Package: rdhte (via r-universe)

May 26, 2026

Title Heterogeneous Treatment Effects in Regression Discontinuity Designs

Version 0.2.0

Description Understanding heterogeneous causal effects based on pretreatment covariates is a crucial step in modern empirical work in data science. Building on the recent developments in Calonico et al (2025) <doi:10.48550/arXiv.2503.13696>, this package provides tools for estimation and inference of heterogeneous treatment effects in Regression Discontinuity (RD) Designs. The package includes two main commands: 'rdhte' to conduct estimation and robust bias-corrected inference for conditional RD treatment effects (given choice of bandwidth parameter); 'rdbwhte', which implements automatic bandwidth selection methods; and 'rdhte_lincom' to test linear combinations of parameters.

License GPL-3

Imports rdrobust (>= 4.0.0), sandwich, multcomp

Encoding UTF-8

Suggests broom, ggplot2, knitr, rmarkdown, testthat (>= 3.0.0), xtable

Config/testthat/edition 3

VignetteBuilder knitr

Depends R (>= 3.5)

LazyData true

NeedsCompilation no

Author Sebastian Calonico [aut, cre], Matias D. Cattaneo [aut], Max H. Farrell [aut], Filippo Palomba [aut], Rocio Titiunik [aut]

Maintainer Sebastian Calonico <scalonico@ucdavis.edu>

Repository https://scalonico.r-universe.dev

Date/Publication 2026-05-26 19:31:39 UTC

RemoteUrl https://github.com/cran/rdhte

RemoteRef HEAD

RemoteSha 719203f63782d6f089af0895045ccf44d15d55ff

Contents

rdhte-package 2
plot.rdhte 3
rdbwhte 4
rdhte 7
rdhte_contrast 12
rdhte_dataset 13
rdhte_lincom 14

Index **17**

`rdhte-package` *rdhte: RD Heterogeneous Treatment Effects Estimation and Inference*

Description

Building on the recent developments in Calonico, Cattaneo, Farrell, Palomba, and Titiunik (2025), this package implements estimation and inference of heterogeneous treatment effects in RD designs. The package includes two main commands: `rdhte` conduct estimation and robust bias-corrected inference for conditional RD treatment effects, for a given choice of bandwidth parameter; and `rdbwhte` implements automatic bandwidth selection methods. We illustrate the methods implemented in the package `rdhte` using a canonical empirical application. We also demonstrate how the package `rdhte` complements, and in very specific cases recovers, the methods available in the packages rdrobust (Calonico, Cattaneo, Farrell, Titiunik (2017) and rdmulti, Cattaneo, Titiunik, VazquezBare (2020).

Commands: `rdhte` for estimation and inference. `rdbwhte` for data-driven bandwidth selection.

Related software packages useful for inference in regression discontinuity (RD) designs are described in the website: `https://rdpackages.github.io/`.

Author(s)

Sebastian Calonico, University of California, Davis <scalonico@ucdavis.edu>.

Matias D. Cattaneo, Princeton University <matias.d.cattaneo@gmail.com>.

Max H. Farrell, University of California, Santa Barbara <mhfarrell@gmail.com>.

Filippo Palomba, Princeton University <filippo.palomba19@gmail.com>.

Rocio Titiunik, Princeton University <rocio.titiunik@gmail.com>.

References

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): rdhte: Conditional Average Treatment Effects in RD Designs. *Working paper*.

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): Treatment Effect Heterogeneity in Regression Discontinuity Designs. *Working paper*.

plot.rdhte *Plot rdhte heterogeneous treatment effects*

Description

For an rdhte object fit with a categorical covs.hte, draw one point per group at the conventional point estimate (Estimate) with the robust bias-corrected confidence interval (ci.rb). A dashed horizontal line at zero gives a visual reference for the null effect.

Usage

```
## S3 method for class 'rdhte'
plot(x, sort = FALSE, point.size = 2.5,
                      errorbar.width = 0.2, zero.line = TRUE,
                      title = NULL, xlab = NULL, ylab = NULL, ...)
```

Arguments

x	An object of class rdhte returned by rdhte.
sort	Logical or character; if TRUE (or "effect"), reorder groups along the x-axis by point estimate. FALSE (default) keeps the original W.lev order.
point.size	Numeric; size of the point markers. Default 2.5.
errorbar.width	Numeric; width of the error-bar caps relative to the x-axis discrete unit. Default 0.2.
zero.line	Logical; if TRUE (default), draw a dashed horizontal line at y = 0.
title, xlab, ylab	Optional plot annotations. Defaults derived from the rdhte object (x$rdmodel, x$covs.hte_chr, "Treatment effect").
...	Currently unused.

