

ACSC/STAT 4703, Actuarial Models II

FALL 2022

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Homework Sheet 7

Due: Tuesday 28th November: 17:30 AM

Basic Questions

1. An insurance company has the following data on its policies:

Policy limit	Losses Limited to				
	50,000	100,000	200,000	500,000	1,000,000
50,000	2,295,020				
100,000	6,405,601	6,962,250			
200,000	9,036,806	10,339,041	10,744,125		
500,000	14,832,105	16,246,821	17,383,225	18,641,393	
1,000,000	10,390,552	11,537,920	12,346,002	13,780,532	14,016,403

Use this data to calculate the ILF from \$50,000 to \$1,000,000 using

- (a) The direct ILF estimate.
(b) The incremental method.
2. For a certain line of insurance, the loss amount per claim follows a gamma distribution with parameters $\alpha = 0.3$ and θ . If the policy has a deductible per loss set at 0.1θ and a policy limit set at 2.5θ (for the current value of θ), by how much will the expected payment per loss increase if there is inflation of 7%?
3. An insurance company charges a risk charge equal to the square of the average loss amount, divided by 100,000. It has the following data on a set of 1693 claims from policies with limit \$1,000,000.

Losses Limited to	200,000	500,000	1,000,000
Total claimed	\$93,543,632	\$112,984,361	\$126,093,821

Calculate the ILF from \$200,000 to \$1,000,000.

Standard Questions

4. An insurer sets its premiums for an insurance contract with policy limit 500,000 or 1,000,000 as the expected payment plus a 10% loading, plus a risk charge equal to the square of the expected payment divided by 50,000. Using these premiums, the ILF from 500,000 to 1,000,000 is 1.45.

A reinsurer offers reinsurance of 500,000 over 500,000 for a premium of \$143. Using this reinsurance policy, the original insurer can reduce the ILF to 1.43. What is the reinsurer's loading on this policy?

5. An insurer sells policies with limits \$1,000,000 and \$2,000,000. The trend factor for losses limited to \$1,000,000 is 1.052. The trend factor for losses limited to \$2,000,000 is 1.044. The insurer's loading for policies with limit \$1,000,000 is 25%. For policies with limit \$2,000,000, the insurer buys reinsurance from a reinsurer. The ILF from \$1,000,000 to \$2,000,000 decreases from 1.36 in 2021 to 1.35 in 2022. What is the reinsurer's loading on this reinsurance.