Package ‘cotrend’

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Type Package
Title Consistent Co-Trending Rank Selection
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Description Implements cointegration/co-trending rank selection algorithm in Guo and Shintani (2013) "Consistent co-trending rank selection when both stochastic and nonlinear deterministic trends are present". The Econometrics Journal 16: 473-483 <doi:10.1111/j.1368-423X.2012.00392.x>
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Package implements method to find cointegration and cotrending rank according to Guo and Shintani (2011).

Usage

cotrend(x, ...)
## Default S3 method:
cotrend(x,type=c("paired","joint"),CT="BIC",...)
## S3 method for class 'cotrend'
print(x,...)

Arguments

x Matrix or xts object of dimension T x m. Where T is the number of time periods and m is the number of time series.

... Additional parameters are type = "paired" (default) or "joint" which metric function CT="BIC" (default),"HQ" or "AIC".

type Selects the method. "paired" is default and it find r1 and r2 independently. "joint" selects both r1 and r2 at the same time.

CT Penalty functions elements. The default is to use "BIC" (Bayesian information criterion). User can also select "AIC" or "HQ". See Guo and Shintani (2011).

Details

For details on method see Guo and Shintani (2011). Most experiments find default method (paired,BIC) to have good performance. The probability of finding the correct rank is quite good for data sample as small as 50 observations.

Value

List with:

rank Array with 2 elements. First element is the cointegration rank (r1) and the second is the week cotrending rank (r2).

m Number of time series. Number of cols of input matrix.

T Number of time periods (observations). Number of rows of input matrix.

eigenvalues Eigenvalues from von Neumann matrix used in the algorithm.

tvonNeumann Multivarite ratio of the von Neumann ratio. A matrix of dimension m x m.

Author(s)

A. Christian Silva
Examples

References

Examples
x <- example_eq3()
cotrend(x)
cotrend(x, type="joint")

Examples time series presented in Guo and Shintani (2011) to test their algorithm.

Description
Some examples found in Guo and Shintani (2011). The number of the example corresponds to the equation number in the paper (version published on Feb 2011). The current code can adjust every parameters in the paper. The default values are the most common values selected in the paper.

Usage
example_eq3(T = 50, mu1 = 0.5, mu2 = 2, c1 = 0.5, c2 = 1)
example_eq4(T = 50, mu1 = 0.5, mu2 = 2, c1 = 0.5, c2 = 1)
example_eq8(T = 50, rho1 = 1, mu0 = 2, mu1 = 0.5, c = 0.5, tau = 0.5, y0 = 0)
example_eq9(T = 400, mu0 = 2, mu1=0.5, c=0.5, tau1=0.5, tau2=1/3)

Arguments
T Number of time periods (observations). Practically the number of rows in the output matrix.
mu0 Increase rate for deterministic trend. See Gou and Shintani (2011).
mu1 Increase rate for deterministic trend. See Guo and Shintani(2011).
u02 Increase rate for deterministic trend.
c Intercept for deterministic trend.
c1 Intercept for deterministic trend.
c2 Intercept for deterministic trend.
rho1 Autocorrelation coefficient. If rho1 = 1, we have a I(1) process. See Guo and Shintani (2011).
tau Time location for break point. Before tau the mean trend is different than after.
tau1 Time location for break point. Before tau the mean trend is different than after.
tau2 Time location for break point. Before tau the mean trend is different than after.
Details

The outcome of the rank finding algorithm cotrend depends on T. That is true for all examples. If $T \to \infty$, the probability to find the correct rank pair is $P \to 1$. Equation 3 should give rank pair $r_1 = 0$ and $r_2 = 1$. Equation 4 has $r_1 = 1$ and $r_2 = 1$. Both examples are independent of the parameters selected. Equation 8 has rank $r_1 = 1$ and $r_2 = 1$ if $\rho_1 = 0.5$ and $r_1 = 0$ and $r_2 = 1$ if $\rho_1 = 1$. Equation 9 has rank $r_1 = 0$ and $r_2 = 0$ for the default parameters. See Guo and Shintani (2011).

Value

Output is matrix of dimension $T \times m$. $m=2$ for eq3 or eq4 and $m=3$ for eq8 and eq9.

Author(s)

A. Christian Silva

References


Examples

```r
x <- example_eq3()
c <- cotrend(x)
print(c)
```
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