Package 'punitroots'

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Title Tests for unit roots in panels of (economic) time series, with and without cross-sectional dependence.

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Depends CADFtest

Suggests plm, urca, tseries, fUnitRoots

Description This package performs the panel unit root tests advocated in Choi (2001), Demetrescu et al. (2006), Hanck (2008) and Costantini and Lupi (2011) can also be performed.

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URL http://www.r-forge.r-project.org

LazyLoad yes

LazyData yes

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R topics documented:

GDPseries — *OECD statistics on GDP, unemployment rates, and industrial production indices.*

Description

These objects contain OECD seasonally adjusted quarterly data on GDP, harmonized unemployment rates and industrial production indices for 8 countries (Australia, Canada, France, Italy, Japan, Norway, United Kingdom and United States). Data are from the public OECD web repository OECD.Stat Extracts.

Usage

```
data("GDPseries")
data("unempseries")
data("productionseries")
```

Format

Data are are saved as binary data `.rda` objects. They are multiple time series objects.

Author(s)

Claudio Lupi

Source

OECDStatExtracts.

References

OECD, OECD.StatExtracts http://stats.oecd.org/Index.aspx.

Hartung — *Hartung's combination test for dependent p-values*

Description

This function implements the procedure for combining dependent tests of significance proposed by Hartung (1999).

Usage

```
Hartung(p, lambda=rep(1,length(p)), kappa=0.2, alpha=0.10)
```

Arguments

p	the vector of p-values.
lambda	a vector of weights. It must be of the same length as p.
kappa	adjustment parameter. It can be either a positive scalar (0.2 is the default value) or it can take the character value "formula". When `k = "formula"` is used, then it is computed as in Hartung (1999), p. 853.
alpha	level for the 1-alpha confidence interval for rho (0.10 is the default).

Value

The function returns a list of class `"htest"` containing:

statistic	the Ht test statistic.
parameter	the number of combined tests (p-values).
p.value	the p-value of the combination test.
conf.int	the confidence interval for the estimated correlation.
estimate	the estimated correlation.
null.value	the specified hypothesized value under the null.
alternative	a character string describing the alternative hypothesis.
method	a character string indicating the type of combination test.
data.name	a character string giving the name of the vector of p-values.

Author(s)

Claudio Lupi

References

Hartung, J (1999). A Note on Combining Dependent Tests of Significance, *Biometrical Journal*, **41** (7), 849–855.

Examples

```
fake.pvalues <- runif(20)
Hartung(fake.pvalues)
```

pCADFtest *Panel Covariate-Augmented Dickey Fuller (CADF) test for unit roots*

Description

This function implements the panel Covariate Augmented Dickey-Fuller (pCADF) test developed in Costantini and Lupi (2011). The panel unit root tests proposed in Choi (2001) and in Demetrescu et al. (2006) can also be performed using this function.

Usage

```
pCADFtest(Y, X=NULL, covariates=NULL, crosscorr=0.10, type="trend",
     data=list(), max.lag.y=1, min.lag.X=0, max.lag.X=0,
     dname=NULL, criterion=c("none", "BIC", "AIC", "HQC",
     "MAIC"), ...)
```

Arguments

Y	a multiple time series or a $T \times N$ matrix. It contains the series to be tested. The series may have different length.
X	a vector, a matrix, or a vector time series of stationary covariates. If no X is specified, then the tests proposed by Choi (2001) and Demetrescu et al. (2006) are performed. As an alternative, the pCADF test (Costantini and Lupi 2011) can also be performed with the stationary covariate(s) derived from Y.
covariates	a character or a vector of scalars containing integers from 1 to N. The default is NULL. When covariates = NULL then tests proposed in Choi (2001) or Demetrescu et al. (2006) are performed (no stationary covariates). If covariates = "PC", the stationary covariate is computed as the difference of the first principal component of Y and the same covariate is used for all the individual tests. If covariates = "DY", each individual test is carried out using the average of the other differenced Y. See Costantini and Lupi (2011) for details. Otherwise, covariates must be a vector of length equal to the number of columns of X. The first number will indicate which column of Y is associated to the first stationary covariate represented by the first column of X; the second number identifies the correspondence between a column of Y with the second column of X and so on.
crosscorr	a real scalar between 0 and 1. It is the threshold of the p-value of Pesaran's test for cross-correlation. If the actual test p-value is lower than crosscorr, then the correction proposed by Hartung (1999) is applied. if crosscorr = 0 the original p-value combination test developed by Choi (2001) for independent series is carried out. If crosscorr = 1 then Hartung's correction is always applied as in Demetrescu et al. (2006).
type	a character or a N-vector of characters. It defines the deterministic kernel to be used in the tests. It accepts the values used in package urca. It specifies if the underlying model must be with linear trend ("trend", the default), with constant ("drift") or without constant ("none"). When a character is passed to the procedure, then the same deterministic kernel is used for all the tests.

