6. (2.5 points)

An insurance company has a private passenger auto book of business with the following claims experience:

Territory	Years Since Last Accident	Earned Premium at Present Rates for Two Years Since Last Accident	Earned Car Years	Number of Claims	Incurred Loss
1	0	$15,000,000	15,000	5,000	$9,000,000
1	1	$125,000,000	125,000	41,000	$75,000,000
1	2+	$230,000,000	230,000	76,000	$138,000,000
2	0	$25,000,000	25,000	7,000	$16,000,000
2	1	$310,000,000	300,000	84,000	$187,000,000
2	2+	$550,000,000	535,000	147,000	$328,000,000
3	0	$10,000,000	10,000	4,000	$7,000,000
3	1	$80,000,000	100,000	35,000	$43,000,000
3	2+	$160,000,000	170,000	60,000	$100,000,000

Choose an appropriate exposure base for calculating credibility. Justify the selection.

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Question 6:

Model Solution 1

Premium should be used as the base to prevent the maldistribution of premium IF higher frequency territories have higher premiums AND territory differentials are correct.

	(A)	(B)	(C)	(D)	(A)/(B)	
Terr	EP	ECY	# Clms	Losses	Avg EP	Rel EP
1	370,000,000	370,000	122,000	222,000,000	1,000	1.0033
2	885,000,000	860,000	238,000	531,000,000	1,029	1.0325
3	250,000,000	280,000	99,000	150,000,000	893	0.8958
Total	1,505,000,000	1,510,000	459,000	903,000,000	997	1.0000

	(C)/(D)		(C)/(B)	
Terr	Avg PP	Rel PP	Freq	Rel Freq
1	1,820	0.9249	0.3297	1.0847
2	2,231	0.1341	0.2767	0.9104
3	1,515	0.7702	0.3536	1.1632
Total	1,967		0.3040	1.000

Compare Rel Freq to Rel EP. They are not lining up. Terr 3 has the highest rel freq but the lowest rel EP.
That means ECY is a more appropriate base than EP.

Model Solution 2

Bailey and Simon use EP as exposure base to eliminate maldistribution due to high frequency territories having high territorial relativity and a high # of non-accident-free risks.

Hazaam says this exposure base works only when:

1) High frequency territories are also high premium territories, and
2) Territorial relativities are proper

Thus, I will test the two above points.

1:

Territory	Frequency ($\sum claims/\sum car\ years$)	avg Prem ($\sum Prem/\sum car\ years$)
1	.330	1000
2	.277	1029
3	.354	893

High frequency territories do not appear to have higher avg premium.

2:

Territory	Loss	Prem	LR (Loss/Prem)
1	222M	370M	.6
2	531M	885M	.6
3	150M	250M	.6

All territories have the same LR, which suggests that the relativities are proper. However, due to #1 failing, I would not use EP, and instead use earned car years.

Model Solution 3

Check territory differentials

		Average Premium	Loss Ratio	Frequency
Terr 1	0	1000	60%	33%
	1	1000	60%	33%
	2+	1000	60%	33%
Terr 2	0	1000	64%	28%
	1	1033	60%	28%
	2+	1028	59.6%	27%
Terr 3	0	1000	70%	40%
	1	800	54%	35%
	2+	941	62.5%	35%

Bailey & Simon use EP @ current rates for exposure base to eliminate maldistribution of high frequency territories causing more 0, 1 risks
Hazaam points out this only works if high frequency territories are high premium and territory differentials are proper
In this case, territory 3 differential is not proper, and it has highest frequency without high premium.
∴ choose car years as exposure base for credibility

Examiner's Comments:

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This question was somewhat polarizing. Many candidates responded well, and received a significant portion of the points. Many other candidates did not know how to approach the problem and received little or no points.

The most common mistake was approaching the question as a problem about how to calculate credibility but not answering anything about what exposure base should be used.

The next most common mistake was answering that one should use earned premium as the exposure base as stated in Bailey & Simon but not looking at whether the data met Hazaam's conditions.

Another common mistake was providing the calculations needed to draw a proper conclusion but not providing a conclusion or providing the wrong conclusion. Another common mistake was not looking at average earned premium and frequency, but the candidate instead looked at total earned premium and total losses. They then draw the wrong conclusion.

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