**Derive p-value of bootstrap-based sup-wald statistic ,some other estimations, and parameters for testing for the null of no cointegration in a TVECM model.**

**Description**

*boot.w.detail* is a function which computes the sup-Wald statistic, p-value of bootstrap-based sup-Wald statistic, estimations of coefficients and gamma and gives minimum number of observations in each regime and number of iterating grid for finding argmin and argmax gamma. It gives these information for a given data and some input parameters such as lag, beta, quantile of ECT(qn), minimum number of observations in each regime(kn), grid number(m1), and number of bootstrapping. This function has been coded according to the paper Seo(2006).

**Usage**

boot.w.detail(data, lag, beta, qn, kn, m1, nb)

**Arguments**

**data** time-series data, an n x k matrix where each row is observation and each column is variable

**lag** time lag for the data(0~)

**beta** cointegration vector. In this code, it is assumed to be known. In the paper, this beta is set as (1, -1)

**qn** quantile value(0~1) of the absolute value of error correction term Z. See Seo(2006)

**kn** minimum number of observations in each regime. In the paper, this value is 10 and denoted as m. See Seo(2006).

**m1** number of iterating grid for finding argmin determinant of sigma and argmax wald statistics for each gamma.

**nb** number of bootstrapping.

**Value**

The output of this function is the list of some results. Results include following contents : sup-Wald statistic, p-value of bootstrap-based sup-Wald statistic, estimations of coefficients and gamma and gives minimum number of observations in each regime and number of iterating grid for finding argmin and argmax gamma.

**Examples**

# Setting parameters

lag<-0;beta<-c(1,-1);qn<-0.9;kn<-10;m1<-100;nb<-10

# Main Function

boot.w.detail(data,lag,beta,qn,kn,m1,nb)

**Monte-Carlo simulation for comparing size or power of some unit root tests**

**Description**

*simulation* is a function which gives the result of Monte-Carlo simulation like table3 or table4 in the paper Seo(2006). That is, this function derives size or power of each test : bootstrapped-sup Wald test, HW test, ADF test.

**Usage**

simulation(t0,ap0,gm0,rho0,mu,t,beta,nb,mod.type)

**Arguments**

**t0** number of simulation. It should be a scalar. If it is a numeric vector, the output would be for the case of the last element of t0.

**ap0** Threshold coefficient alpha which is used in the band-TVECM model based data generating procedure. It should be (2\*j)x2 matrix form where j is number of candidate for the alpha. For example, if the matrix is 2x2, the first row means alpha1 and the second row means alpha2. Each column means variables. See Seo(2006).

**gm0** Threshold parameters gamma1 and gamma2. This should be a scalar or a numeric vector. For the element x, this means that gamma1 is -x and gamma2 is x. Here, gamma is symmetric. In the paper, this is set as c(5, 8, 10). See Seo(2006).

**rho0** VAR coefficient matrix. This should be the form of (2\*j)x2 matrix. J means the number of candidate of rho and for each j, the 2x2 matrix is the coefficient matrix for VAR model. This is used in the VAR model based data generating procedure. See Seo(2006).

**mu** This is mean vector of the model. It should be a 2-dimensional vector. Usually, it is set as 0 vector.

**t** This is the sample size. Usually set as 100 or 250. See Seo(2006).

**beta** cointegrating vector. This is usually set as (1, -1). Or, it should be a numeric 2-dimensional vector

**nb** number of bootstrap. It should be positive integer.

**mod.type** This character input determines mode of the function. It can be either “size” or “power”. If it is “size”, the simulation function above derives the result of table3 which is the size of each tests. If it is “power”, the function computes the result of table4 which is the power of each tests. See Seo(2006).

**Value**

The output of the function is size or power of each case. For the “size” case, it is the numeric matrix where each row means what the test is and each column means what the significant level is and what the coefficient in the band-TVECM model is. There are 2 significant level : 0.1 and 0.05. And there are 3 coefficient matrices(See Seo(2006)). Each element means size of each case. For the “power” case, it is the character matrix where each row means the same as “size”case and each column means what the significant level is and what the gamma value is. Gamma values are 5, 8, 10. Furthermore, there would be “Case1” and “Case2”. Case1 means the case where alpha1 is (-0.1,0), and alpha2 is (0.1,0). Case2 means the case where alpha1 is (-0.1,0) and alpha2 is (-0.3,0). See Seo(2006). Each element means power of each case.

**Examples**

t0<-1

t<-100

nb<-1

qn<-1;kn<-10

mu<-matrix(c(0,0),2,1)

beta<-c(1,-1)

ap0<-rbind(matrix(c(-0.1,0,0,0.1),2,2),matrix(c(-0.1,-0.3,0,0),2,2))

gm0<-c(5,8,10)

rho0 <- rbind(matrix(0,2,2),matrix(c(-0.2,-0.1,0,-0.2),2,2),matrix(c(-0.2,-0.1,-0.1,-0.2),2,2))

mod.type<-"size" #"power"

simulation(t0,ap0,gm0,rho0,mu,t,beta,nb,mod.type)