13. (3 points)

An insurance company sells workers compensation insurance, which includes both indemnity and medical loss types. In preparation for its next rate filing, effective January 1, 2017, the company uses the following information about its book of business for accident year 2015, evaluated as of December 31, 2015:

Territory	Exposures	Indemnity Loss & ALAE	Medical Loss & ALAE	Workers Compensation Total Current Relativity
A	2,500	$2,000,000	$2,000,000	1.20
B	3,500	$3,000,000	$500,000	0.90
C	4,500	$4,000,000	$1,000,000	1.00

- Indemnity development factor to ultimate = 2.50.
- Medical development factor to ultimate = 1.50.
- Indemnity annual loss and ALAE trend = 3%.
- Medical annual loss and ALAE trend = 6%.
- Accidents are evenly distributed throughout the experience period.
- All policies are annual.
- Rates are in effect for one year.
- The base territory remains the same.

a. (2.25 points)

Calculate the indicated territorial relativities to the base territory.

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.

QUESTION 13		
TOTAL POINT VALUE: 3		**LEARNING OBJECTIVE(S): A8**
SAMPLE ANSWERS		

Part a: 2.25 points

Sample 1

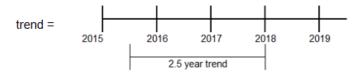| Territory	Indemnity Loss	LDF	Trend	Trended Ult Indemnity
A	2,000,000	2.5	1.03^2.5	5,383,480
B	3,000,000	2.5	1.03^2.5	8,075,219
C	4,000,000	2.5	1.03^2.5	10,766,959

Trend from 7/1/2015 to 1/1/2018

Territory	Medical Loss	LDF	Trend	Trended Ult Indemnity
A	2,000,000	1.5	1.06^2.5	3,470,451
B	500,000	1.5	1.06^2.5	867,613
C	1,000,000	1.5	1.06^2.5	1,735,226

Territory	Total Losses	Exposures	PP	Ind Rel	Rebased
A	8,853,931	2500	3541.57	1.227	1.275
B	8,942,832	3500	2555.09	0.885	0.919
C	12,502,185	4500	2778.26	0.963	1.000
Total			2885.61		

Sample 2

A		2	2.5	1.03^2.5	2	1.5	1.06^2.5
B		3	2.5	1.03^2.5	0.5	1.5	1.06^2.5
C		4	2.5	1.03^2.5	1	1.5	1.06^2.5

trend =

2015   2016   2017   2018   2019

2.5 year trend

	Ult Indemnity + Medical		Pure Prem
A	5.383 + 3.47	2500	3,541.2
B	8.075 + 0.868	3500	2,555.14
C	10.767 + 1.735	4500	2,778.22

Relativities (Rebased)	
A	1.275
B	0.920
C	1.000

Part b: 0.75 point

Sample 1

Terr	Curr Rel	Ind Rel
A	1.2	1.275
B	0.9	0.919
C	1.0	1.0
	1.0143	1.0385

Exposure Weighted

Off-Balance Factor = (1.0143 / 1.0385) = 0.977

Terr	% Change
A	(1.275 / 1.2) * .977 - 1.0 = .0377
B	(.919 / .9) * .977 - 1.0 = -.0024
C	(1.0 / 1.0) * .977 - 1.0 = -.023

Sample 2

Terr	Exp	Curr Rel	Ind Rel
A	2500	1.2	1.275
B	3500	0.9	0.919
C	4500	1.0	1.0

$$\text{Off Balance Factor} = \frac{1.275(2500) + .919(3500) + 1(4500)}{1.2(2500) + .9(3500) + 1(4500)} = \frac{10904}{10650} = 1.0238$$

Terr	% Change
A	(1.275 / 1.2) / 1.0238 - 1.0 = .0377
B	(.919 / .9) / 1.0238 - 1.0 = -.0024
C	(1.0 / 1.0) / 1.0238 - 1.0 = -.023

Sample 3

Terr	Curr Rel	Normalized Current Rel	Ind Rel	Normalized Indicated Rel	% Change
A	1.2	1.183	1.275	1.228	1.228 / 1.183 - 1.0 = .038
B	0.9	0.887	0.919	0.885	.885 / .887 - 1.0 = -.002
C	1.0	0.986	1.0	0.963	.963 / .986 - 1.0 = -.023
	1.0143		1.0385		

Sample 4

Terr	Exposures	Current PP Relativity	Current Premium	Indicated PP Relativity	Indicated Premium
A	2,500	1.20	3,000	1.275	3,188
B	3,500	0.90	3,150	0.920	3,220
C	4,500	1.00	4,500	1.000	4,500
			10,650		10,908

Terr	Current Premium	Indicated Premium	Indicated Change	Rebalanced
A	3,000	3,188	6.3%	3.7%
B	3,150	3,220	2.2%	-0.2%
C	4,500	4,500	0.0%	-2.4%
	10650	10907.5	2.4%	0.0%

Sample 5

Terr	Curr Rel	Ind Rel
A	1.2	1.275
B	0.9	0.919
C	1.0	1.0
	1.0143	1.0385

Exposure Weighted

Off-Balance Factor = (1.0143 / 1.0385) = 0.977

Terr	% Change
A	(1.275 / 1.2) - 1.0 = .0625
B	(.919 / .9) - 1.0 = .0211
C	(1.0 / 1.0) - 1.0 = 0

Base rate should be multiplied by 0.977 to result in no overall premium change

EXAMINER'S REPORT

Part a. of this question required candidates to calculate indicated relativities to the base territory given the empirical data as ratios of the trended ultimate pure premium for each territory over the base territory. This part was challenging due to the fact that candidates needed to treat each line of business separately in trending and developing before combining to determine pure premiums for Workers Compensation in total.

Part b. of this question required candidates to calculate the percent change by territory. Since the problem states that no overall premium change is desired, candidates were expected to recognize the need to re-balance the indicated relativities in order to offset any changes to the base rate due to changes in relativities. This part was challenging, requiring candidates to recognize the need for an off-balance factor, and calculate the off-balance factor correctly.

Overall, candidates performed well on this question despite the challenges.

Part a

Candidates were expected to know how to trend losses, calculate the appropriate trend period, and develop losses to ultimate – treating Indemnity and Medical losses separately.

Candidates were expected to calculate indicated pure premium relativities for each territory and then rebase to Territory C.

Common mistakes included:
- Calculating the wrong trend period
- Not rebasing indicated relativities to Territory C
- Not trending and developing losses
- Calculating indicated relativities as ratios of ultimate loss, rather than pure premium

Part b

Candidates were expected to calculate the percentage change in relativities by territory that would result in no overall premium change.

Common mistakes included:
- Not calculating an off-balance factor, and simply calculating percentage changes for each territory