Details

Continuous covs.hte (or no covs.hte) is not yet supported – the function errors with a clear message in those cases.

Requires the **ggplot2** package. The intervals shown are the same robust bias-corrected CIs reported by print(x) and summary(x): they are centered on Estimate.bc (not Estimate) and use the robust standard error se.rb. Because the point and the CI center can differ slightly, the point may sit just inside or just outside the bar; this is the rdrobust convention and is not a plotting bug.

Value

Invisibly, a ggplot object.

Examples

```
## Not run:
  set.seed(1)
  n <- 600
  x <- runif(n, -1, 1)
  W <- factor(sample(c("A", "B", "C"), n, replace = TRUE))
  y <- 0.5 + (x >= 0) * (W == "A") * 1.0 +
             (x >= 0) * (W == "B") * 2.0 +
             (x >= 0) * (W == "C") * 0.3 + rnorm(n)
  m <- rdhte(y = y, x = x, covs.hte = W)
  plot(m)
  plot(m, sort = TRUE)        # reorder by effect size

## End(Not run)
```

`rdbwhte` *Data-Driven Optimal Bandwidth Selection for RD Heterogeneous Treatment Effects Estimation*

Description

`rdbwhte` computes MSE- and CER-optimal bandwidths for estimating RD heterogeneous treatment effects based on covariates (Calonico, Cattaneo, Farrell, Palomba and Titiunik, 2025a).

Companion commands: `rdhte` for RD HTE estimation and inference, and `rdhte_lincom` for testing linear restrictions of parameters.

A detailed introduction to the software is given in Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025b). Related software packages for analysis and interpretation of RD designs and related methods are available in: https://rdpackages.github.io/.

For background methodology, see Calonico, Cattaneo, Farrell, and Titiunik (2019), Calonico, Cattaneo and Farrell (2020), and Cattaneo and Titiunik (2022).

Usage

```
rdbwhte(
  y,
  x,
  c = 0,
  covs.hte = NULL,
  covs.eff = NULL,
  p = 1,
  q = NULL,
  kernel = "tri",
  weights = NULL,
  vce = "hc3",
  cluster = NULL,
  bwselect = "mserd",
```

```
  bw.joint = FALSE,
  subset = NULL,
  data = NULL
)
```

Arguments

y	Outcome variable.
x	Running variable.
c	RD cutoff in x; default is c = 0.
covs.hte	covariates for heterogeneous treatment effects. Factor variables can be used to distinguish between continuous and categorical variables, select reference categories, specify interactions between variables, and include polynomials of continuous variables.
covs.eff	additional covariates to be used for efficiency improvements.
p	order of the local polynomial used to construct the point estimator (default = 1).
q	order of the local polynomial used to construct the bias correction. If NULL (default), q is set to p + 1.
kernel	kernel function used to construct the RD estimators. Options are triangular (default option), epanechnikov and uniform.
weights	variable used for optional weighting of the bandwidth-selection procedure. The unit-specific weights multiply the kernel function.
vce	character string specifying the variance-covariance matrix estimator type. Without cluster: "hc0", "hc1", "hc2", "hc3" (default "hc3"). With cluster: "cr1" (default), "cr2", "cr3". Legacy aliases: "hc0"/"hc1" + cluster are remapped to "cr1" with a warning; "hc2" -> "cr2" and "hc3" -> "cr3" similarly. "cr1", "cr2", "cr3" without cluster fall back to "hc1", "hc2", "hc3" with a warning.
cluster	variable indicating the clustering of observations.
bwselect	bandwidth selection procedure to be used. Options are: mserd one common MSE-optimal bandwidth selector for the RD treatment effect estimator. msetwo two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. msesum one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). msecomb1 for min(mserd,msesum). msecomb2 for median(msetwo,mserd,msesum), for each side of the cutoff separately. cerrd one common CER-optimal bandwidth selector for the RD treatment effect estimator. certwo two different CER-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. cersum one common CER-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). cercomb1 for min(cerrd,cersum). cercomb2 for median(certwo,cerrd,cersum), for each side of the cutoff separately. Note: MSE = Mean Square Error; CER = Coverage Error Rate. Default is bwselect=mserd.
bw.joint	logical. If TRUE, forces all bandwidths to be the same across groups (default is bw.joint = FALSE). When covs.hte is continuous (rather than a factor or 0/1 indicator), a single joint bandwidth is always used regardless of this argument.

subset	optional vector specifying a subset of observations to be used.
data	optional data frame. When supplied, y, x, covs.hte, covs.eff, weights, cluster, and subset may be given as bare variable names referring to columns of data.

