ACSC/STAT 4703, Actuarial Models II
Fall 2020
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Homework Sheet 7
Due: Monday 6th April: 11:59 PM

Basic Questions

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

Policy limit	Losses Limited to			
	20,000	50,000	100,000	500,000
20,000	1,800,712			
50,000	9,744,913	11,144,757		
100,000	21,397,938	36,895,869	37,078,835	
500,000	16,783,656	18,797,737	18,915,855	20,046,074

   Use this data to calculate the ILF from \$20,000 to \$500,000 using

   (a) The direct ILF estimate.

   (b) The incremental method.

2. For a certain line of insurance, the loss amount per claim follows a Weibull distribution with parameters $\tau = 2$ and θ. If the policy has a deductible per loss set at 0.2θ and a policy limit set at 3θ, by how much will the expected payment per loss increase if there is inflation of 6%?

3. An insurance company charges a risk charge equal to the square of the average loss amount, divided by 50,000. It has the following data on a set of 800 claims from policies with limit \$1,000,000.

Losses Limited to	20,000	50,000	100,000	500,000	1,000,000
Total claimed	4,030,561	9,075,070	16,189,091	43,178,156	51,263,984

   Calculate the ILF from \$50,000 to \$1,000,000.

Standard Questions

4. An insurer calculates the ILF from \$500,000 to \$1,000,000 on a particular policy is 1.103. The average loss per unit of exposure with the policy limit of \$1,000,000 is \$2,047. The insurer's premium also includes a risk charge equal to the square of the expected loss divided by 10,000. A reinsurer is willing to provide excess-of-loss reinsurance of \$500,000 over \$500,000 (that is, the attachment point is \$500,000 and the limit on the reinsurer's payment is \$500,000) with a loading of 20%.

(a) Calculate the average loss per unit of exposure for a policy with limit $500,000.

(b) Calculate the premium the insurance company should charge for a policy with limit $1,000,000 if they buy excess-of-loss reinsurance.

5. An insurer sells policies with limits $500,000 and $1,000,000 with the premium equal to the expected payment plus a risk charge equal to the square of expected loss divided by 10,000. The insurer calculates a trend factor of 1.047 for expected payments on policies with limit $1,000,000. A reinsurer offers excess-of-loss reinsurance of $500,000 over $500,000 for a 20% loading on the expected reinsurance payment. The trend factor for expected payments on a policy with limit $500,000 is 1.044. The insurer finds that buying reinsurance would not affect its premium before applying trend factors. After applying trend factors, buying reinsurance allows the insurer to lower its premium by 0.5%. What is the expected payment on the policy with limit $1,000,000 before trend factors are applied.