

Crystal Ball Software and Risk Analysis Tips

Running a Simulation with the Same Random Numbers

In many circumstances, you may want to use the same set of random numbers for your simulations. For example, when you build a model, using the same set of random numbers will eliminate the possibility that varying results are due to the random numbers that were generated (rather than the changes you made in the model). Also, if you want a colleague to exactly reproduce your results, you can have that person use the same set of random numbers.

To use this option, select the Sampling tab in the Run Preferences dialog. At the top of this tab, check Use Same Sequence of Random Numbers. For the Initial Seed Value, select any positive integer less than 2,147,483,647. This setting ensures that for each simulation, Crystal Ball will generate the same string of random numbers for an assumption.

To test this feature, create a single normal distribution with a mean of 0 and a standard deviation of 1. Make the same cell into a forecast (remember that assumptions can also be forecasts!). Set the Run Preferences as described above so that it uses the same sequence of random values.

Run ten trials and extract the forecast data (using the Extract Data button). Copy those ten values to the spreadsheet with the assumption. Reset Crystal Ball and run a second set of ten values. Extract those values and place them adjacent to the first set of values. They will be identical, because Crystal Ball used the same seed value to generate the random numbers.

ADDENDUM

A Subscriber Comments.

Thomas Prentiss, a Crystal Ball user at Xerox, disagreed with our tips on using seed values (Issues #75 and #76):

"As an add to this and the previous issue's CB tip, you might want to let your customers know that even changing the location of the assumptions on your sheet can change the order of random numbers, and therefore the results.

"This brings into question the usefulness of the ability to set the random seed. It is of no use in the development of the model since assumptions and locations change. This, however, does no harm. Also it is of little value and is potentially dangerous to use it to

Crystal Ball Software and Risk Analysis Tips

exactly duplicate the model's results. If the results vary enough to make a difference from run to run, you are probably not running enough iterations. If you are not running enough iterations, any one run will not be an adequate representation of the uncertainties and risks in the forecast(s). This can lead to faulty decisions.

"Maybe others have additional reasons to use this ability, but the above reasons are why I do not recommend using it. I hope that this may help others and help to maintain the credibility and value of the Monte Carlo simulation methodology and your tools."

Our response:

We agree with most of Mr. Prentiss' points, in particular that setting the seed value will not help if you are still building and changing your model in fundamental ways. However, changing the location of the assumptions within a sheet will not change the order of the random numbers. The definition order on a single sheet is all that matters for this process.

or finished models, we still believe that the seed value is a valuable tool because you can use it to show someone repeatable results. Setting a seed value in presentations or training sessions is useful because it will result in identical and expected output statistics. This predictability can often help to eliminate some confusion about how Monte Carlo works.

Finally, if you want to know whether or not you have run enough iterations, you can use Precision Control to address this concern. The One-Minute Spotlight above covers how this feature is used.