ALM 2017

1. Fitting a claim size distribution

You have received a dataset of historical claim severities of 810 claims.

Fit a gamma probability distribution and a lognormal distribution to the data.

2. Simulation using the fitted distribution

Make 1000 simulation of one year's aggregate claims, where

- the claim severities follow the gamma distribution you found above; and
- the expected number of claims is an unobserved random variable Θ; and
- given Θ, the actual number of claims is a Poisson(Θ) random variable.

Assume that the expected number of claims Θ follows a gamma distribution with $E(\Theta) = 50$ and $SD(\Theta) = 10$. The random variable Θ can represent true randomness or your uncertainty regarding the number of claims to expect.

Having simulated Θ, assume that the number of claims N follows a Poisson distribution with $E(N) = \Theta$. You may use the approximation Poisson(λ) ~ Normal(λ, λ) for large λ.

Based on the simulations:

- Estimate the expected annual claim cost;
- Estimate the VaR and TailVar of the annual claim cost, using $\alpha = 95\%$. The loss measured by VaR and TailVar is the difference between actual claim cost and expected claim cost.

3. Simulation using resampling

Do the same exercise as above, but use resampling from the list of claims to simulate the claim severities. Compare with the results of using a fitted distribution.