Value

A list with the following named elements:

W.lev	Group-level identifiers, or NULL for continuous covs.hte.
W.names	Display labels for the rows of h (prefixed with the covs.hte expression for categorical covs.hte).
covs.hte_chr	Character representation of the covs.hte argument.
kernel	Kernel type used.
vce	Variance estimator display label.
vce_select	Canonical lowercase variance-estimator name.
c	Cutoff value.
h	An n.lev x 2 matrix of left/right bandwidths, one row per group.
p	Order of the polynomial used for estimation.
q	Order of the polynomial used for bias correction.
bwselect	Bandwidth selection procedure used.
N	Length-2 vector c(N_left, N_right) of pre-bandwidth sample sizes.
Nh	An n.lev x 2 matrix of effective sample sizes (per group, per side).
covs.cont	Logical; TRUE for continuous covs.hte (or no covs.hte), FALSE for factor.
rdmodel	Human-readable model description string.

Author(s)

Sebastian Calonico, University of California, Davis <scalonico@ucdavis.edu>.

Matias D. Cattaneo, Princeton University <matias.d.cattaneo@gmail.com>.

Max H. Farrell, University of California, Santa Barbara <mhfarrell@gmail.com>.

Filippo Palomba, Princeton University <filippo.palomba19@gmail.com>.

Rocio Titiunik, Princeton University <rocio.titiunik@gmail.com>.

References

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): rdhte: Conditional Average Treatment Effects in RD Designs. *Working paper*.

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): Treatment Effect Heterogeneity in Regression Discontinuity Designs. *Working paper*.

Cattaneo and Titiunik. 2022. Regression Discontinuity Designs. *Annual Review of Economics*, 14: 821-851.

Calonico, Cattaneo, and Farrell. 2020. Optimal Bandwidth Choice for Robust Bias Corrected Inference in Regression Discontinuity Designs. *Econometrics Journal*, 23(2): 192-210.

Calonico, Cattaneo, Farrell, and Titiunik. 2019. Regression Discontinuity Designs using Covariates. *Review of Economics and Statistics*, 101(3): 442-451.

Calonico, Cattaneo, and Titiunik. 2014a. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs. *Econometrica* 82(6): 2295-2326.

Granzier, Pons, and Tricaud. 2023. Coordination and Bandwagon Effects: How Past Rankings Shape the Behavior of Voters and Candidates. *American Economic Journal: Applied Economics*, 15(4): 177-217.

See Also

rdhte, rdhte_lincom

Examples

```
set.seed(123)
n <- 5000
X <- runif(n, -1, 1)
W <- rbinom(n, 1, 0.5)
Y <- 3 + 2*X + 1.5*X^2 + 0.5*X^3 + sin(2*X) + 3*W*(X>=0) + rnorm(n)
rdbwhte.1 = rdbwhte(y=Y, x=X, covs.hte=factor(W))
summary(rdbwhte.1)

## Not run:
data(rdhte_dataset)
with(rdhte_dataset, {
  summary(rdbwhte(y = y, x = x, covs.hte = factor(w_ideology),
                  cluster = cluster_var))
  summary(rdbwhte(y = y, x = x, covs.hte = factor(w_ideology),
                  cluster = cluster_var, bw.joint = TRUE))
  summary(rdbwhte(y = y, x = x, covs.hte = w_strength,
                  cluster = cluster_var))
})

## End(Not run)
```

---

rdhte *RD Heterogeneous Treatment Effects Estimation and Inference*

Description

rdhte provides estimation and inference for heterogeneous treatment effects in RD designs using local polynomial regressions, allowing for interactions with pretreatment covariates (Calonico, Cattaneo, Farrell, Palomba and Titiunik, 2025a). Inference is implemented using robust bias-correction methods (Calonico, Cattaneo, and Titiunik, 2014)

Companion commands: rdbwhte for data-driven bandwidth selection and rdhte_lincom for testing linear restrictions of parameters.

