13. (3 points)

An insurance company is considering updating its territorial relativities given the following information:

Territory	Number of Exposures	Trended and Ultimate Incurred Losses & ALAE	Current Territorial Relativity
1	30,000	$3,000,000	1.100
2	50,000	$4,000,000	1.000
3	25,000	$1,500,000	0.850

- The base territory remains the same.
- Exposures are homogeneous within each territory.
- The full credibility standard = 45,000 exposures.
- Partial credibility is determined by the square root rule.
- Complement of credibility is equal to normalized current territorial relativities.

a. (1.5 points)

Calculate the credibility weighted territorial relativities using the pure premium approach.

b. (0.75 point)

Determine the percent change by territory, assuming the indicated relativities are to be adopted and no overall premium change is desired.

c. (0.75 point)

Briefly discuss three reasons why proposed rate changes might deviate from indicated rate changes.

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QUESTION 13

TOTAL POINT VALUE: 3 | **LEARNING OBJECTIVE: A8, A9**

SAMPLE ANSWERS

Part a: 1.5 points

Sample Answer

Territory	Pure Premium	Credibility	Ind PP Rel	Norm Curr Terr Rel	Cred Wtd Rel	Cred Wtd Rel @ Base Terr
1	100	81.6%	1.235	1.108	1.212	1.226
2	80	100.0%	0.988	1.007	0.988	1.000
3	60	74.5%	0.741	0.856	0.770	0.780
Total	81			0.993		1.012

Calculations for Terr 1:
Pure Premium = Ult Inc Loss & ALAE/Exposures = 3,000,000/30,000 =100 (Total = 80.95)
Credibility = (30,000/45,000)^(1/2) = .816
Ind PP Rel = 100/80.95 = 1.235
Norm Curr Rel = Curr Rel/Tot Avg Curr Rel = 1.1/.993 = 1.108
Cred Wtd Rel
=Cred*Ind PP Rel + (1-Cred)*Norm Curr Rel=.816*1.235+(1-.816)*1.108=1.212
Cred Wtd Rel @ Base Terr = 1.212/.988 = 1.226
All Totals are exposure weighted

Part b: 0.75 point

Sample Answer 1

Territory	Ind Terr Rel Chg	Offset = 1/(1.013)	% Chg with Off-Balance
1	11.5%	0.987	10.0%
2	0.0%	0.987	-1.3%
3	-8.3%	0.987	-9.5%

Calculations for Terr 1:
Ind Terr Rel Chg
= Cred Wtd Rel @Base Terr/Curr Rel -1 = 1.226/1.10 = +11.5%
Exp Wtd Total = (30,000 * 11.5% + 50,000 * 0% + 25,000 * -8.3%)/(105,000) = 1.3%
Offset = 1/(1+Exp Wtd Total) = 1/(1+.013) = .987
% Change with Off-Balance = (1 + Ind Terr Rel Chg)*Offset -1= (1.115*0.987)-1=10.0%

Sample Answer 2

Territory	Ind Terr Rel Chg	% Chg with Off-Balance
1	11.5%	9.4%
2	0.0%	-1.9%
3	-8.3%	-10.0%
Total	1.9%	0.0%

Calculations for Terr 1:
Ind Terr Rel Chg
= Cred Wtd Rel @Base Terr/Curr Rel -1 = 1.226/1.10 = +11.5%
% Change with Off-Balance = (1 + Terr 1 Ind Terr Rel Chg)/(1 + Total Ind Terr Rel Chg) -1= (1.115/1.019)-1=9.4%

Part c: 0.75 point

Sample Answers (needed three reasons for full credit)

- Regulation might restrict large rate increases or decreases
- Large premium swings might be avoided to avoid customers leaving
- Competitive concerns: the company may be worried that an increase in rates could reduce market share
- Insurer might look at the lifetime profitability of the business and realize losses are usually higher for new policies than for renewal policies and may choose a long-term pricing approach
- For volatiles lines of business where very large indications are expected due to the volatility and credibility of data, actuarial judgment may be used to propose a more reasonable change
- The insurer has decided to address the imbalance in rates by revising underwriting guidelines to restrict business from being written at inadequate rates
- Indicated rates may not be fully implemented due to system/operational constraints like a factor requiring new systems

Note that this list is not exhaustive, and other reasonable answers were accepted provided they were adequately supported.

EXAMINER'S REPORT

Part a

Candidates were expected to know how to calculate territorial relativities using the pure premium approach, including calculating partial credibility, the credibility-weighted indicated relativities, and normalizing the current and indicated relativities to the correct base.

Common mistakes included:

- Miscalculating the normalized current territorial relativities
- Credibility weighting the indicated pure premium relativities balanced to the base territory with the normalized current territorial relativities balanced to the average rating factor

Part b

Candidates were expected to be able to calculate the indicated factor change by territory, use the results to determine the base rate offset needed to achieve a revenue-neutral rate change, and calculate the final percentage change by territory.

Common mistakes included:

- Not calculating the offset, simply dividing the indicated territorial relativities from part a by the current territorial relativities
- Calculating the wrong offset by using either the current territorial relativities or the indicated territorial relativities, but not both, in the calculation
- Not converting the territorial impacts to a final percentage change

Part c

Candidates were expected to know why, generally, proposed changes might deviate from indicated changes.

A common mistake was explaining why actual performance could be different than indicated performance.