

Package ‘rdhte’

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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](https://doi.org/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.

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Imports rdrobust (>= 4.0.0), sandwich, multcomp

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| | |
|---------------|---|
| rdhte-package | <i>rdhte: RD Heterogeneous Treatment Effects Estimation and Inference</i> |
|---------------|---|

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 `rdbwhite` 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 `rdrubust` (Calonico, Cattaneo, Farrell, Titiunik (2017) and `rdmulti`, Cattaneo, Titiunik, VazquezBare (2020).

Commands: `rdhte` for estimation and inference. `rdbwhite` 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/>.

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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)
```

 rdbwhite

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

Description

rdbwhite 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

```
rdbwhite(
  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 $\min(\text{mserd}, \text{msesum})$. msecomb2 for $\text{median}(\text{msetwo}, \text{mserd}, \text{msesum})$, 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 $\min(\text{cerrd}, \text{cersum})$. cercomb2 for $\text{median}(\text{certwo}, \text{cerrd}, \text{cersum})$, for each side of the cutoff separately. Note: MSE = Mean Square Error; CER = Coverage Error Rate. Default is <code>bwselect=mserd</code> . |
| bw.joint | logical. If TRUE, forces all bandwidths to be the same across groups (default is <code>bw.joint = FALSE</code>). When <code>covs.hte</code> 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, <code>y</code> , <code>x</code> , <code>covs.hte</code> , <code>covs.eff</code> , <code>weights</code> , <code>cluster</code> , and <code>subset</code> may be given as bare variable names referring to columns of data. |

Value

A list with the following named elements:

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

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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 <code>rdbwhte</code> . 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 <code>vcovCL</code> . |
| 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: <code>mserd</code> one common MSE-optimal bandwidth selector for the RD treatment effect estimator. <code>msetwo</code> two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. <code>msum</code> one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). <code>msecomb1</code> for <code>min(mserd,msum)</code> . <code>msecomb2</code> for <code>median(msetwo,mserd,msum)</code> , for each side of the cutoff separately. <code>cerrd</code> one common CER-optimal bandwidth selector for the RD treatment effect estimator. <code>certwo</code> two different CER-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator. <code>cersum</code> one common CER-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). <code>cercomb1</code> for <code>min(cerrd,cersum)</code> . <code>cercomb2</code> for <code>median(certwo,cerrd,cersum)</code> , for each side of the cutoff separately. Note: MSE = Mean Square Error; CER = Coverage Error Rate. Default is <code>bwselect=mserd</code> . |
| bw.joint | logical. If TRUE, forces all bandwidths to be the same across groups (default is <code>bw.joint = FALSE</code>). When <code>covs.hte</code> 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, <code>y</code> , <code>x</code> , <code>covs.hte</code> , <code>covs.eff</code> , <code>weights</code> , <code>cluster</code> , and <code>subset</code> may be given as bare variable names referring to columns of data. <code>covs.hte</code> additionally accepts a one-sided formula (e.g. " <code>~ z1 + z2</code> ") 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:

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

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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 | <i>RD Heterogeneous Treatment Effects: contrast-targeted bandwidth</i> |
|----------------|--|

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 <code>nrow(model\$Estimate)</code> . 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 | <i>RD Heterogeneous Treatment Effects. Linear combinations of parameters</i> |
|--------------|--|

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 <code>rdhte</code> . |
| 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. <code>0.95</code>) 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.

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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)
```

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