EXCEL REFERENCE – STATISTICS FUNCTIONS

Sorin R. Straja, Ph.D., FRM
Montgomery Investment Technology, Inc.
200 Federal Street
Camden, NJ 08103
Phone: (610) 688-8111
sorin.straja@fintools.com
www.fintools.com

KURT (EXCEL)

Returns the kurtosis of a data set. Kurtosis characterizes the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution.

Syntax:
KURT(**number1**,number2, ...)

Number1,number2,...   are 1 to 30 arguments for which you want to calculate kurtosis. You can also use a single array or a reference to an array instead of arguments separated by commas.

Remarks:
- The arguments must be either numbers or names, arrays, or references that contain numbers.
- If an array or reference argument contains text, logical values, or empty cells, those values are ignored; however, cells with the value zero are included.
- If there are fewer than four data points, or if the standard deviation of the sample equals zero, KURT returns the #DIV/0! error value.
- Kurtosis is defined as:

$$\left\{ \frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum \left(\frac{x_j - \bar{x}}{s} \right)^4 \right\} - \frac{3(n-1)^2}{(n-2)(n-3)}$$

  where: s is the sample standard deviation.

Notes:
- Usually the kurtosis is defined as follows where S is the population standard deviation:

$$\frac{1}{n} \sum \left(\frac{x_j - \bar{x}}{S} \right)^4 \quad - \quad 3$$

- The Excel formula is a good estimate for the sample kurtosis, while the usual formula is for the population kurtosis (Joanes and Gill 1998). For large values of n the two formulas converge.

SKEW (EXCEL)

Returns the skewness of a distribution. Skewness characterizes the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values.

Syntax
SKEW(**number1**,number2,...)

Number1,number2...   are 1 to 30 arguments for which you want to calculate skewness. You can also use a single array or a reference to an array instead of arguments separated by commas.

Remarks:
- The arguments must be either numbers or names, arrays, or references that contain numbers.
- If an array or reference argument contains text, logical values, or empty cells, those values are ignored; however, cells with the value zero are included.
- If there are fewer than three data points, or the sample standard deviation is zero, SKEW returns the #DIV/0! error value.
- The equation for skewness is defined as:

$$\frac{n}{(n-1)(n-2)}\sum\left(\frac{x_j - \bar{x}}{s}\right)^3$$

Notes:
- Usually the skewness is defined as follows where S is the population standard deviation:

$$\frac{1}{n}\sum\left(\frac{x_j - \bar{x}}{S}\right)^3$$

- The Excel formula is a good estimate for the sample skewness, while the usual formula is for the population skewness (Joanes and Gill 1998). For large values of n the two formulas converge.

STDEV (EXCEL)

Estimates standard deviation based on a sample. The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

Syntax:
STDEV(**number1**,number2,...)

Number1,number2,...   are 1 to 30 number arguments corresponding to a sample of a population. You can also use a single array or a reference to an array instead of arguments separated by commas. Logical values such as TRUE and FALSE and text are ignored. If logical values and text must not be ignored, use the STDEVA worksheet function.

Remarks:
- STDEV assumes that its arguments are a sample of the population. If your data represents the entire population, then compute the standard deviation using STDEVP.
- The standard deviation is calculated using the "nonbiased" or "n-1" method.
- STDEV uses the following formula:

$$\sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

REFERENCES

Joanes, D. N.; Gill, C. A. Comparing Measures of Sample Skewness and Kurtosis. *Journal of the Royal Statistical Society: Series D (The Statistician)*,**47(**1):183–189; 1998.