

RANK COVARIANCE

PURPOSE

Compute the rank covariance between two variables.

DESCRIPTION

The rank covariance is recommended in the following cases:

1. When the underlying data does not have a meaningful numerical measure, but it can be ranked;
2. When the relationship between the two variables is not linear;
3. When the normality assumption for two variables is not valid.

The rank covariance statistic is the distribution-free analog of the covariance statistic. It is the covariance 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. Ties are replaced with an average rank. For example, if the seventh and eighth ranks are the same value, both are replaced with 7.5. The formula for the rank covariance is:

$$\text{cov} = \frac{\sum_{i=1}^N (X_{\text{rank}i} - \bar{X}_{\text{rank}i})(Y_{\text{rank}i} - \bar{Y}_{\text{rank}i})}{(N - 1)} \quad (\text{EQ 2-10})$$

SYNTAX

LET <par> = RANK COVARIANCE <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 covariance is stored;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

```
LET A = RANK COVARIANCE Y1 Y2
LET A = RANK COVARIANCE Y1 Y2 SUBSET TAG > 2
```

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

| | | |
|------------------|---|--|
| COVARIANCE | = | Compute the covariance between two variables. |
| CORRELATION | = | Compute the Pearson correlation coefficient between two variables. |
| RANK CORRELATION | = | Compute the rank correlation between two variables. |

APPLICATIONS

Exploratory Data Analysis

IMPLEMENTATION DATE

Pre-1987

PROGRAM

```
SKIP 25
READ SNAIL.DAT Y X
LET A = RANK CORRELATION Y X
```

The computed correlation is 1.0.