RMS® CCRA™ Training Program
Financial Modeling Exercise 4

Learning Objectives:

This exercise will allow you to gain an appreciation for computations involved in various statistics from both an Event Loss Table (ELT) and Period (or Year) Loss Table (PLT/YLT). You will experience the simplicity of computing statistics from a YLT and recognize the complexity of those same statistics from the ELT.

Base model output is provided in both analytical (ELT) and simulated (YLT) form. The Excel workbook "CCRA Financial Model Exercise 4.xlsx" is provided to assist with computations. A template for the ELT calculations is provided in "ELT_Worksheet", while the data for the simulated YLT calculations are found in "YLT_Worksheet". This YLT contains 500 simulated years.

Generate Statistical Model Output - AAL

1. Using the workbook provided, calculate the total Average Annual Loss (AAL) using both the analytical approach (ELT) and the simulation approach (YLT).

   AAL Based on YLT = *1,055.08*

   AAL Based on ELT = *1,087.00*

EP Calculations

2. Using the workbook provided, calculate the exceedance probability for both the OEP and AEP for both the analytical approach (ELT) and simulation approach (YLT).

   20-yr OEP Loss Based on YLT = *4,641.10*

   100-yr OEP Loss Based on YLT = *11,751.40*

   250-yr OEP Loss Based on YLT = *19,543.20*

   20-yr AEP Loss Based on YLT = *5,093.50*

   100-yr AEP Loss Based on YLT = *11,947.00*

   250-yr AEP Loss Based on YLT = *21,936.20*

   20-yr OEP Loss Based on ELT = *4,975.00*

   100-yr OEP Loss Based on ELT = *12,530.00*

   250-yr OEP Loss Based on ELT = *16,982.00*

3. Based on the ELT data, approximately what percentage of the time will more than one event occur in a year?

   9%

4. Explain some of the challenges you faced when calculating statistics using the ELT.

   The AAL is relatively straightforward to calculate, but OEP requires an understanding of the beta distribution in order to calculate the conditional probabilities of exceeding the various loss thresholds. The ELT data also do not have any information on which events occur together in a given period; calculating the AEP requires use of a Fast Fourier Transform that is beyond the remit of this course.

5. What differences do you see between the OEP curves created with the ELT and with the YLT? Why do you think these are different?

   The OEP calculated from the ELT is much smoother and more continuous than that from the YLT. It also extends out to lower probabilities than the YLT curves and requires fewer simulated losses.

   This is because the ELT creates an "exact" analytical solution using continuous probability distributions, whereas losses in the YLT are sampled and thus include uncertainty due to the simulation process. This uncertainty becomes more pronounced at lower probabilities where fewer simulations have been run. It can be reduced through additional samples or more simulated periods but cannot be eliminated.

6. BONUS: The results in the spreadsheet provide sufficient data to calculate the standard deviation on the AAL from both the ELT and YLT. What values do you get for these metrics?

   AAL standard deviation (YLT): *2,587.82*   AAL standard deviation (ELT): *2,767.45*

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