A detailed introduction to the software is given in Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025b).

Related software packages for analysis and interpretation of RD designs and related methods are available in: https://rdpackages.github.io/.

For background methodology, see Calonico, Cattaneo, Farrell, and Titiunik (2019), Calonico, Cattaneo and Farrell (2020), and Cattaneo and Titiunik (2022).

Usage

```
rdhte(
  y,
  x,
  c = 0,
  covs.hte = NULL,
  covs.eff = NULL,
  p = 1,
  q = NULL,
  kernel = "tri",
  weights = NULL,
  h = NULL,
  h.l = NULL,
  h.r = NULL,
  vce = "hc3",
  cluster = NULL,
  level = 95,
  bwselect = "mserd",
  bw.joint = FALSE,
  subset = NULL,
  data = NULL,
  target.contrast = NULL
)
```

Arguments

y	Outcome variable.
x	Running variable.
c	RD cutoff in x; default is c = 0.
covs.hte	covariates for heterogeneous treatment effects. Factor variables can be used to distinguish between continuous and categorical variables, select reference categories, specify interactions between variables, and include polynomials of continuous variables. If not specified, the RD Average Treatment Effect is computed.
covs.eff	additional covariates to be used for efficiency improvements.
p	order of the local polynomial used to construct the point estimator (default = 1).
q	order of the local polynomial used to construct the bias correction. If NULL (default), q is set to p + 1.

kernel — kernel function used to construct the RD estimators. Options are triangular (default option), epanechnikov and uniform.

weights — variable used for optional weighting of the estimation procedure. The unit-specific weights multiply the kernel function.

h — main bandwidth used to construct the RD estimator. If not specified, bandwidth h is computed by the companion command rdbwhte. More than one bandwidth can be specified for categorical covariates.

h.l — same as h, but only used for observations left of the cutoff c.

h.r — same as h, but only used for observations right of the cutoff c.

vce — character string specifying the variance-covariance matrix estimator type. Without cluster: "hc0", "hc1", "hc2", "hc3" (default "hc3"). With cluster: "cr1" (default; standard cluster-robust sandwich with small-sample correction), "cr2" (Bell-McCaffrey leverage-adjusted), "cr3" (block-jackknife). Legacy aliases: "hc0"/"hc1" + cluster are remapped to "cr1" with a warning; "hc2" -> "cr2" and "hc3" -> "cr3" similarly. "cr1", "cr2", "cr3" without cluster fall back to "hc1", "hc2", "hc3" with a warning. It is based on the R function vcovCL.

cluster — variable indicating the clustering of observations.

level — confidence level for confidence intervals; default is level = 95.

bwselect — bandwidth selection procedure to be used. Options are: mserd one common MSE-optimal bandwidth selector for the RD treatment effect estimator. msetwo two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. msesum one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). msecomb1 for min(mserd,msesum). msecomb2 for median(msetwo,mserd,msesum), for each side of the cutoff separately. cerrd one common CER-optimal bandwidth selector for the RD treatment effect estimator. certwo two different CER-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. cersum one common CER-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). cercomb1 for min(cerrd,cersum). cercomb2 for median(certwo,cerrd,cersum), for each side of the cutoff separately. Note: MSE = Mean Square Error; CER = Coverage Error Rate. Default is bwselect=mserd.

bw.joint — logical. If TRUE, forces all bandwidths to be the same across groups (default is bw.joint = FALSE). When covs.hte is continuous (rather than a factor or 0/1 indicator), a single joint bandwidth is always used regardless of this argument.

subset — optional vector specifying a subset of observations to be used.

data — optional data frame. When supplied, y, x, covs.hte, covs.eff, weights, cluster, and subset may be given as bare variable names referring to columns of data. covs.hte additionally accepts a one-sided formula (e.g. "~ z1 + z2") whose variables are looked up in data first.

target.contrast — (experimental, in-flight) optional contrast vector or matrix used to refit the bandwidth to be MSE-optimal for a particular contrast of the CATE vector. NULL (default) keeps the standard per-cell MSE-optimal bandwidth. API may change.

