11. (3 points)

Given the following information for a homeowners book of business:

Territory	Earned Exposures	Earned Premium ($000)	Ultimate Losses Excluding Catastrophes ($000)	Current Relativity
1	2,500	3,375	3,200	1.150
2	7,000	11,200	6,200	1.000
3	500	700	1,000	0.900

- Ratio of ALAE to loss = 4%.
- Full credibility standard for exposures = 5,000.
- Use square root rule for credibility calculations.
- Territory 2 is the base class.
- The rating algorithm is Base Rate x Territory Factor x Amount of Insurance Factor.

a. (2 points)

Calculate the credibility-weighted indicated non-catastrophe relativity to the base for each territory using the pure premium method.

b. (0.5 point)

Territory 1 has a high percentage of low-value homes relative to territories 2 and 3. Describe a possible distortion to the indicated territory 1 relativity resulting from the distribution of home values.

c. (0.5 point)

Assume that $1,000,000 of the loss in territory 2 came from a single loss. Discuss an appropriate adjustment to the analysis.

CONTINUED ON NEXT PAGE

QUESTION 11

TOTAL POINT VALUE: 3 | **LEARNING OBJECTIVE: A9**

SAMPLE ANSWERS

Part a: 2 points

Accepted Answer 1

Terr	EE	Ult nonCAT Loss	ALAE	PP	Normalized PP	Cred Z	Curr Rel
1	2,500	3,200	1.04	3200x1.04/2500 =1.3312	1.2308	sqrt(2500/5000) =0.7071	1.15
2	7,000	6,200	1.04	0.9211	0.8506	1	1
3	500	1,000	1.04	2.08	1.9231	0.3162	0.9
Total	10,000			1	1		1.0325

Terr	Normalized Curr Rel	Cred wted ind rel	ind rel to base
1	1.1138	0.7071x1.2308+ (1-0.7071) x1.138=1.1965	1.1965/0.8506 =1.4067
2	0.9685	0.8506	1
3	0.8717	1.2042	1.4157
Total			

Accepted Answer 2

Terr	EE	($000) Ult Loss&ALAE	($000) PP	inc rel	cred	compliment
1	2,500	3200x1.04=3328	1.3312	1.23086	sqrt(2500/5000)	1.15/1.0325
2	7,000	6200x1.04=6448	0.9211	0.85161	1	1/1.0325
3	500	1000x1.04=1040	2.08	1.9231	sqrt(500/5000)	0.9/1.0325
Total	10,000	10816	1.0816	1		1

*Total current relativity = 0.25x1.15+0.7*1+0.05*0.9=1.0325

compliment is the current relativity
Adjust Terr 2 Relativity to 1 (base Rate)
cred weighted relativities are

Terr 1 =[sqrt(2500/5000)x1.23076 + (1-sqrt(2500/5000)x1.15/1.0325]
=1.405
Terr 3 =[sqrt(500/5000)x1.9231 + (1-sqrt(500/5000)x0.9/1.0325]
1.414
Terr 2 =1

Part b: 0.5 point

Accepted Answer 1

Terr. 1 is likely to have high percentage of los sev. Losses that will impact into Terr 1 rate relativity, since Pure Premium method assumes uniform distribution of other variables and does not take correlation into account. Terr. 1 rate is understated.

Accepted Answer 2

Terr. 1 relativity may be unjustifiably low since we're not controlling for amount of insurance in this univariate analysis, ie we may be "double counting" the effect of low value homes

Accepted Answer 3

The pure premium method does not account for the fact that some rating variables might be correlated. When there is correlation b/w rating variables, we can see a double counting effect. Therefore, territory 1 might be picking up the fact that ult losses are smaller (b/c home values are smaller), which can distort the indicated territory 1 relativity. The indicated terr 1 relativity will be too low if it picks up the smaller avg loss amount in terr 1 due to smaller avg home values.

Part c: 0.5 point

Accepted Answer 1

This loss should be excluded and add-back an appropriate large loss load based on analysis with larger volume of data

Accepted Answer 2

Remove from losses and include it as a part of the large loss loading and apply loading factor back to the non-cat loss

Accepted Answer 3

This loss should be taken out of the analysis because it is a shock loss. If it is left in the analysis it can distort the results and make them volatile. If left in, the indicated rel will be higher in years with shock losses and lower in years without shock losses. Since we took it out of the analysis a large loss provision should be added back in to price for large losses over a longer term.

EXAMINER'S REPORT

Part a

Candidates were expected to apply the pure premium method to determine credibility weighted revised relativities. This includes calculating pure premium – including ALAE (unless mentioning that

ALAE had no effect on this particular problem's answer) – by territory and in total, calculating territory relativity to total, and then credibility weighting against the normalized current relativity. Finally, relativities needed to be restated using Territory two as the base territory.

Common mistakes included omitting ALAE from pure premium, not calculating the revenue-neutral normalized current relativity and calculating a loss ratio rather than pure premium by dividing loss+ALAE by earned premium.

Part b

Candidates were expected to explain the direction and source of the distortion, as well as the underlying assumption of the pure premium method that was violated. Common mistakes included providing only discussion around one of those items (for example describing the assumption violated but not the direction of distortion) or simply restating the question as their reasoning. Other responses gave descriptions of how to correct for distortions, which while often insightful, did not address the question.

Part c

Candidates were expected to know how to reduce distortions in rating caused by large losses, specifically by capping/removing large losses and applying an excess/large loss load. Candidates generally did well on this part, although the most common mistake was neglecting to add in a large loss or excess loading back in.