10. (3.5 points)

Given the following information about an insurance product:

Territory Factors	
Territory	Factor
A	0.85
B	1.00
C	1.35

- Fixed expense per exposure = $50.
- Variable expense ratio = 17%.
- Underwriting profit provision = 3%.
- LAE provision = 16% of loss cost.
- Base rate = $435.
- Policy fee = $55.
- Policy fee is an additive fee added to each exposure in the last step of the rate calculation.

Based on a separate analysis, an actuary projects the following for calendar-accident year 2018:

Territory	Earned Exposures	Ultimate Loss Cost
A	150	$300
B	200	$350
C	100	$500

a. (1.5 points)

Calculate the projected total underwriting profit for calendar-accident year 2018.

b. (1.5 points)

Calculate the indicated policy fee, indicated territory factors, and indicated base rate.

c. (0.5 point)

Management suggests reaching the targeted profit by only increasing the base rate. Discuss this approach.

CONTINUED ON NEXT PAGE

QUESTION 10

TOTAL POINT VALUE: 3.5 | **LEARNING OBJECTIVE(S): A7, A9**

SAMPLE ANSWERS

Part a: 1.5 points

Sample 1

Total Premium = (150)(.85)(435) + 150(55) + (200)(1)(435) + 200(55) + (100)(1.35)(435) + 100(55) = 225,937.5

Total Losses = 300(150) + 350(200) + 500(100) = 165,000

1 =((165,000/225,937.5)(1.16) + 50(450/225,937.5)) /(1 - .17 – Profit)

Profit = 11.67%

Sample 2

Terr	Prem/Exp	Total Prem	Ult Loss Cost	LAE	Ult Loss Cost + LAE	Total L + LAE
A	435 * .85 + 55	63,713	300	1.16	348	52,200
B	435 * 1 + 55	98,000	350	1.16	406	81,200
C	435 * 1.35 + 55	64,225	500	1.16	580	58,000
	502.08	225,938				191,400

Prem = Loss + LAE + Fixed Exp + Var Exp + Profit

Profit = Prem – Loss – LAE – Fixed Exp – Var Exp

Profit = 225,938 – 191,400 – 50(150 + 200 + 100) – 0.17(225,938) = -26,371.46

Part b: 1.5 points

Sample 1

- Indicated territory factors

Territory	Ult Loss Cost	Indicated Factors
A	300	300/350 = 0.857
B	350	1
C	500	500/350=1.429

- Indicated policy fee = fixed expense/(1-V-Q) = 50/(1-17%-3%) = 62.5
- Indicated base rate
  Assume the indicated base rate = B. Then,
  (150 X 0.857 + 200 x 1 + 100 x 1.429) x B x (1-V-Q) = 191,400
  ⇨ 239,250 = 471.45B => B = 507.5

Sample 2

Average Territory Factor = (150 x 0.857 + 200 + 100 x 1.429)/(150 + 200 + 100) = 1.0477

Average Loss Cost = (150 x 300 + 200 x 350 + 100 x 500)/450 = 366.66

Ind Rate = (366.66 + 50)/(1 – 17% - 3%) = 594.17

Ind Base Rate = (594.17 – 62.50) x (1/1.0477) = 507.48

Sample 3

Indic Pol Fee = 50/(1-.17-.03) = 62.5

Terr	Factors (Keep B as base)
A	300/350 = .857
B	1.000
C	1.429

Base Rate = 350(1.16)/(1-.17-.03) = 507.5

Part c: 0.5 point

Sample 1

Over time, this will lead to adverse selection as Terr C is underpriced and should have its relativity increased. In the short term, this approach will not have a large impact and would make for a simpler regulatory rate filing.

Sample 2

Assuming no shift in the mix of business, this will bring the company to the correct rate level. However, this analysis shows that the relativity is too low for territory C. This means that even after increasing the base rate, rates for territory C will be too low to cover their loss cost in that territory. This means part of C's loss cost will be subsidized by territories A and B. If other insurers price more accurately for C, this insurer will get more territory C customers and less customers from A and B due to adverse selection. This would lead to the insurer becoming unprofitable.

Sample 3

I would advise against this as by changing the policy fee and relativities prices will be more equitable and better aligned with expected loss per policy.

EXAMINER'S REPORT

Candidates were expected to understand the pure premium method and how to include different loss, expense and premium amounts. They needed to understand how to calculate premiums with a fixed expense fee.

Part a

Candidates were expected to use the pure premium formula to calculate the profit realized.

Common errors included:

- Forgetting to include expenses in the calculation.
- Forgetting to apply the variable expense ratio to premium including fixed expenses premium.
- Forgetting to apply LAE to the losses.
- Getting the fixed expense and policy fee mixed up in the calculation; or adding both as premium; or subtracting both as expenses.

Part b

Candidates were expected to know how to calculate territorial relativities, an indicated policy fee, and an indicated base rate.

Common errors included:

- Using the $55 current expense fee instead of the $50 fixed expense amount when calculating the indicated policy fee.
- Dividing the per exposure loss amount by exposures to create an incorrect pure premium amount when calculating the territorial relativities.
- Calculating an indicated total rate instead of an indicated base rate.
- Using the average loss cost instead of the base loss cost.

Part c

Candidates were expected to understand the implications of taking a simple base rate change instead of a more comprehensive rate change that results in more appropriate rates by territory.

Common errors included:

- Only providing one reason in the explanation.
- Providing a reason without any discussion, such as "agree with Management".
- Not understanding which territories are underpriced versus overpriced, such as providing a discussion that suggests that territory C was overpriced.