Value

A list with the following named elements:

`Estimate`	Vector of conventional local-polynomial RD estimates, one per group level (or per slope-coefficient for continuous `covs.hte`). Also available as `coef`.
`Estimate.bc`	Vector of bias-corrected estimates. Also available as `coef.bc`.
`se.rb`	Vector of robust bias-corrected standard errors.
`ci.rb`	Matrix (`n.lev` x 2) of robust bias-corrected confidence-interval bounds.
`t.rb`	Vector of asymptotic z-statistics (named `t.rb` for legacy reasons; the underlying inference is Gaussian).
`pv.rb`	Vector of two-sided p-values from the standard normal.
`vcov`	Group-level variance-covariance matrix of `Estimate.bc`.
`coef.full`	Full coefficient vector from the underlying joint local-polynomial regression (used by `rdhte_lincom`).
`vcov.full`	Full variance-covariance matrix of `coef.full`.
`W.lev`	Group-level identifiers (or coefficient names for continuous `covs.hte`).
`W.names`	Display labels for the rows of `Estimate`.
`kernel`	Kernel type used (e.g. `"Triangular"`).
`bwselect`	Bandwidth selection procedure used.
`vce`	Variance estimator display label (e.g. `"CR1"`, `"HC3"`).
`vce_select`	Canonical lowercase variance-estimator name (e.g. `"cr1"`, `"hc3"`).
`c`	Cutoff value.
`h`	An `n.lev` x 2 matrix of left/right bandwidths, one row per group.
`p`	Order of the polynomial used for estimation.
`q`	Order of the polynomial used for bias correction.
`N`	Length-2 vector `c(N_left, N_right)` of pre-bandwidth sample sizes.
`Nh`	An `n.lev` x 2 matrix of effective sample sizes (per group, per side).
`covs.cont`	Logical; `TRUE` for continuous `covs.hte` (or no `covs.hte`), `FALSE` for factor.
`level`	Confidence level used.
`rdmodel`	Human-readable model description string.

Author(s)

Sebastian Calonico, University of California, Davis <scalonico@ucdavis.edu>.

Matias D. Cattaneo, Princeton University <matias.d.cattaneo@gmail.com>.

Max H. Farrell, University of California, Santa Barbara <mhfarrell@gmail.com>.

Filippo Palomba, Princeton University <filippo.palomba19@gmail.com>.

Rocio Titiunik, Princeton University <rocio.titiunik@gmail.com>.

References

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): rdhte: Conditional Average Treatment Effects in RD Designs. *Working paper*.

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): Treatment Effect Heterogeneity in Regression Discontinuity Designs. *Working paper*.

Cattaneo and Titiunik. 2022. Regression Discontinuity Designs. *Annual Review of Economics*, 14: 821-851.

Calonico, Cattaneo, and Farrell. 2020. Optimal Bandwidth Choice for Robust Bias Corrected Inference in Regression Discontinuity Designs. *Econometrics Journal*, 23(2): 192-210.

Calonico, Cattaneo, Farrell, and Titiunik. 2019. Regression Discontinuity Designs using Covariates. *Review of Economics and Statistics*, 101(3): 442-451.

Calonico, Cattaneo, and Titiunik. 2014a. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs. *Econometrica* 82(6): 2295-2326.

Granzier, Pons, and Tricaud. 2023. Coordination and Bandwagon Effects: How Past Rankings Shape the Behavior of Voters and Candidates. *American Economic Journal: Applied Economics*, 15(4): 177-217.

See Also

rdbwhte, rdhte_lincom

Examples

```
set.seed(123)
n <- 1000
X <- runif(n, -1, 1)
W <- rbinom(n, 1, 0.5)
Y <- 3 + 2*X + 1.5*X^2 + 0.5*X^3 + sin(2*X) + 3*W*(X>=0) + rnorm(n)
m1 = rdhte(y = Y, x = X, covs.hte = factor(W))
summary(m1)

## Not run:
# Empirical examples using the bundled Granzier, Pons, and Tricaud data.
data(rdhte_dataset)
with(rdhte_dataset, {
  rd_left <- rdhte(y = y, x = x, covs.hte = factor(w_left),
                   cluster = cluster_var)
  summary(rd_left)
  rdhte_lincom(rd_left,
               linfct = "`factor(w_left)1` - `factor(w_left)0` = 0")

  summary(rdhte(y = y, x = x, covs.hte = factor(w_left),
                cluster = cluster_var, bw.joint = TRUE))
  summary(rdhte(y = y, x = x, covs.hte = factor(w_left):factor(w_strong),
                cluster = cluster_var))
  summary(rdhte(y = y, x = x, covs.hte = w_strength,
                kernel = "uni", cluster = cluster_var))
})
```

```
## End(Not run)
```

