Problem 7: Scotia Bank

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<u>Outline</u>

- The General Problem
- Static Case.
- Dynamic Case.
- Weighted Dynamic Case.

TO DO:

- Non-parametric: K-S, sK-S
- Parametric-Beta Distribution?
- Scatter Plot
- Static-Dynamic

The General Problem:
How to combine two relative rankings of credit risk into one ranking?

- In the wholesale space, Banks rates each individual borrower and gives a credit rating in a way similar to rating agencies. The internal credit rating plays an important role in the credit risk management framework.
- Credit rating is defined as the relative ranking of default risk for a borrower of the Bank. The assignment of a relative ranking is industry-specific.

- Each industry uses a rating model internally built by the Bank. A rating from the model is the starting point of rating assessment. The model rating usually will be further adjusted based on experienced credit judgement after considering borrower's past performance and forecast of the future performance. When assigning the rating both borrower specific factors (e.g. level of debt, profitability and so on) and macro factors (e.g. Industry, geography and so on) are considered.
- For an example, we rank borrowers in the Oil and Gas industry into 16 buckets and also rank borrowers in the Financial Services industry into 16 buckets. How can we combine these two relative rankings into one relative ranking scale so that the relative ranking is now considering borrowers in both industries?

Are the two distributions the same distributions?

Answer: The Kolmogorov-Smirnov Test

The Kolmogorov-Smirnov Test may be used to test whether two underlying one-dimensional probability distributions differ. The Kolmogorov-Smirnov statistic is

$$D_{n,n'} = \sup_x |F_{1,n}(x) - F_{2,n'}(x)|,$$

where $F_{1,n}$ and $F_{2,n'}$ are the empirical distribution functions of the first and the second sample respectively. The null hypothesis is rejected at level $\alpha\alpha$ if

$$D_{n,n'} > c(\alpha)\sqrt{\frac{n+n'}{nn'}}.$$

Where n and n' are the sizes of first and second sample respectively.

The value of $c(\alpha)$ is given in the table below for each level of α

α	$c(\alpha)$
0.10	1.22
0.05	1.36
0.025	1.48
0.01	1.63
0.005	1.73
0.001	1.95

Remark

Note that the two-sample test checks whether the two data samples come from the same distribution. This does not specify what that common distribution is (e.g. whether it's normal or not normal).