`data`	not used.
`max.lag.y`	maximum number of lags allowed for the lagged differences of the variable to be tested. Both a scalar integer or a N-vector of integers can be used. When using a scalar, the same maximum lag is used for all the series. Different maximum lags can be used for each series by defining a N-vector of integers.
`min.lag.X`	an integer scalar or an vector of integers. Same as `max.lag.y`. If negative it is the maximum lead allowed for the covariates. If zero, it is the minimum lag allowed for the covariates. When more than one covariate is used, the same `min.lag.X` is used for all the covariates.
`max.lag.X`	an integer scalar or an vector of integers. Maximum lag allowed for the covariates. Same as `min.lag.X`.
`dname`	NULL or character. It can be used to give a special name to the model. If the NULL default is accepted and the model is specified using a formula notation, then dname is computed according to the used formula.
`criterion`	it can be either `"none"` (the default), `"BIC"`, `"AIC"`, `"HQC"` or `"MAIC"`. If `criterion="none"`, no automatic model selection is performed. Otherwise, automatic model selection is performed using the specified criterion. In this case, the max and min orders serve as upper and lower bounds in the model selection.
`...`	Extra arguments that can be set to use special kernels, prewhitening, etc. in the estimation of ρ^2. A Quadratic kernel with a VAR(1) prewhitening is the default choice. To set these extra arguments to different values, see `kernHAC` in package `sandwich` (Zeileis, 2004, 2006). Other arguments can be passed also to the procedure that performs Hartung's correction.

Value

The function returns an object of class `c("pCADFtest", "htest")` containing:

`statistic`	the test statistic.
`parameter`	the estimated nuisance parameter ρ^2 (see Hansen, 1995, p. 1150).
`method`	the test performed: it can be either `ADF` or `CADF`.
`p.value`	the p-value of the test.
`corr`	logical. `TRUE` if Hartung correction has been applied, `FALSE` otherwise.
`individual.tests`	a $N \times 5$ matrix containing the values of the p.value, ρ^2, the orders p, q_1 and q_2 of each single test on each of the N time series.
`Pesaran`	the outcome of Pesaran's test for cross-dependence.

Author(s)

Claudio Lupi

References

Choi I (2001). Unit Root Tests for Panel Data, *Journal of International Money and Finance*, **20**(2), 249–272.

Costantini M, Lupi C, (2011). A Simple Panel-CADF Test for Unit Roots. Economics Series n. 261, Institute for Advanced Studies, Vienna.

Hansen BE (1995). Rethinking the Univariate Approach to Unit Root Testing: Using Covariates to Increase Power, *Econometric Theory*, **11**(5), 1148–1171.

Hartung J (1999). A Note on Combining Dependent Tests of Significance, *Biometrical Journal*, **41**(7), 849–855.

Lupi C (2009). Unit Root CADF Testing with R, *Journal of Statistical Software*, **32**(2), 1–19. http://www.jstatsoft.org/v32/i02/

Pesaran MH (2004). General Diagnostic Tests for Cross Section Dependence in Panels, University of Cambridge, mimeo.

Zeileis A (2004). Econometric Computing with HC and HAC Covariance Matrix Estimators, *Journal of Statistical Software*, **11**(10), 1–17. http://www.jstatsoft.org/v11/i10/

Zeileis A (2006). Object-Oriented Computation of Sandwich Estimators, *Journal of Statistical Software*, **16**(9), 1–16. http://www.jstatsoft.org/v16/i09/.

See Also

`fUnitRoots`, `urca`

Examples

```
data("GDPseries")
Y <- log(GDPseries)
Demetrescuetal.test <- pCADFtest(Y, max.lag.y = 2, criterion = "AIC")
```

`Pesaran` *Pesaran's test for cross-correlation among panel units.*

Description

This function implements the procedure for testing for the presence of cross-correlation among panel units using the test proposed in Pesaran (2004).

Usage

```
Pesaran(resids)
```

Arguments

`resids`	a $T \times N$ matrix of residuals from N single-equation models over N time series of length T.

Details

This function should be applied to residuals from individual tests regressions.

Value

The function returns a list of class `"htest"` containing:

`statistic`	the test statistic.
`parameter`	the number N of time series and their length T.
`p.value`	the p-value of the test.
`null.value`	the specified hypothesized value under the null.
`alternative`	a character string describing the alternative hypothesis.
`method`	a character string indicating the type of test.
`data.name`	a character string giving the name of the vector of residuals.

Author(s)

Claudio Lupi

References

Pesaran, MH (2004). General Diagnostic Tests for Cross Section Dependence in Panels, Department of Applied Economics, University of Cambridge, mimeo.

Examples

```
fake.resids <- matrix(rnorm(1000),100,10)
Pesaran(fake.resids)
```

`Simes` *Simes' test for panel unit root*

Description

This function implements Simes' test applied to the panel unit root hypothesis (see Simes, 1986; Sarkar and Chang, 1997; Hanck 2008).

Usage

```
Simes(pCADFtest.results, alpha = 0.05)
```

Arguments

`pCADFtest.results`	an object of class pCADFtest.
`alpha`	the significance level (it can be passed as a vector).

Value

`outcome` logical: it is a vector if alpha is a vector. TRUE if the test doesn't reject at the specified significance level, FALSE otherwise.

Author(s)

Claudio Lupi

References

Hanck, C (2008). An Intersection Test for Panel Unit Roots, Technische Universitaet Dortmund, mimeo.

Sarkar, SK and Chang, C-K (1997). The Simes Method for Multiple Hypothesis Testing With Positively Dependent Test Statistics, *Journal of the American Statistical Association*, **92** (440), 1601–1608.

Simes, RJ (1986). An Improved Bonferroni Procedure for Multiple Tests of Significance, *Biometrika*, **73** (3), 751–754.

Examples

```
data("GDPseries")
Y <- log(GDPseries)
Demetrescuetal.test <- pCADFtest(Y, max.lag.y = 2, criterion = "AIC")
Simes(Demetrescuetal.test, c(0.01, 0.05, 0.10))
```

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