`rdhte_contrast` *RD Heterogeneous Treatment Effects: contrast-targeted bandwidth*

Description

`rdhte_contrast` refits an `rdhte` model at the MSE-optimal bandwidth for a single user-chosen linear combination of the Estimate vector and returns the resulting point estimate, robust bias-corrected estimate, standard error, p-value, and confidence interval.

Usage

```
rdhte_contrast(model, contrast, refit = TRUE, level = 95, tol = 1e-10)
```

Arguments

`model`	A fitted model returned by `rdhte`.
`contrast`	Numeric vector with length equal to `nrow(model$Estimate)`. The user-facing linear combination of Estimate rows whose MSE is optimized.
`refit`	Logical. `TRUE` refits the model at the contrast-targeted bandwidth. `FALSE` projects the existing fit and returns inference under the model's current bandwidth.
`level`	Confidence level in percentage form, in `[1, 100)`.
`tol`	Tolerance below which the estimated contrast bias is treated as zero and the contrast-targeted bandwidth is declared undefined.

Details

Use `rdhte_lincom` instead when you want joint Wald inference on several linear restrictions at one bandwidth.

Value

A list with the conventional estimate, robust bias-corrected estimate, robust standard error, z-statistic, p-value, confidence interval, selected bandwidth, pilot bandwidth, contrast diagnostics, and (when `refit = TRUE`) the refitted `rdhte` object.

See Also

`rdhte`, `rdhte_lincom`

Examples

```
## Not run:
set.seed(123)
n <- 1000
X <- runif(n, -1, 1)
W <- rbinom(n, 1, 0.5)
Y <- 3 + 2 * X + 1.5 * X^2 + 3 * W * (X >= 0) + rnorm(n)
m <- rdhte(y = Y, x = X, covs.hte = factor(W))
rdhte_contrast(m, contrast = c(-1, 1))

## End(Not run)
```

`rdhte_dataset` *Granzier-Pons-Tricaud Election Dataset for rdhte Illustrations*

Description

A working extract of the data used in Granzier, Pons, and Tricaud (2023, AEJ: Applied), distributed with the **rdhte** package as a fixed-format example dataset for the package vignette and worked examples. The running variable `x` is the candidate's first-round margin against the threshold for advancing to the runoff; `y` is an indicator for advancing.

Usage

```
data("rdhte_dataset")
```

Format

A data frame with 39,534 observations on the following variables.

`y` Outcome: indicator (0/1) for advancing to the runoff.

`x` Running variable: first-round margin against the qualifying threshold (the cutoff is at zero).

`cluster_var` Cluster identifier (district).

`w_left` Binary: 1 if the candidate's party is left of center, 0 otherwise.

`w_ideology` Unordered categorical (4 levels): party ideology bucket.

`w_strength` Continuous: candidate's average prior national-level vote share, used as a proxy for ex-ante candidate strength.

`w_strong` Binary: above-median strength (`w_strength`).

`w_strength_qrt` Ordered categorical (4 levels): quartile bucket of `w_strength`.

Source

Granzier, R., V. Pons, and C. Tricaud (2023). Coordination and Bandwagon Effects: How Past Rankings Shape the Behavior of Voters and Candidates. *American Economic Journal: Applied Economics* 15(4): 177-217.

Examples

```
data(rdhte_dataset)
str(rdhte_dataset)
```

`rdhte_lincom` *RD Heterogeneous Treatment Effects. Linear combinations of parameters*

Description

`rdhte_lincom` computes point estimates, p-values, and robust bias-corrected confidence intervals for linear combinations of parameters after any estimation using `rdhte` (Calonico, Cattaneo, Farrell, Palomba and Titiunik, 2025a). Inference is implemented using robust bias-correction methods (Calonico, Cattaneo, and Titiunik, 2014). It is based on the `R` function `glht`.

Companion commands: `rdhte` for estimation and inference of RD-HTE and `rdbwhte` for data-driven bandwidth selection.

A detailed introduction to the software is given in Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025b).

