11. (3.5 points)

An insurance company is researching three new rating variables to include in its homeowners risk classification system. The insurer has determined the following information about the existing book of business:

Credit	Exposures	Pure Premium	Competitor's Rating Plan Factor	Base Class
Excellent	1,500	$116.67	0.85	No
Good	2,500	$128.00	1	Yes
Fair	1,000	$155.00	1.3	No
Total	5,000	$130.00		

Age of Homeowner	Exposures	Pure Premium	Competitor's Rating Plan Factor	Base Class
Under 30 years	800	$150.00	0.7	No
30 to 40 years	1,200	$116.67	1	Yes
Over 40 years	3,000	$130.00	1.2	No
Total	5,000	$130.00		

Loss Prevention	Exposures	Pure Premium	Competitor's Rating Plan Factor	Base Class
Fire extinguisher	100	$100.00	0.9	No
Smoke detector	4,700	$128.72	1	Yes
None	200	$175.00	1.5	No
Total	5,000	$130.00		

- Credit is determined using the credit score for the primary homeowner.
- Age of homeowner is determined using the age of the primary homeowner.
- A homeowner with both a fire extinguisher and smoke detector would be classified with a smoke detector.
- Full credibility claim standard = 400.
- The square root rule is used to determine partial credibility.
- A competitor's rating relativities are used as the credibility complement.
- Frequency for every risk classification = 10%.
- Assume that the insurer can implement only one new rating variable at this time.
- Assume that each variable is independent.

a. (1.5 points)

For each potential rating variable, briefly describe two possible concerns of adding it to a risk classification system.

b. (0.75 point)

Without performing any calculations, recommend and justify which rating variable the insurer should implement within a risk classification system.

c. (1.25 points)

Develop the indicated credibility weighted rating factors for the variable recommended in part b. above.

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Exam 5 Question #11

Credit: -Lacks causality as is correlated with loss exposure; however, difficult to show causality
-Invades privacy of insureds

Age: -Lacks controllability since insured cant control their age
-The indicated relativities from the insurer's data differ significantly from competitor relativities. (e.g. Ind Under 30 Rel > 1.00)

Loss Prevention:

-Difficult and expensive to verify as it is subject to manipulation from the insureds

-Non sensical deifinition. Why would someone with both a fire extinguisher and a smoke detector be rated higher than someone with just a fire extinguisher

a. I would recommend credit score as score as a variable.
-significant loss cost differentiation
-objective definition
-Easy and inexpensive to verify and administer
-Social concerns are not sufficient to prevent using this variable (assuming it is legal to do so)

Credit	PP	Ind Rel	Comp Rel	Z
Excellent	116.67	0.8975	0.8374	61.24%
Good	128.00	0.9846	0.9852	79.06%
Fair	155.00	1.1923	1.2808	50.00%
	130.00	1.000	1.000	

Ex: $\frac{116.67}{130} = 0.8975$

Ex: $\frac{0.85}{1.015} = 0.8374$

EX: 61.24%= $\sqrt{\frac{1500x0.1}{400}}$

$\left(\sqrt{\frac{reg \times exp}{400}}\right)$

@Base
Cred Wgtd Rel
0.888
1.000
1.256

$$\frac{(2) \times (4) + (3) \times [1 - (4)]}{(2) \times (4) + 3 \times [1 - (4)]}$$

EX: *For good*

c. The most common mistakes on this part was providing the similar responses twice, only defining fixed and variable expenses.

10. Generally speaking, the candidate pool did very well on both parts of this question.

a. When candidates did make mistakes, the most common ones were:

1. Only calculated the lifetime value of the expected total profit but did not calculate the expected premium (the denominator for the final ratio)
2. Didn't apply cumulative persistency to the expected premium
3. Incorrect discounting (for example, multiplying by 0.97 in year 2 instead of dividing by 1.03)
4. Mathematical error (with credit given for the remainder of Part A in situations where the correct answer would have been calculated without the math error)

b. Candidates scored well on this part too, with credit was typically given for the following themes:

1. The use of multiple policy years (i.e. "lifetime" of the policy)
2. The use of persistency (i.e. "retention")
3. Reflection of discounting
4. Differences in expenses/losses for new business versus renewal business

11.

a. Candidates needed to provide a brief description along with the characteristic they listed. Most candidates lost points for either no, or an insufficient, description of the characteristic listed. For example, a common insufficient answer is that "credit is discriminatory". Such an answer is not quite accurate, since all classification plan factors discriminate among insureds. Thus, a clarification of the nature of discrimination that causes concern is warranted. Some candidates mentioned concern that the age of homeowners relativities curve does not trend monotonically. Candidates who received credit typically mentioned lack of credibility in the youngest age group or the dissimilar direction compared to competitor relativities. However, the lack of monotonic relationship in and of itself was not accepted as a valid concern.

b. Many candidates did not provide a description commensurate with the point value assigned. In order to receive full credit, candidates needed to briefly describe at least three reasons to support their choice. Some candidates provided reasons for choosing a variable that contradicted the concerns listed in Part A, which lost them points. Often, candidates described reasons why they wouldn't choose other variables. Points were awarded when the reason a variable wasn't selected for one variable was a valid reason to select the chosen variable. For example, if the candidate didn't select loss prevention because it is difficult to verify and they were choosing credit score (which is not difficult to verify), points were awarded. However, if a candidate said they didn't select age of homeowner because of lack of credibility and they chose loss prevention (which has an issue with credibility),

points were not awarded. Many candidates who chose credit score lost points for saying the levels were "fully credible", as opposed to "good credibility" which leads to a different discussion and also lead to candidates losing points in Part C.

c. To receive full credit, candidates needed to correctly calculate the full credibility standard, calculate the credibility using the square root rule, calculate the company indicated relativities, credibility weight the company relativities with the competitor relativities, and finally re-base the credibility weighted relativities. The most common mistake here was claiming full credibility, not recognizing that the 400 full credibility standard refers to claim count and not exposure. For candidates who calculated the indicated company relativities relative to the total pure premium, a common mistake was not calculating the revenue neutral competitor relativities as well. Additionally, some candidates missed the instruction to use the competitor's relativities as the complement of credibility.

12. In general, the response to this question was poor. Many candidates recognized the small data volume but incorrectly went about combining alarm types or deductibles into one category. This was often accompanied by a calculation of a proposed factor by weighted the GLM output. Time was unnecessarily lost by this calculation. Another common error was candidate's often recognized unintuitive output that seemed to be the result of sparse data but yet still proposed to select the predicted factor.

13. Many candidates received full credit on this question. Some common mistakes that were made on this problem:

- Forgetting fixed expense is in the numerator.
- Treating the loss elimination ratio as the excess loss ratio. If the candidate used the incorrect LER "correctly" (applied the deductible processing and credit risk loads to the losses under the deductible, the excess risk margin to the losses above the deductible, and used the losses above the deductible in the numerator) candidates still received some partial credit.
- Applying the ALAE % to excess losses.

14.

a. Candidates not receiving partial credit on often restated the same item twice or two sides of the same item. To receive full credit, 2 separate ideas were necessary.

b. On part b, very few candidates only received partial credit. Examples of full credit statements include:

- "An insurer's retention may decline if a rate cap is not adopted."
- "State laws may require a maximum rate change be followed for all policies."

15. This question was answered poorly with few candidates receiving full credit.