ACSC/STAT 3703, Actuarial Models I

WINTER 2024
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Homework Sheet 7

Due: Wednesday 28th March: 13:00

Note: **This homework assignment is only valid for WINTER 2024. If you find this homework in a different term, please contact me to find the correct homework sheet.**

Basic Questions

1. An insurance company has an insurance policy where the loss amount follows a Gamma distribution with $\alpha = 3$ and $\theta = 400$. Calculate the expected payment per claim if the company introduces a deductible of d.

2. The severity of a loss on a fire insurance policy follows a Pareto distribution with $\alpha = 1.4$ and $\theta = 4000$. Calculate the loss eliminatrion ratio of a deductible of \$5,000.

3. An insurance company has a policy where losses follow a log-logistic distribution with $\tau = 0.5$ and $\theta = 6000$. The company wants the TVaR at the 95% level for this policy to be \$3,000,000. What policy limit should the company put on the policy to achieve this?

   (i) \$3,076,044

   (ii) \$3,140,336

   (iii) \$3,622,541

   (iv) \$4,102,421

   Justify your answer.

4. Aggregate payments have a compound distribution. The frequency distribution is negative binomial with $r = 5.1$ and $\beta = 0.2$. The severity distribution has mean 3,940 and variance 25,145,000. Use a Pareto approximation to aggregate payments to estimate the expected payment on a reinsurance policy with attachment point \$100,000.

Standard Questions

5. For a certain insurance policy, losses follow a Weibull distribution with $\tau = 2$ and $\theta = 1,000$. The policy limit of \$2,000 is applied after the

deductible. The deductible is set to achieve a loss elimination ratio of 15%. What deductible achieves this loss elimination ratio?

(i) $88

(ii) $135

(iii) $194

(iv) $284

Justify your answer

6. An insurance company models loss frequency as negative binomial with $r = 0.1$ and $\beta = 360$, and loss severity as inverse Pareto with $\alpha = 3$, and $\theta = 1500$. The insurer sets a policy limit $u = \$30,000$ per loss. The insurer buys stop-loss reinsurance for aggregate losses above 1.2 times the expected aggregate losses, the price for which is based on using a Pareto distribution for aggregate losses with parameters fitted using the method of moments. The insurer's loading is 25% for the whole policy, including the ceded part, and the insurer pays 45% of its total premiums to the reinsurer. What is the loading on the reinsurance policy?