

Package ‘fastdid’

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Type Package

Title Fast Staggered Difference-in-Difference Estimators

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Description A fast and flexible implementation of Callaway and Sant'Anna's (2021)<doi:10.1016/j.jeconom.2020.12.001> staggered Difference-in-Differences (DiD) estimators, 'fastdid' reduces the computation time from hours to seconds, and incorporates extensions such as time-varying covariates and multiple events.

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Depends R (>= 4.1.0)

Imports data.table (>= 1.15.0), stringr, BMisc, collapse, dreamerr (>= 1.4.0), ggplot2

Suggests did, knitr, parallel, rmarkdown, tinytest

Encoding UTF-8

RoxygenNote 7.3.2

URL <https://github.com/TsaiLintung/fastdid>,
<https://tsailintung.github.io/fastdid/>

BugReports <https://github.com/TsaiLintung/fastdid/issues>

VignetteBuilder knitr

NeedsCompilation no

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fastdid	<i>Fast Staggered DID Estimation</i>
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Description

Performs Difference-in-Differences (DID) estimation.

Usage

```
fastdid(
  data,
  timevar,
  cohortvar,
  unitvar,
  outcomevar,
  control_option = "both",
  result_type = "group_time",
  balanced_event_time = NA,
  control_type = "ipw",
  allow_unbalance_panel = FALSE,
  boot = FALSE,
  biters = 1000,
  cband = FALSE,
  alpha = 0.05,
  weightvar = NA,
  clustervar = NA,
  covariatesvar = NA,
  varycovariatesvar = NA,
  copy = TRUE,
  validate = TRUE,
  anticipation = 0,
  anticipation2 = 0,
  base_period = "universal",
  exper = NULL,
  full = FALSE,
  parallel = FALSE,
  cohortvar2 = NA,
  event_specific = TRUE,
  double_control_option = "both"
)
```

Arguments

data	data.table, the dataset.
timevar	character, name of the time variable.
cohortvar	character, name of the cohort (group) variable.
unitvar	character, name of the unit (id) variable.
outcomevar	character vector, name(s) of the outcome variable(s).
control_option	character, control units used for the DiD estimates, options are "both", "never", or "notyet".
result_type	character, type of result to return, options are "group_time", "time", "group", "simple", "dynamic" (time since event), "group_group_time", or "dynamic_stagger".
balanced_event_time	number, max event time to balance the cohort composition.
control_type	character, estimator for controlling for covariates, options are "ipw" (inverse probability weighting), "reg" (outcome regression), or "dr" (doubly-robust).
allow_unbalance_panel	logical, allow unbalance panel as input or coerce dataset into one.
boot	logical, whether to use bootstrap standard error.
biters	number, bootstrap iterations. Default is 1000.
cband	logical, whether to use uniform confidence band or point-wise.
alpha	number, the significance level. Default is 0.05.
weightvar	character, name of the weight variable.
clustervar	character, name of the cluster variable.
covariatesvar	character vector, names of time-invariant covariate variables.
varycovariatesvar	character vector, names of time-varying covariate variables.
copy	logical, whether to copy the dataset.
validate	logical, whether to validate the dataset.
anticipation	number, periods with anticipation.
anticipation2	number, periods with anticipation for the second event.
base_period	character, type of base period in pre-preiods, options are "universal", or "varying".
exper	list, arguments for experimental features.
full	logical, whether to return the full result (influence function, call, weighting scheme, etc.,).
parallel	logical, whether to use parallization on unix system.
cohortvar2	character, name of the second cohort (group) variable.
event_specific	logical, whether to recover target treatment effect or use combined effect.
double_control_option	character, control units used for the double DiD, options are "both", "never", or "notyet".

Details

‘balanced_event_time’ is only meaningful when ‘result_type == "dynamic“.
 ‘result_type’ as ‘group-group-time’ and ‘dynamic staggered’ is only meaningful when using double did.
 ‘biter’ and ‘clustervar’ is only used when ‘boot == TRUE’.

Value

A data.table containing the estimated treatment effects and standard errors or a list of all results when ‘full == TRUE’.

Examples

```
# simulated data
simdt <- sim_did(1e+02, 10, cov = "cont", second_cov = TRUE, second_outcome = TRUE, seed = 1)
dt <- simdt$dt

# basic call
result <- fastdid(
  data = dt, timevar = "time", cohortvar = "G",
  unitvar = "unit", outcomevar = "y",
  result_type = "group_time"
)
```

plot_did_dynamics *Plot event study*

Description

Plot event study results.

Usage

```
plot_did_dynamics(x, margin = "event_time")
```

Arguments

x	A data table generated with [fastdid] with one-dimensional index.
margin	character, the x-axis of the plot

Value

A ggplot2 object

Examples

```

# simulated data
simdt <- sim_did(1e+02, 10, seed = 1)
dt <- simdt$dt

# estimation
result <- fastdid(
  data = dt, timevar = "time", cohortvar = "G",
  unitvar = "unit", outcomevar = "y",
  result_type = "dynamic"
)

# plot
plot_did_dynamics(result)

```

sim_did

Simulate a Difference-in-Differences (DiD) dataset

Description

Simulates a dataset for a Difference-in-Differences analysis with various customizable options.

Usage

```

sim_did(
  sample_size,
  time_period,
  untreated_prop = 0.3,
  epsilon_size = 0.001,
  cov = "no",
  hetero = "all",
  second_outcome = FALSE,
  second_cov = FALSE,
  vary_cov = FALSE,
  na = "none",
  balanced = TRUE,
  seed = NA,
  stratify = FALSE,
  treatment_assign = "latent",
  second_cohort = FALSE,
  confound_ratio = 1,
  second_het = "all"
)

```

Arguments

sample_size	The number of units in the dataset.
time_period	The number of time periods in the dataset.
untreated_prop	The proportion of untreated units.
epsilon_size	The standard deviation for the error term in potential outcomes.
cov	The type of covariate to include ("no", "int", or "cont").
hetero	The type of heterogeneity in treatment effects ("all" or "dynamic").
second_outcome	Whether to include a second outcome variable.
second_cov	Whether to include a second covariate.
vary_cov	include time-varying covariates
na	Whether to generate missing data ("none", "y", "x", or "both").
balanced	Whether to balance the dataset by random sampling.
seed	Seed for random number generation.
stratify	Whether to stratify the dataset based on a binary covariate.
treatment_assign	The method for treatment assignment ("latent" or "uniform").
second_cohort	include confounding events
confound_ratio	extent of event confoundedness
second_het	heterogeneity of the second event

Value

A list containing the simulated dataset (dt) and the treatment effect values (att).

Examples

```
# Simulate a DiD dataset with default settings
data <- sim_did(sample_size = 100, time_period = 5)
```

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