Package ‘cotrend’

February 19, 2015

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| cotrend | Consistent Cotrending Rank Selection |

Description

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 finds r1 and r2 independently. "joint" selects both r1 and r2 at the same time.

CT  Penalty function 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.

vonNeumann  Multivariate ratio of the von Neumann ratio. A matrix of dimension m x m.

Author(s)

A. Christian Silva

References

Examples

```r
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

```r
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

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

The outcome of the rank finding algorithm `cotrend` depends on T. That is true for all examples. If T-> Inf, the probability to find the correct rank pair is P -> 1. Equation 3 should give rank pair r1 = 0 and r2 = 1. Equation 4 has r1 = 1 and r2 = 1. Both examples are independent of the parameters selected. Equation 8 has rank r1 = 1 and r2 = 1 if rho1 = 0.5 and r1 = 0 and r2 = 1 if rho1 = 1. Equation 9 has rank r1 = 0 and r2 = 0 for the default parameters. See Guo and Shintani (2011).
Value

Output is matrix of dimension T x 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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