

Package ‘orddid’

February 10, 2020

Title Difference-in-Differences Design for Ordinal Outcome

Version 0.1.0

Imports cli,
crayon,
Matrix,
Rcpp,
RcppArmadillo,
VGAM

LinkingTo Rcpp,
RcppArmadillo

Description A R package for implementing difference-in-differences design for the ordinal outcome.

License GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Suggests testthat (>= 2.1.0),
dplyr,
haven,
covr

R topics documented:

orddid-package	2
calc_threshold	2
equivalence_test	3
gun_threewave	4
gun_twowave	5
ord_did	6
plot.orddid.test	7
summary.orddid	8
Index	9

orddid-package

Difference-in-Differences for Ordinal Outcomes

Description

This package provides tools for estimating treatment effects and diagnosing assumptions with ordinal outcomes in the difference-in-differences design.

Details

The package has the following main functions:

- `ord_did`: Implements the ordinal DID estimator.
- `summary.orddid`: Output the treatment effects and their uncertainties.
- `equivalence_test`: Test the assumption in the pre-treatment periods.
- `plot.orddid.test`: Visualize the result of the equivalence test.

In addition to the above functions, orddid packages contains two example datasets: [gun_twowave](#) and [gun_threewave](#).

Author(s)

Maintainer: Soichiro Yamauchi <syamauchi@g.harvard.edu> (0000-0003-0554-2717)

calc_threshold

Selecting the equivalence threshold

Description

`calc_threshold()` computes the data-dependent threshold for the equivalence test.

Usage

```
calc_threshold(object, omega = 0.05)
```

Arguments

`object` An object from `ord_did`, where the estimation is based on the pre-treatment data (`pre = TRUE`).

Value

`calc_threshold()` return a value of equivalence threshold, which can be supplied to `threshold` argument in `equivalence_test`.

equivalence_test	<i>Conduct an equivalence test of the distributional parallel trends assumption.</i>
------------------	--------------------------------------------------------------------------------------

Description

equivalence_test() implements an equivalence test to assess the distributional parallel trends assumption using the data from the pre-treatment periods.

Usage

```
equivalence_test(object, alpha = 0.05, threshold = NULL)
```

Arguments

object	A fitted object from ord_did .
alpha	The level of a test. This value should take between 0 and 1. Default is 0.05.
threshold	An equivalence threshold. If left as NULL, the data-driven threshold, estimated in calc_threshold , is used for the test.

Value

equivalence_test() returns a list of class 'orddid.test', which contains the following items:

tv	A vector of point-wise deviation between $q1(v)$ and $q0(v)$.
tv_var	A vector of variances for each $t(v)$.
tmax	A maximum deviation of $q1(v)$ and $q0(v)$.
v_range	A range of v used to evaluate $q1$ and $q0$.
Uv	Point wise $1 - \alpha$ level upper confidence interval.
Lv	Point wise $1 - \alpha$ level lower confidence interval.
Umax	Maximum upper bound.
Lmin	Minimum lower bound.
Upvalue	Point-wise pvalues associated with the upper bounds.
Lpvalue	Point-wise pvalues associated with the lower bounds.
pvalue	P-value of the test.
zscore	Z-score of the test.
reject	Decision of the equivalence test. If TRUE, the test rejects the null of non-equivalence.

gun_threewave	<i>Three-wave panel from Barney and Schaffner (2019)</i>
---------------	----------------------------------------------------------

Description

gun_threewave is a part of the replication data from Barney and Schaffner (2019). The data set is constructed combining the three-wave panel from the Cooperative Congressional Election Study (CCES) 2010-12-14 study with the mass shooting data originally analyzed by Newman and Hartman (2019).

Usage

```
gun_threewave
```

Format

An object of class `spec_tbl_df` (inherits from `tbl_df`, `tbl`, `data.frame`) with 23832 rows and 11 columns.

Source

Barney, David; Schaffner, Brian. "Replication Data for: Reexamining the Effect of Mass Shootings on Public Support for Gun Control." <https://doi.org/10.7910/DVN/YJQIXP>, Harvard Dataverse, V1, 2018.

Schaffner, Brian; Ansolabehere, Stephen. "2010-2014 Cooperative Congressional Election Study Panel Survey." <https://doi.org/10.7910/DVN/TOE8I1>, Harvard Dataverse, V11, 2015.

References

Barney, David J., and Brian F. Schaffner. "Reexamining the Effect of Mass Shootings on Public Support for Gun Control." *British Journal of Political Science* 49.4 (2019): 1555-1565. <https://doi.org/10.1017/S0007123418000352>.

Newman, B. J. and Hartman, T. K. "Mass shootings and public support for gun control." *British Journal of Political Science*, 49.4 (2019): 1527–1553. <https://doi.org/10.1017/S0007123417000333>.

Examples

```
require(dplyr)
require(haven)
data("gun_threewave")
gun_threewave
```

gun_twowave

Two-wave panel from Barney and Schaffner (2019)

Description

gun_twowave is a part of the replication data from Barney and Schaffner (2019). The data set is constructed combining the two-wave panel from the Cooperative Congressional Election Study (CCES) 2010-12 study with the mass shooting data originally analyzed by Newman and Hartman (2019).

