Package ‘RCT2’

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Description

This function computes the point estimates and variance estimates of the direct effect and spillover effect for ITT and CADE/CASE

Usage

CADEparamreg(data, assign.prob, ci.level = 0.95)

Arguments

data A data frame containing the relevant variables. The names for the variables should be: “Z” for the treatment assignment, “D” for the actual received treatment, “Y” for the outcome, “A” for the treatment assignment mechanism and “id” for the cluster ID. The variable for the cluster id should be a factor.

assign.prob A double between 0 and 1 specifying the assignment probability to either assignment mechanism.

ci.level A double between 0 and 1 specifying the confidence interval level to be output.

Details

For the details of the method implemented by this function, see the references.
Value

A list of class CADEparamreg which contains the following items:

- **ITT.DE**: Estimate of direct effect under ITT regression.
- **ITT.SE**: Estimate of spillover effect under ITT regression.
- **ITT.DE.CI**: Confidence interval of direct effect under ITT regression.
- **ITT.SE.CI**: Confidence interval of spillover effect under ITT regression.
- **IV.DE**: Estimate of direct effect under IV regression.
- **IV.SE**: Estimate of spillover effect under IV regression.
- **IV.DE.CI**: Confidence interval of direct effect under IV regression.
- **IV.SE.CI**: Confidence interval of spillover effect under IV regression.
- **ITT.tstat**: t-stats from ITT regression.
- **IV.tstat**: t-stats from IV regression.
- **ITT.pvals**: p-values from ITT regression.
- **IV.pvals**: p-values from IV regression.

```r
data(india) india$id <- factor(india$id) CADEreg(india, ci.level = 0.90)
```

Author(s)

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References


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CADErand  
Randomization-based method for the complier average direct effect and the complier average spillover effect

Description

This function computes the point estimates and variance estimates of the complier average direct effect (CADE) and the complier average spillover effect (CASE). The estimators calculated using this function are either individual weighted or cluster-weighted. The point estimates and variances of ITT effects are also included.
Usage

CADErand(data, individual = 1, ci = 0.95)

Arguments

data A data frame containing the relevant variables. The names for the variables should be: “Z” for the treatment assignment, “D” for the actual received treatment, “Y” for the outcome, “A” for the treatment assignment mechanism and “id” for the cluster ID. The variable for the cluster id should be a factor.

individual A binary variable with TRUE for individual-weighted estimators and FALSE for cluster-weighted estimators.

ci A numeric variable between 0 and 1 for the level of the confidence interval to be returned.

Details

For the details of the method implemented by this function, see the references.

Value

A list of class CADEr and which contains the following items:

CADE The point estimates of the CADE for each assignment mechanism.
CASE The point estimate of CASE for each assignment mechanism.
var.CADE The variance estimate of CADE for each assignment mechanism.
var.CASE The variance estimate of CASE for each assignment mechanism.
DEY The point estimate of DEY for each assignment mechanism.
DED The point estimate of DED for each assignment mechanism.
var.DEY The variance estimate of DEY for each assignment mechanism.
var.DED The variance estimate of DED for each assignment mechanism.
SEY The point estimate of SEY for each pairwise groups of assignment mechanisms.
SED The point estimate of SED for each pairwise groups of assignment mechanisms.
var.SEY The variance estimate of SEY for each pairwise groups of assignment mechanisms.
var.SED The variance estimate of SED for each pairwise groups of assignment mechanisms.
lci.CADE The left endpoint for the confidence intervals for the CADE from each assignment mechanism.
rci.CADE The right endpoint for the confidence intervals for the CADE from each assignment mechanism.
lci.CASE The left endpoint for the confidence intervals for the CASE from each assignment mechanism.
rci.CASE The left endpoint for the confidence intervals for the CASE from each assignment mechanism.
CADEreg

<table>
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<td>lci.DEY</td>
<td>The left endpoint for the confidence intervals for the DEY from each assignment mechanism.</td>
</tr>
<tr>
<td>rci.DEY</td>
<td>The left endpoint for the confidence intervals for the DEY from each assignment mechanism.</td>
</tr>
<tr>
<td>lci.SEY</td>
<td>The left endpoint for the confidence intervals for the SEY from each pairwise groups of assignment mechanisms.</td>
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</tr>
<tr>
<td>lci.SED</td>
<td>The left endpoint for the confidence intervals for the SED from each pairwise groups of assignment mechanisms.</td>
</tr>
<tr>
<td>rci.SED</td>
<td>The left endpoint for the confidence intervals for the SED from each pairwise groups of assignment mechanism.</td>
</tr>
</tbody>
</table>

