The Cens. normal distribution

The Censored normal distribution is a distribution concentrated on the set of positive numbers. If X is a variable having this distribution, then we may think of X as being derived using the following formula:

$$X = \max(0, Y)$$

where Y is another variable having a Normal distribution with some suitable expectation and standard deviation.

Thus, everytime Y takes on a non-negative value, X will be equal to Y. On the other hand if Y is negative, X will be 0. This implies that the probability of X = 0, is equal to the probability of $Y \leq 0$. This probability will always be positive. The actual value of the probability, however, depends on the expectation and standard deviation of Y.

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

“a”
=
The 10%-fractile of Y

“b”
=
The 50%-fractile of Y

“c”
=
The 90%-fractile of Y

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 is a very common statistical distribution. It is used to model uncertainty in many different situations. The tails of the distribution ranges over the entire set of real numbers.

Sometimes, however, it is necessary to restrict the range of the distribution to the set of positive reals. In such cases one may use either the Censored normal distribution (or the Truncated normal distribution). In the Censored normal distribution negative values are “corrected” simply by replacing them by zeros.

In most cases the location of the distribution will be such that the probability of having a negative value replaced by zero is small. Thus, in particular, one will typically have:

“a” > 0.

You may of course use the Censored normal distribution in situations where one or more of the key numbers are negative as well. In such cases the probability of getting a corrected value may be large. Thus, the resulting distribution will have a large portion of its probability mass concentrated in zero. If you do not want this to happen, you should probably consider using other distributions, e.g., the Truncated normal distribution.