

Spearman's Rank Correlation Coefficient

[Nematrian website page: [SpearmanRankCorrelationCoefficient](#), © Nematrian 2015]

Spearman's rank correlation coefficient is defined as the normal (i.e. Pearson) correlation coefficient but applied to the ranks of the observations in the two data series. Thus if the two series are x_t and y_t and the ranks (1 = lowest, ..., n = highest) of the elements in the two series are q_t and r_t respectively then:

$$\rho = \frac{\frac{1}{n-1} \sum_{t=1}^n (q_t - \bar{q})(r_t - \bar{r})}{\sqrt{\frac{1}{n-1} \sum_{t=1}^n (q_t - \bar{q})^2 \cdot \frac{1}{n-1} \sum_{t=1}^n (r_t - \bar{r})^2}}$$

If observations can be tied then it is usual to assign a rank to each of the tied observations which is the mean of what their ranks would otherwise have been.

A Spearman correlation of 1 arises when the two variables being compared are monotonically related, even if their relationship is not linear.

See [MnSpearmanRankCorrelation](#) or [MnSpearmanRankCorrelations](#) for Nematrian web functions that can be used to calculate Spearman rank correlation coefficients.