Author(s)

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References


Examples

data(india)
india$id <- factor(india$id)
CADErand(india, 0.95)

CADEreg Regression-based method for the complier average direct effect
Description

This function computes the point estimates of the complier average direct effect (CADE) and four different variance estimates: the HC2 variance, the cluster-robust variance, the cluster-robust HC2 variance and the variance proposed in the reference. The estimators calculated using this function are cluster-weighted, i.e., the weights are equal for each cluster. To obtain the individual-weighted estimators, please multiply the received treatment and the outcome by $n_jJ/N$, where $n_j$ is the number of individuals in cluster $j$, $J$ is the number of clusters and $N$ is the total number of individuals.

Usage

CADEreg(data, ci.level = 0.95)

Arguments

data A data frame containing the relevant variables. The names for the variables should be: “Z” for the treatment assignment, “D” for the actual received treatment, “Y” for the outcome, “A” for the treatment assignment mechanism and “id” for the cluster ID. The variable for the cluster id should be a factor.

ci.level A double between 0 and 1 specifying the confidence interval level to be output.

Details

For the details of the method implemented by this function, see the references.

Value

A list of class CADEreg which contains the following items:

CADE1 The point estimate of CADE(1).
CADE0 The point estimate of CADE(0).
var1.clu The cluster-robust variance of CADE(1).
var0.clu The cluster-robust variance of CADE(0).
var1.clu.hc2 The cluster-robust HC2 variance of CADE(1).
var0.clu.hc2 The cluster-robust HC2 variance of CADE(0).
var1.hc2 The HC2 variance of CADE(1).
var0.hc2 The HC2 variance of CADE(0).
var1.ind The individual-robust variance of CADE(1).
var0.ind The individual-robust variance of CADE(0).
var1.reg The proposed variance of CADE(1).
var0.reg The proposed variance of CADE(0).

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References


Examples

data(india)
india$id <- factor(india$id)
CADEreg(india, ci.level = 0.90)

CalAPO

Point Estimation and Variance for the unit-level direct effect (ADE), marginal direct effect (MDE), and unit level spillover effect (ASE)

Description

This function calculates the estimated average potential outcomes $Y(z,a)$, point estimates for the ADE, MDE, and ASE, and conservative covariance matrix estimates.

Usage

CalAPO(data)

Arguments

data: A data frame containing the relevant variables. The names for the variables should be “Z” for the treatment assignment, “Y” for the treatment outcome, “A” for the treatment assignment mechanism, and “id” for the cluster ID. The variable for the cluster ID should be a factor.

Details

For the details of the method implemented by this function, see the references.

Value

A list of class CalAPO which contains the following items:

- Y.hat: Estimate of the average potential outcomes.
- ADE.est: Estimate of the unit level direct effect.
- MDE.est: Estimate of the marginal direct effect.
- ASE.est: Estimate of the unit level spillover effect.
- cov.hat: Conservative covariance matrix for the estimated potential outcomes.
- var.hat.ADE: Estimated variance of the ADE.
- var.hat.MDE: Estimated variance of the MDE.
- var.hat.ASE: Estimated variance of the ASE.
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References

Examples
data(jd)
data_LTFC <- data.frame(jd$assigned, jd$pct0, jd$cdd6m, jd$anonale)
colnames(data_LTFC) <- c("Z", "A", "Y", "id")
test <- CalAPO(data_LTFC)
print(CalAPO(data_LTFC))

calpara Sample size parameter calculations for detecting a specific alternative

Description
This function calculates the parameters needed for the method to calculate sample size references.

Usage
calpara(data)

Arguments
data A data frame containing the relevant variables. The names for the variables should be "Z" for the treatment assignment, "Y" for the treatment outcome, "A" for the treatment assignment mechanism, and "id" for the cluster ID. The variable for the cluster ID should be a factor.

Value
A list of class calpara which contains the following item:
sigmaw The within-cluster variance of the potential outcomes, with the assumption that the all of the variances the same.
sigmab The between-cluster variance of the potential outcomes, with the assumption that all of the variances are the same.
r The intraclass correlation coefficient with respect to the potential outcomes.
sigma.tot The total variance of the potential outcomes.
n.avg The mean of the number of treated observations by cluster.