Related software packages for analysis and interpretation of RD designs and related methods are available in: `https://rdpackages.github.io/`.

For background methodology, see Calonico, Cattaneo, Farrell, and Titiunik (2019), Calonico, Cattaneo and Farrell (2020), and Cattaneo and Titiunik (2022).

Usage

```
rdhte_lincom(model, linfct, level = 95, digits = 3)
```

Arguments

`model`	a fitted model returned by `rdhte`.
`linfct`	a specification of the linear hypotheses to be tested. Linear functions can be specified by either the matrix of coefficients or by symbolic descriptions of one or more linear hypotheses.
`level`	Confidence level for intervals (percentage form, in `[1, 100]`); default is `level = 95`. Passing the fraction form (e.g. `0.95`) is rejected with a clear error.
`digits`	Number of decimal places to format numeric outputs (default 3).

Value

A list with two data frames:

`individual` One row per hypothesis. Columns: `hypothesis`, `estimate` (conventional point estimate of the linear combination), `z_stat` (asymptotic z-statistic from the bias-corrected fit), `p_value` (two-sided p-value from the standard normal), `conf.low`, `conf.high` (robust bias-corrected CI bounds at the requested confidence level).

`joint` One row. Columns: `statistic` (Wald chi-squared from the bias-corrected fit), `df` (number of restrictions), `p_value`.

Numeric columns are rounded to `digits` decimal places.

Author(s)

Sebastian Calonico, University of California, Davis <scalonico@ucdavis.edu>.

Matias D. Cattaneo, Princeton University <matias.d.cattaneo@gmail.com>.

Max H. Farrell, University of California, Santa Barbara <mhfarrell@gmail.com>.

Filippo Palomba, Princeton University <filippo.palomba19@gmail.com>.

Rocio Titiunik, Princeton University <rocio.titiunik@gmail.com>.

References

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): rdhte: Conditional Average Treatment Effects in RD Designs. *Working paper*.

Calonico, Cattaneo, Farrell, Palomba and Titiunik (2025): Treatment Effect Heterogeneity in Regression Discontinuity Designs. *Working paper*.

Cattaneo and Titiunik. 2022. Regression Discontinuity Designs. *Annual Review of Economics*, 14: 821-851.

Calonico, Cattaneo, and Farrell. 2020. Optimal Bandwidth Choice for Robust Bias Corrected Inference in Regression Discontinuity Designs. *Econometrics Journal*, 23(2): 192-210.

Calonico, Cattaneo, Farrell, and Titiunik. 2019. Regression Discontinuity Designs using Covariates. *Review of Economics and Statistics*, 101(3): 442-451.

Calonico, Cattaneo, and Titiunik. 2014a. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs. *Econometrica* 82(6): 2295-2326.

Granzier, Pons, and Tricaud. 2023. Coordination and Bandwagon Effects: How Past Rankings Shape the Behavior of Voters and Candidates. *American Economic Journal: Applied Economics*, 15(4): 177-217.

See Also

`rdhte`, `rdbwhte`

Examples

```
set.seed(123)
n <- 1000
X <- runif(n, -1, 1)
W <- rbinom(n, 1, 0.5)
Y <- 3 + 2*X + 1.5*X^2 + 0.5*X^3 + sin(2*X) + 3*W*(X>=0) + rnorm(n)
m1 <- rdhte(y = Y, x = X, covs.hte = factor(W))
linfct <- c("`factor(W)0` - `factor(W)1` = 0")
rdhte_lincom(model = m1, linfct = linfct)

## Not run:
```

```
data(rdhte_dataset)
with(rdhte_dataset, {
  rd_ideology <- rdhte(y = y, x = x, covs.hte = factor(w_ideology),
                       cluster = cluster_var)
  rdhte_lincom(rd_ideology,
               linfct = c("`factor(w_ideology)4` - `factor(w_ideology)3` = 0",
                          "`factor(w_ideology)4` = 0"))
})

## End(Not run)
```

Index

∗ **datasets**
rdhte_dataset, 13

glht, *14*

plot.rdhte, 3

rdbwhte, *2*, 4, *7*, *9*, *11*, *14*, *15*
rdhte, *2–4*, 7, *7*, *12*, *14*, *15*
rdhte-package, 2
rdhte_contrast, 12
rdhte_dataset, 13
rdhte_lincom, *4*, *7*, *10–12*, 14

vcovCL, *9*