandwidths are restricted to the range of *runvar*. See rdrobust for details.

**stdvarsvar(***string***)** a variable of length equal to the number of different cutoffs that specifies whether *depvar* and *runvar* are standardized. See rdrobust for details.

### Variance-Covariance Estimation and Inference

**vcevar(***string***)** a variable of length equal to the number of different cutoffs that specifies the variance-covariance matrix estimation method for **rdrobust** to calculate cutoff-specific estimates. See rdrobust for details.

**level(#)** specifies the confidence level for confidence intervals. See rdrobust for details.

**verbose** displays conventional, instead of robust-bias corrected, p-values and confidence intervals.

### Plot

**plot** plots the pooled and cutoff-specific estimates.

**graph_opt(***string***)** options to be passed to the graph when **plot** is specified.

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## Examples

Standard use of rdms for cumulative cutoffs

```
. rdms yvar xvar, c(cvar)
```

rdms with plot

```
. rdms yvar xvar, c(cvar) plot
```

Standard use of rdms for multiple scores

```
. rdms yvar xvar1 xvar2 treatvar, c(cvar)
```

## Saved results

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

Matrices

| | |
|---|---|
| **e(b)** | bias-corrected coefficient vector |
| **e(V)** | robust variance-covariance matrix of the estimators |
| **e(coefs)** | conventional coefficient vector |
| **e(pv_rb)** | robust p-value vector |
| **e(CI_rb)** | bias-corrected confidence intervals |
| **e(H)** | vector of bandwidths at each side of each cutoff |
| **e(sampsis)** | vector of sample sizes at each side of each cutoff |

## References

Calonico, S., M. D. Cattaneo, M. H. Farrell, and R. Titiunik. 2017. rdrobust: Software for Regression Discontinuity Designs.
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Cattaneo, M. D., L. Keele, R. Titiunik, and G. Vazquez-Bare. 2021. Extrapolating Treatment Effects in Multi-Cutoff Regression Discontinuity Designs.
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