### Calsamplesize

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**References**


**Examples**

```r
data(jd)
data_LTFC <- data.frame(jd$assigned, jd$pct0, jd$cdd6m, jd$anonale)
colnames(data_LTFC) <- c("Z", "A", "Y", "id")
var_LTFC <- calpara(data_LTFC)
```

**Calsamplesize**

*Sample size calculations for detecting a specific alternative*

**Description**

This function calculates the sample size needed to detect a specific alternative hypothesis with a given power at a given significance level. For the details of the method implemented by this function, see the references.

**Usage**

```r
Calsamplesize(data, mu, qa, alpha = 0.05, beta = 0.2)
```

**Arguments**

- **data** A data frame containing the relevant variables. The names for the variables should be “Z” for the treatment assignment, “Y” for the treatment outcome, “A” for the treatment assignment mechanism, and “id” for the cluster ID. The variable for the cluster ID should be a factor.
- **mu** The effect size (i.e. the largest direct effect across treatment assignment mechanisms).
- **qa** The proportions of different treatment assignment mechanisms.
- **alpha** The given significance level (default 0.05).
- **beta** The given power level (default 0.2).
Value
A list of class sampleSRE which contains the following item:
samplesize A list of the calculated necessary number of clusters for each assignment mechanism in order to detect a specific alternative with a given power at a given significance level.

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References

Description
Replication Data for: Causal Inference with Interference and Noncompliance in Two-Stage Randomized Experiments.

Usage
data(india)

Format
A data frame with columns:

id The id for the village.
DistrictId The id for the district.
Z The treatment status for the individual.
A The treatment assignment mechanism.
D Whether or not the individual enrolled.
Y The hospital expenditure.
X Enumeration of the patients.

Source
doi:10.7910/DVN/N7D9LS
Replication Data for: Statistical Inference and Power Analysis for Direct and Spillover Effects in Two-Stage Randomized Experiments

Description

Replication Data for: Statistical Inference and Power Analysis for Direct and Spillover Effects in Two-Stage Randomized Experiments

Usage

data(jd)

Format

A data frame with columns:

- **anonale** The local employment agency.
- **tempsc_av** Categorical variable for full-time work at time of assignment (1: 1-4 months, 2: 4-8 months, 3: 8-12 months, 4: 12+ months)
- **assigned** An indicator variable for whether or not the individual is assigned to treatment.
- **pct0** The share of the local population treated (as a decimal).
- **cdi** An indicator variable for whether the individual works on a permanent contract 8 months after assignment.
- **cdd6m** An indicator variable for whether the individual works in CDD (LTFC-time contract) for more than 6 months, 8 months after the assignment.
- **emploidur** An indicator variable for whether the individual works on a permanent or LTFC-term contract for more than 6 months, 8 months after the assignment.
- **tempsc** An indicator variable for whether the individual works full time, 8 months after the assignment.
- **salaire** The individual’s salary in Euros.

Print Method for the RCT2 Package

Description

This function prints a nicely formatted summary of the three functions in the RCT2 package.

Usage

```r
## S3 method for class 'regression'
print(x, ...)
```
Arguments

- `data`: A list object generated by running one of the analyses on a data set.
- `effect`: Specify which null hypothesis to be tested. “DE” for direct effect, “ME” for marginal effect, and “SE” for spillover effect.
- `alpha`: The level of significance at which the test is to be run (default is 0.05).

Details

For the details of the method implemented by this function, see the references.

Value

`NULL`

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References


Description

This function tests the null hypotheses of no direct effect, no marginal direct effect, and no spillover effect.

Usage

```r
Test2SRE(data, effect = "DE", alpha = 0.05)
```
Details

For the details of the method implemented by this function, see the references.

Value

A list of class Test2SRE which contains the following item:

rej Rejection region for test conducted.

Author(s)

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References


Examples

data(jd)
data_LTFC <- data.frame(jd$assigned, jd$pct0, jd$cdd6m, jd$anonale)
colnames(data_LTFC) <- c(“Z”, “A”, “Y”, “id”)
Test2SRE(data_LTFC, effect=”MDE”, alpha=0.05)
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