Package 'SignTestsDufour'

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Title Exact Nonparametric Signed and Signed Rank Tests

Version 1.0.0

Description This package contains the exact signed, HAC-corrected signed, signed rank and point-optimal sign-based tests of Professor. Jean-Marie Dufour and his coauthors. The tests are distribution-free and robust against heteroskedasticity of unknown form. Moreover, within a predictive regression framework, the tests of Campbell and Dufour (1995, 1997) are valid (control size for any given sample size), in the presence of highly persistent/endogeneous regressors.

Imports MASS, caTools, purrr, Rdpack (>= 0.7)

RdMacros Rdpack

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R topics documented:

CD_95 *Signed and Signed Rank Tests of Campbell and Dufour (1995)*

Description

This function provides the test statistic and the critical value for the nonparametric sign-based and signed-rank tests proposed by Campbell and Dufour (1995). These tests are valid in the presence of a single regressor and no nuisance parameters (e.g. intercept).

Usage

```
CD_95(y, x, level = 0.05, p = 0.5, W = FALSE, SR = FALSE)
```

Arguments

y	the vector of dependent variables
x	the $n \times 1$ vector or $n \times k$ matrix of regressors.
level	the level of the test -i.e. α. Default value is 0.05.
p	is the success probability of the binomial distribution for each trial. Default value is 0.5.
W	includes the Wilcoxon signed rank test variate when set to TRUE.
SR	includes signed rank test variate proposed by Campbell and Dufour (1995) when set to TRUE.

References

Bryan Campbell, Jean–Marie Dufour (1995). "Exact nonparametric orthogonality and random walk tests." *The Review of Economics and Statistics*, **77**(1), 1–16.

Examples

```
CD_95(y,x)
```

CD_97 *Signed and Signed Rank Tests of Campbell and Dufour (1997)*

Description

This function extends the nonparametric signed and signed rank tests of Campbell and Dufour (1997) by allowing the presence of a nuisance parameter. The nuisance parameter problem is dealt with by employing bound-type procedures. These tests are valid in the presence of a single regressor and a nuisance parameter (e.g. intercept).

Usage

```
CD_97(y, x, level = 0.05, alpha_1 = 0.14 * level, p = 0.5, SRTest = FALSE)
```

Arguments

y	the vector of dependent variables
x	the $n \times 1$ vector or $n \times k$ matrix of regressors.
level	the level of the test -i.e. α. Default value is 0.05.
alpha_1	or α_1 for empolying the bound-type procedure. Default value is $0.14 \times \alpha$. Note: $\alpha_1 < \alpha$.
p	the success probability of the binomial distribution for each trial. Default value is 0.5.
SR	includes signed rank test variate proposed by Campbell and Dufour (1995) when set to TRUE.

References

Bryan Campbell, Jean-Marie Dufour (1997). "Exact nonparametric tests of orthogonality and random walk in the presence of a drift parameter." *International Economic Review*, 151–173.

Examples

```
CD_97(y,x)
```

POS_Fix *Point-Optimal Sign-Based Tests of Dufour and Taamouti (2010)*

Description

This function provides the test statistic and the critical values for the nonparametric point-optimal sign-based tests proposed by Dufour and Taamouti (2010). The proposed tests are exact, distribution-free and valid in the presence of nonstandard distributions and heteroskedasticity of unknown form. Moreover, they have the highest power amongst commonly encountered tests that are intended to be robust against heteroskedasticity.

Usage

```
POS_Fix(y, x, null = c(0, 0), level = 0.05, p = 0.5, B = 10000, ...)
```

Arguments

y	the vector of dependent variables
x	the vector of regressors
null	the null hypothesis
level	is the level of the test. Default value is 0.05.
p	is the success probability of the binomial distribution for each trial. Default value is 0.5.
B	is the number iterations for simulating the

References

Jean-Marie Dufour, Abderrahim Taamouti (2010). "Exact optimal inference in regression models under heteroskedasticity and non-normality of unknown form." *Computational Statistics \& Data Analysis*, **54**(11), 2532–2553.

Examples

```
POS_Fix(y,x,null=c(0,0))
```

SB_Dep *Signed and HAC-Corrected Signed Tests of Coudin and Dufour (2009)*

Description

This function provides the nonparametric signed and HAC-corrected signed statstics proposed by Coudin and Dufour (2009). The tests are distribution-free, exact and valid in the presence of multiple regressors, and errors exhibiting serial nonlinear dependence and heterogeneous volatility. The distribution of the test statistic is simulated under the null hypothesis with sufficient number of replications and the critical values are derived respectively. Unlike Coudin and Dufour (2009), this function is only limited to finite sample distributions. As such, the assumption of strict exogeneity must hold for the tests to be valid in small samples. The R code for estimating the HAC covariance matrix has been retrieved from the paper by Heberle and Sattarhoff (2017).

Usage

```
SB_Dep(
  y,
  x,
  null = c(0, 0),
  level = 0.05,
  p = 0.5,
  Dpndnt = FALSE,
  B = 10000,
  bwidth
)
```

Arguments

y	the vector of dependent variables.
x	the $n \times 1$ vector or $n \times k$ matrix of regressors.
null	the null hypothesis. Default vector is $(0, 0)'$ for a bivariate regression.
level	the level of the test -i.e. α. Default value is 0.05.
p	the success probability of the binomial distribution for each trial. Default value is 0.5.
Dpndnt	includes HAC-corrected signed statistic for serial (nonlinear) dependent data when set to TRUE.
B	number of iterations for simulating the distribution of the test statistic under the null hypothesis.
bwidth	the bandwidth for the Bartlett Kernell estimator.

References

Elise Coudin, Jean-Marie Dufour (2009). "Finite-sample distribution-free inference in linear median regressions under heteroscedasticity and non-linear dependence of unknown form." *The Econometrics Journal*, **12**, S19–S49.

Jochen Heberle, Cristina Sattarhoff (2017). "A fast algorithm for the computation of HAC covariance matrix estimators." *Econometrics*, **5**(1), 9.

Examples

```
SB_Dep(y,x,null=c(0,0),bwdith=2)
```

Index