

The Normal distribution

The Normal distribution has the property of being symmetric around its 50%-fractile. The distribution is particularly well suited to model uncertainty of quantities being a sum of many “underlying” variables. The range of the distribution is the set of all real numbers. However, a Normally distributed variable will with very high probability get a value not more than 3 standard deviations away from the 50%-fractile. Thus, in cases where the standard deviation is very small compared to the mean, the Normal distribution may be a good approximation even if the actual range of the variable is only a limited interval.

In the Normal distribution the key numbers, “a”, “b” and “c” are interpreted as follows:

“a”
=
The 10%-fractile.

“b”
=
The 50%-fractile.

“c”
=
The 90%-fractile.

To get a sensible distribution, the specified values must satisfy:

$$“a” < “b” < “c”$$

DynRisk will adjust the numbers further to make the fractiles fit the fractiles of a Normal distribution.

The Normal distribution will fit the specified fractiles perfectly, i.e., no further adjustments are needed if the fractiles satisfy the following equation:

$$“b” - “a” = “c” - “b”$$

Note that in this case, the “b” value is the arithmetic mean of the “c” and the “a” value.

Assume e.g., that the following key numbers are specified:

$$\begin{aligned} \text{"a"} &= 0.5 \\ \text{"b"} &= 1.0 \\ \text{"c"} &= 1.5 \end{aligned}$$

In this case we get that:

$$\text{"b"} - \text{"a"} = \text{"c"} - \text{"b"} = 0.5$$

Thus, the Normal distribution fits the specified fractiles perfectly.