Documentation for rscv.m

(calculating critical values for "Regime-Switching Tests: Asymptotic Critical Values")

Parameters that govern simulation

d=150
j=3:d
these parameters index the sum: $\sum_{j=3}^{d}$

nr
the number of replications (typically 100,000)

eta=linspace(l,u,nh)
the range of values for the index eta: *H=[l,u]*
note: the user is prompted for the values *l,u*
nh
the number of elements in the grid: =100*(u-l)+1
to create values on a grid of .01 from -1 to 1: nh=201, c=1
to use a grid mesh of .001, change 100 to 1000 in selecting the number of elements in the grid

Elements of the summation

stddev
a vector with d-2 rows, and elements $\left[1/\sqrt{3!}, 1/\sqrt{4!}, \cdots, 1/\sqrt{150!}\right]$
these capture the elements: $\sum_{j=3}^{d} 1/\sqrt{j!}$

(recall $\Gamma(k+1) = k!$)
emat
matrix of normal random variables with d-2 rows and nr columns
the random variable in row *j* has mean 0 and std deviation $1/\sqrt{j!}$

$$\begin{bmatrix} \frac{1}{\sqrt{3!}}\varepsilon_3^{(1)} & \cdots & \frac{1}{\sqrt{3!}}\varepsilon_3^{(100,000)} \\ \vdots & \ddots & \vdots \\ \frac{1}{\sqrt{150!}}\varepsilon_{150}^{(1)} & \cdots & \frac{1}{\sqrt{150!}}\varepsilon_{150}^{(100,000)} \end{bmatrix}$$

the first column of emat captures, for the first replication, the elements of: $\sum_{j=3}^{d} \frac{1}{\sqrt{j!}}\varepsilon_j$
the second column of emat captures the same elements, for the second replication
etamat
matrix of grid values with d-2 rows and nh columns
let η_1 be the first grid value and let η_{201} be the last grid value

$$\begin{bmatrix} \eta_1^3 & \ldots & \eta_{201}^3 \\ \vdots & \ddots & \vdots \\ \eta_1^{150} & \ldots & \eta_{201}^{150} \end{bmatrix}$$

the first column of etamat captures, for the first grid value, the elements of $\sum_{j=3}^{d}\eta^j$

s1

matrix of summations with nh rows and nr columns

$$\begin{bmatrix} \sum_{j=3}^{150}\eta_1^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)} & \cdots & \sum_{j=3}^{150}\eta_1^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(100,000)} \\ \vdots & \ddots & \vdots \\ \sum_{j=3}^{150}\eta_{201}^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)} & \cdots & \sum_{j=3}^{150}\eta_{201}^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(100,000)} \end{bmatrix}$$

sc

scaling vector with 1 row and nh columns

$$\left[\left(e^{\eta_1^2}-1-\eta_1^2-\frac{\eta_1^4}{2}\right)^{1/2} \quad \dots \quad \left(e^{\eta_{201}^2}-1-\eta_{201}^2-\frac{\eta_{201}^4}{2}\right)^{1/2}\right]$$

cs

matrix of rescaled summations with nh rows and nr columns

$$\begin{bmatrix} \left(e^{\eta_1^2}-1-\eta_1^2-\frac{\eta_1^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_1^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)} & \cdots & \left(e^{\eta_1^2}-1-\eta_1^2-\frac{\eta_1^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_1^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(100,000)} \\ \vdots & \ddots & \vdots \\ \left(e^{\eta_{201}^2}-1-\eta_{201}^2-\frac{\eta_{201}^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_{201}^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)} & \cdots & \left(e^{\eta_{201}^2}-1-\eta_{201}^2-\frac{\eta_{201}^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_{201}^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(100,000)} \end{bmatrix}$$

cs1

matrix cs with row of zeros appended to bottom, nh+1 rows and nr columns

m2

vector with 1 row and nr columns, captures $\left[min\left(0, G(\eta)\right)\right]^2$

column 1 = A^2, where

$$A = min\begin{bmatrix} \left(e^{\eta_1^2}-1-\eta_1^2-\frac{\eta_1^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_1^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)}, \dots \\ \dots, \left(e^{\eta_{201}^2}-1-\eta_{201}^2-\frac{\eta_{201}^4}{2}\right)^{-1/2}\sum_{j=3}^{150}\eta_{201}^j\frac{1}{\sqrt{j!}}\varepsilon_j^{(1)}, 0 \end{bmatrix}$$

m1

vector with 1 row and nr columns, captures $[max(0,\varepsilon_4)]^2$

column *j*=A_j^2, where

$$A_k = max\left(0, \varepsilon_4^{(k)}\right)$$

Note, the second row of emat has variables of the form $\frac{\varepsilon_4^{(k)}}{\sqrt{4!}}$, so the elements of the second row of emat must be multiplied by $\sqrt{4!} = \Gamma(5)$.