Package 'twfeivdecomp'

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Title Instrumented Difference-in-Differences Decomposition

Version 0.1.0

Description Implements a decomposition of the two-
way fixed effects instrumental variable estimator into all possible Wald difference-in-differences estimators.
Provides functions to summarize the contribution of different cohort comparisons to the overall two-way fixed effects instrumental variable estimate, with or without controls.
The method is described in Miyaji (2024) <doi:10.48550/arXiv.2405.16467>.

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Encoding UTF-8

RoxygenNote 7.3.1

URL https://github.com/shomiyaji/twfeiv-decomp

BugReports https://github.com/shomiyaji/twfeiv-decomp/issues

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

Depends R (>= 3.5)

LazyData true

Imports dplyr, Formula, AER, stats, magrittr

NeedsCompilation no

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Repository CRAN

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Contents

print_summary *Print the summary.*

Description

Print the summary.

Usage

```
print_summary(data, return_df = FALSE)
```

Arguments

data	A data.frame.
return_df	Logical. If TRUE, returns the summary data.frame.

Value

Invisibly prints the summary to console. Returns a data.frame if return_df = TRUE.

simulation_data *Example simulation data*

Description

A toy dataset included in the package to illustrate the use of the twfeiv_decomp() function. This is artificial data and does not represent real observations.

Usage

```
simulation_data
```

Format

A data frame with 60 rows and 6 variables:

id Individual identifier (1–10)

time Time period (2000–2005)

instrument Binary instrumental variable

treatment Treatment variable

outcome Outcome variable

control1 Control variable 1

control2 Control variable 2

Examples

```
data(simulation_data)
head(simulation_data)
```

`twfeiv_decomp` *DID-IV decomposition*

Description

twfeiv_decomp() is a function that decomposes the TWFEIV estimator into all possible Wald-DID estimators.

Usage

```
twfeiv_decomp(formula, data, id_var, time_var, summary_output = FALSE)
```

Arguments

`formula`	A formula object of the form `Y ~ D + controls | controls + Z`, where: • Y is the outcome variable, • D is the treatment variable, • Z is a binary instrumental variable, and • controls are optional control variables. Do not include fixed effects (e.g., individual or time dummies) in the control variables.
`data`	A data frame containing all variables used in the formula, as well as the variables specified by id_var and time_var.
`id_var`	The name of id variable.
`time_var`	The name of time variable.
`summary_output`	Logical. If TRUE, prints a summary table showing, for each design type, the total weight and the weighted average of the Wald-DID estimates. If FALSE (the default), no summary is printed.

Value

If no control variables are included in the formula, the function returns a data frame named exposed_unexposed_combinations which contains the Wald-DID estimates and corresponding weights for each exposed/unexposed cohort pair.

If control variables are included, the function returns a list named decomposition_list containing:

within_IV_coefficient Numeric. The coefficient from the within-IV regression.

between_IV_coefficient Numeric. The coefficient from the between-IV regression.

Omega Numeric. The weight on the within-IV coefficient in the TWFEIV estimator, such that $TWFEIV = \Omega \times \text{within} + (1 - \Omega) \times \text{between}$.

exposed_unexposed_combinations A data.frame with the between-IV coefficients and corresponding weights for each exposed/unexposed cohort pair.

Examples

```
# Load example dataset
data(simulation_data)
head(simulation_data)

# Example without controls
decomposition_result_without_controls <- twfeiv_decomp(outcome ~ treatment | instrument,
                                       data = simulation_data,
                                       id_var = "id",
                                       time_var = "time")

# Example with controls
decomposition_result_with_controls <- twfeiv_decomp(
  outcome ~ treatment + control1 + control2 |control1 + control2 + instrument,
  data = simulation_data,
  id_var = "id",
  time_var = "time"
)
```

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