Capstone Project 1: Reinsurance -- P&C Loss Development and Fitting a Size of Loss Distribution
Project Learning Goals

- Extract, summarize, and analyze the data needed for a loss development study:
  - Earned Premiums
  - Paid Loss Triangle
  - Reported Loss Triangle
- Extract a claim listing needed to fit a size of loss distribution
- Employ multiple approaches to the same problem and make informed choices between results of different approaches
• Pretend you work for Imagine Insurance and your boss has asked you to provide analysis to support a reinsurance transaction being considered
  • You have a large book of long-tailed US casualty business with policy limits up to $5,000,000 per occurrence
  • Imagine Insurance is considering purchasing excess of loss reinsurance for the layer $4,000,000 excess of $1,000,000
  • Management would like an estimate of the percentage of total losses that would be ceded under this reinsurance coverage
  • You have 10 years worth of detailed policy and claim data in your dataset to use for this analysis
Simplifying Assumptions

- The book has been very stable
- There are no exposure, frequency, or severity trends
- There have been no changes in coverages or limits written
- The book contains no Worker’s Compensation exposures
- There have been no changes in claims handling processes
- The severity distribution for this book is known to be best modeled by the Lognormal distribution
• In P&C and Health, individual claims “develop” over time
  • Lag from time of occurrence until claim reported
  • Lag from time claim reported until final settlement
  • Larger and more complicated claims tend to have longer lags and more volatile development

• Key actuarial task is to estimate the ultimate value of collections of claims based on available data
# Actuarial Concepts: Development Triangles

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• Various distribution functions are used to model loss severity, most have heavy right tails
• Limited Expected Value (LEV) function can be used to model the relative costs of layers of losses
• LEV for a pdf f(x) limited to d is:
  \[ E[x^d] = \int_0^d xf(x) + d \int_d^\infty f(x) \]