9. (2.75 points)

Given the following information for an insurance company:

State	Class	Exposures	Losses	Current Pure Premium
A	1	200	$800	4.00
A	2	300	$2,100	7.00
A	Subtotal	500	$2,900	5.80
B	1	300	$600	2.00
B	2	300	$1,500	5.00
B	Subtotal	600	$2,100	3.50
C	1	500	$1,500	3.00
C	2	750	$4,500	6.00
C	Subtotal	1,250	$6,000	4.80
All	1	1,000	$2,900	2.90
All	2	1,350	$8,100	6.00
All	Total	2,350	$11,000	4.68

- Full credibility standard is 1,500 exposures.

a. (1.5 points)

Calculate the credibility-weighted pure premium for class 2, state B using Harwayne's method.

b. (0.5 point)

Discuss the appropriateness of using Harwayne's method for this company.

c. (0.75 point)

Evaluate Harwayne's method using three desirable qualities for a complement of credibility.

CONTINUED ON NEXT PAGE

EXAM 5 SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 9	
TOTAL POINT VALUE: 2.75	**LEARNING OBJECTIVE(S): A8**
SAMPLE ANSWERS	
Part a: 1.5 points	
Step 1 Pure Premiums at B Exposure B PP = 2100/6 = 3.5 A adjusted PP = (4*300 + 7*300) / 600 = 5.5 C adjusted PP = (3*300) + 6*300) / 600 = 4.5 Step 2 Adjustment factors A adjustment factor = 3.5/5.5 = .636 C adjustment factor = 3.5/4.5 = .778 Step 3 Adjusted Class 2 Adjusted A Class 2 = .636 * 7 = 4.45 Adjusted C Class 2 = .778 * 6 = 4.67 Step 4 Complement of Credibility Weighted Average A and C = (300 * 4.45 + 750 * 4.67) / 1050 = 4.6 Step 5 Credibility for B Class 2 Credibility = min(SQRT(300/1500),1) = .447 Step 6 Total Credibility Weighted Credibility weighted PP B Class 2 = .447*5 + 4.61*(1-.447) = 4.78	
Part b: 0.5 point	
Sample 1 This method is appropriate as it removes some distributional bias and since exposure volume is low for B2. *Sample 2* It is a good way to adjust for the different exposure distribution in state B for the classes relative to other states.	
Part c: 0.75 point	
Any 3 of the following: • It produces accurate estimates (close to the true value) • Unbiased – on average estimates are same as true value • Statically independent between complement & subject • Available – yes, the data is available • Easy to compute - It is NOT easy to compute, though doable, requires detail data; OR the method is relatively simple to use • Logical relationship to values being credibility weighted (using the same state's experience for other class adjusted for bias should be logical)	
EXAMINER'S REPORT	

EXAM 5 SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

Candidates were expected to calculate a credibility-weighted pure premium using given inputs and Harwayne's method. Using the results of this analysis, candidates were expected to assess the appropriateness of this approach on the specific company data and also evaluate the method using three desirable qualities of a credibility complement.

Part a

Candidates were expected to calculate a credibility weighted pure premium for class 2, state B using Harwayne's method.

Common errors included:

- Not using Harwayne's method, as the question specifically instructed that Harwayne's method should be used.
- Not calculating the average pure premium for states A and C.
- Not calculating the adjustment factors correctly.
- Not adjusting the class 2 pure premiums in states A and C to state B level correctly.
- Not calculating the complement of credibility correctly.
- Stopping after calculating the complement of credibility without calculating the credibility weighted pure premium.
- Not calculating the credibility of the experience correctly.
- Not using the correct pure premium in the calculation of the credibility weighted pure premium.
- Applying credibility to the complement of credibility rather than applying (1 – credibility).

Part b

Candidates were expected to evaluate the appropriateness of using Harwayne's method for this company given the data listed in part a. Harwayne's method is appropriate in this case because it adjusts for distributional bias.

Common errors included:

- Just commenting on credibility or the appropriateness of using a complement of credibility with no mention of the specific method; the question specifically asked for the appropriateness of Harwayne's method.
- Stating Harwayne's method was not appropriate because of low volume in all 3 states. Harwayne's method addresses distributional bias in the overall experience and can be used in low volume situations.

Part c

Candidates were expected to provide an evaluation of Harwayne's method using three desirable qualities of a complement of credibility. This part of the question was not specific to the data provided that was used in parts a. and b.

Common errors included:

- Providing a list of desirable qualities of a complement of credibility with no explanation of how they apply to Harwayne's method.