

RANK COMOVEMENT

PURPOSE

Compute the Leigh-Perlman rank comovement coefficient between two variables.

DESCRIPTION

The rank comovement statistic is the distribution-free analog of the comovement statistic. It is the comovement statistic applied to a pair of ranked variables. That is, given a pair (X_i, Y_i) of variables, find the pair of ranked variables $(X_{\text{rank}i}, Y_{\text{rank}i})$. These rankings are performed separately for X and Y. The formula for the rank comovement coefficient is then:

$$\text{comove} = \frac{\sum_{i=2}^N (X_{\text{rank}i} - X_{\text{rank}i-1})(Y_{\text{rank}i} - Y_{\text{rank}i-1})}{\sqrt{\sum_{i=2}^N (X_{\text{rank}i} - X_{\text{rank}i-1})^2} \sqrt{\sum_{i=2}^N (Y_{\text{rank}i} - Y_{\text{rank}i-1})^2}} \quad (\text{EQ 2-8})$$

The computed coefficient has a value between -1 and +1. This formula is similar to the correlation coefficient. However, instead of subtracting the mean from $X_{\text{rank}i}$ or $Y_{\text{rank}i}$, the rank of the previous value is subtracted. That is, the correlation coefficient measures the distance from the mean of corresponding $X_{\text{rank}i}$ and $Y_{\text{rank}i}$ values while the comovement coefficient measures the distance from the most recent value for corresponding $X_{\text{rank}i}$ and $Y_{\text{rank}i}$ values. The two variables must have the same number of elements.

The rank comovement coefficient is less sensitive to normality assumptions than is the standard comovement coefficient. The disadvantage is that it is less efficient than the standard comovement coefficient when the normality assumptions are valid. The rank comovement can also be used when the data do not have a meaningful numerical measure, but they can be ranked.

SYNTAX

LET <par> = RANK COMOVEMENT <y1> <y2> <SUBSET/EXCEPT/FOR qualification>
 where <y1> is the first response variable;
 <y2> is the second response variable;
 <par> is a parameter where the computed rank comovement is stored;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = RANK COMOVEMENT Y1 Y2
 LET A = RANK COMOVEMENT Y1 Y2 SUBSET TAG > 2

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

| | | |
|------------------|---|---|
| COMOVEMENT | = | Compute the comovement of two variables. |
| RANK COMOVEMENT | = | Compute the rank comovement of two variables. |
| CORRELATION | = | Compute the correlation of a variable. |
| RANK CORRELATION | = | Compute the rank correlation of a variable. |
| COVARIANCE | = | Compute the covariance between two variables. |
| VARIANCE | = | Compute the variance of a variable. |

REFERENCE

"An Index for Comovement of Time Sequences with Geophysical Applications: A Working Paper," Leigh and Perlman, Penn State Interface Conference on Astronomy, August, 1991.

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

91/8

PROGRAM

SKIP 25

READ HAYES1.DAT JUNK Y1 Y2

LET A1 = COMOVEMENT Y1 Y2

The computed comovement coefficient is 0.77.