Usage

gun_twowave

Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 33106 rows and 11 columns.

caseid Unique id of a respondent.

year Year of the response.

guns Attitudes towards gun control, corresponding to a variable 'CC320' in CCES. (1) "Less Strict", (2) "Kept As They Are" and (3) "More Strict".

pds_25mi "Prior exposure" variable, taking (1) if the mass shootings happened within 25 miles between 2000 and 2010.

pds_100mi "Prior exposure" variable, taking (1) if the mass shootings happened within 100 miles between 2000 and 2010.

reszip Zipcode of a respondent.

party2010 3-point scale party id constructed by Barney and Schaffner (2019) based on 'pid7' in 2010.

pid3 3-point scale party id, measured in 2010.

pid7 7-point scale party id, measured in 2010.

treat_25mi Treatment indicator which takes 1 if the mass shootings happened within 25 miles.

treat_100mi Treatment indicator which takes 1 if the mass shootings happened within 100 miles.

Source

Barney, David; Schaffner, Brian. "Replication Data for: Reexamining the Effect of Mass Shootings on Public Support for Gun Control." <https://doi.org/10.7910/DVN/YJQIXP>, Harvard Dataverse, V1, 2018.

Ansolabehere, Stephen; Schaffner, Brian. "2010 - 2012 CCES Panel Study." <https://doi.org/10.7910/DVN/24416>, Harvard Dataverse, V4, 2014.

References

Barney, David J., and Brian F. Schaffner. "Reexamining the Effect of Mass Shootings on Public Support for Gun Control." *British Journal of Political Science* 49.4 (2019): 1555-1565. <https://doi.org/10.1017/S0007123418000352>.

Newman, B. J. and Hartman, T. K. "Mass shootings and public support for gun control." *British Journal of Political Science*, 49.4 (2019): 1527–1553. <https://doi.org/10.1017/S0007123417000333>.

Examples

```
require(dplyr)
require(haven)
data("gun_twowave")
gun_twowave
```

ord_did

*Ordinal Difference-in-Differences for Panel Data***Description**

ord_did() implements the difference-in-differences for the ordinal outcome.

Usage

```
ord_did(Ynew, Yold, treat, id_cluster = NULL, cut = c(0, 1),
        n_boot = 500, pre = FALSE, verbose = FALSE)
```

Arguments

Ynew	A numeric vector of ordinal outcome for the post-treatment period.
Yold	A numeric vector of ordinal outcome for the pre-treatment period.
treat	A numeric vector of treatment indicator. The treatment group should take 1 and the control group should take 0.
id_cluster	A vector of cluster id. If left as NULL, bootstrap is implemented at the individual level.
cut	A vector of cutoffs. Two numeric values should be specified. Default is cut = c(0, 1).
n_boot	The number of bootstrap iterations for estimating the variance. Default is n_boot = 500.
pre	A boolean argument used to indicate if the data comes entirely from pre-treatment periods. This should be TRUE when the output is supplied to equivalence_test .
verbose	If TRUE, print the progress of bootstrap iterations.

Value

ord_did() returns a list of class 'orddid' containing the following components:

fit	A list with the output of the ordinal DID estimators, which contains parameter estimates and predicted probabilities for each category.
boot	A list with the output of bootstraps, which contains parameter estimates and predicted probabilities for each category.
boot_params	A list with all objects generated during the bootstrap step.

Examples

```
## load packages
library(orddid)
library(dplyr)

## load example data
data("gun_twowave")

## run
## fit the ordinal DID
set.seed(1234)
fit <- ord_did(
  Ynew = gun_twowave %>% filter(year == 2012) %>% pull(guns),
  Yold = gun_twowave %>% filter(year == 2010) %>% pull(guns),
  treat = gun_twowave %>% filter(year == 2012) %>% pull(treat_100mi),
  id_cluster = gun_twowave %>% filter(year == 2010) %>% pull(reszip),
  n_boot = 10,
  pre = FALSE,
  verbose = FALSE
)

## view summary of the output
## non-cumulative effects
summary(fit, cumulative = FALSE)

## cumulative effects
summary(fit)
```

plot.orddid.test

Visualizing the result of equivalence_test()

Description

plot.orddid.test generates a plot that visualize the result of [equivalence_test](#).

Usage

```
## S3 method for class 'orddid.test'
plot(obj, ylim, fill = TRUE, ...)
```

Arguments

obj	An output from equivalence_test().
ylim	Range of y-axis of the plot.
fill	A boolean argument; if TRUE, confidence band is filled by a polygon.
...	Other arguments passed to plot() function.

summary.orddid *Get summaries of ord_did() and equivalence_test() objects.*

Description

summary.orddid() calculates and reports treatment effects and their uncertainties from a [ord_did](#) object. summary.orddid() reports summaries of an equivalence test when an [equivalence_test](#) object is provided.

Usage

```
## S3 method for class 'orddid'  
summary(obj, cumulative = TRUE)
```

Arguments

obj	An object from ord_did or equivalence_test .
cumulative	A boolean argument to indicate if cumulative effect is reported. Default is TRUE. Only effective for displaying the causal effects.

Index

*Topic **dataset**

gun_threewave, 4

gun_twowave, 5

calc_threshold, 2, 3

equivalence_test, 2, 3, 6–8

gun_threewave, 2, 4

gun_twowave, 2, 5

ord_did, 2, 3, 6, 8

orddid (orddid-package), 2

orddid-package, 2

plot.orddid.test, 2, 7

summary.orddid, 2, 8