Package: xtdhcoint (via r-universe)

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Type Package

Title Durbin-Hausman Panel Cointegration Tests

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Description Implements the Durbin-Hausman panel cointegration tests of Westerlund (2008) <doi:10.1002/jae.963>. The tests are robust to cross-sectional dependence through common factor extraction using principal components. Provides both group-mean (DHg) and panel (DHp) test statistics with automatic factor number selection via information criteria.

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URL https://github.com/muhammedalkhalaf/xtdhcoint

BugReports https://github.com/muhammedalkhalaf/xtdhcoint/issues

Encoding UTF-8

LazyData true

Depends R (>= 3.5.0)

Imports stats

Suggests testthat (>= 3.0.0), knitr, rmarkdown

RoxygenNote 7.3.3

Repository https://muhammedalkhalaf.r-universe.dev

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Contents

`coef.xtdhcoint` *Coef Method for xtdhcoint Objects*

Description

Extracts the test statistics from the Durbin-Hausman test.

Usage

```
## S3 method for class 'xtdhcoint'
coef(object, ...)
```

Arguments

`object`	An object of class `"xtdhcoint"`.
`...`	Additional arguments (currently ignored).

Value

Named numeric vector of z-statistics and p-values.

`fisher_panel` *Fisher Effect Panel Dataset*

Description

Simulated panel dataset for testing the Fisher effect (cointegration between inflation and nominal interest rates). The data are generated with cointegration and common factors, suitable for demonstrating the Durbin-Hausman panel cointegration tests.

Usage

```
fisher_panel
```

Format

A data frame with 1000 observations and 4 variables:

country Character. Country identifier (Country01 through Country20).

year Integer. Year (1970-2019).

inflation Numeric. Annual inflation rate (percent).

interest Numeric. Nominal interest rate (percent).

Details

The data are simulated according to:

$$inflation_{it} = \alpha_i + \beta_i \cdot interest_{it} + F_t' \lambda_i + e_{it}$$

where F_t are common factors, λ_i are factor loadings, and e_{it} is a stationary cointegration error (under cointegration).

The cointegrating coefficient β_i is approximately 1, consistent with the Fisher hypothesis.

Source

Simulated data.

Examples

```
data(fisher_panel)
head(fisher_panel)
table(fisher_panel$country)
```

`print.xtdhcoint` *Print Method for xtdhcoint Objects*

Description

Prints the results of the Durbin-Hausman panel cointegration test.

Usage

```
## S3 method for class 'xtdhcoint'
print(x, ...)
```

Arguments

`x`	An object of class `"xtdhcoint"`.
`...`	Additional arguments (currently ignored).

Value

Invisibly returns the input object.

summary.xtdhcoint *Summary Method for xtdhcoint Objects*

Description

Provides a detailed summary of Durbin-Hausman test results with decision tables at various significance levels.

Usage

```
## S3 method for class 'xtdhcoint'
summary(object, level = 0.95, ...)
```

Arguments

object	An object of class "xtdhcoint".
level	Numeric. Confidence level for hypothesis testing. Default is 0.95.
...	Additional arguments (currently ignored).

Value

Invisibly returns a list with summary statistics.

xtdhcoint *Durbin-Hausman Panel Cointegration Tests*

Description

Performs the Durbin-Hausman panel cointegration tests of Westerlund (2008). The tests are robust to cross-sectional dependence through common factor extraction using principal components.

Usage

```
xtdhcoint(
  formula,
  data,
  id,
  time,
  kmax = 5,
  criterion = c("ic", "pc", "aic", "bic"),
  penalty = 1,
  bandwidth = -1,
  predet = 0,
  constant = TRUE
)
```

Arguments

formula	A formula specifying the cointegrating relationship (e.g., y ~ x1 + x2).
data	A data frame containing panel data.
id	Character string naming the cross-sectional unit identifier.
time	Character string naming the time period identifier.
kmax	Integer. Maximum number of common factors to consider. Default is 5.
criterion	Character string specifying the information criterion for factor number selection. One of "ic" (default), "pc", "aic", or "bic".
penalty	Integer. Penalty type for factor selection (1, 2, or 3). Default is 1.
bandwidth	Integer. Kernel bandwidth for long-run variance estimation. If -1 (default), automatic bandwidth selection using Newey-West rule.
predet	Numeric. If non-zero, uses predetermined coefficient instead of OLS estimation. Default is 0 (estimate via OLS).
constant	Logical. If TRUE (default), includes a constant term.

Details

The Durbin-Hausman tests examine the null hypothesis of no cointegration against the alternative of cointegration. The tests are based on comparing OLS and instrumental variable estimators of the autoregressive parameter in the cumulated residuals.

DHg (Group-mean statistic): Tests the null of no cointegration against the heterogeneous alternative that at least some units are cointegrated. Under the null, the standardized statistic is asymptotically N(0,1).

DHp (Panel statistic): Tests the null of no cointegration against the homogeneous alternative that all units are cointegrated with a common autoregressive parameter. Under the null, the standardized statistic is asymptotically N(0,1).

Both statistics are computed using right-tail critical values. Large positive values indicate evidence of cointegration.

Cross-sectional dependence is handled by extracting common factors from the first-differenced residuals using principal components. The number of factors is selected automatically using information criteria.

Value

An object of class "xtdhcoint" containing:

dhg Raw DHg (group-mean) statistic.

dhp Raw DHp (panel) statistic.

dhg_z Standardized DHg z-statistic.

dhp_z Standardized DHp z-statistic.

dhg_pval P-value for DHg (right-tail).

dhp_pval P-value for DHp (right-tail).

nf Estimated number of common factors.

N Number of cross-sectional units.

TT Number of time periods.

bandwidth Bandwidth used.

criterion Information criterion used.

call The matched call.

References

Westerlund, J. (2008). Panel cointegration tests of the Fisher effect. *Journal of Applied Econometrics*, 23(2), 193–233. doi:10.1002/jae.963

Examples

```
# Load example data
data(fisher_panel)


# Basic test with default settings
result <- xtdhcoint(inflation ~ interest, data = fisher_panel,
                    id = "country", time = "year")
print(result)
summary(result)
```

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