4. (1.5 points)

One approach for estimating excess ratios by individual class in workers compensation insurance is to use a multi-dimensional credibility technique.

According to each of the three statistical considerations listed below, explain whether this technique is an improvement over estimating excess ratios by hazard group:

i. Homogeneity

ii. Credibility

iii. Predictive Stability

CONTINUED ON NEXT PAGE

EXAM 8 FALL 2014 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 4

TOTAL POINT VALUE: 1.5 **LEARNING OBJECTIVE: A1, A2**

SAMPLE ANSWERS

Sample responses for Homogeneity

Sample 1

Yes, multi-dimensional credibility technique for individual classes could be viewed as an improvement over estimating excess ratios by hazard group from a homogeneity standpoint, because at a hazard group level there could be greater variance within the hazard group, whereas we would expect lower within variance at the class level and thus greater homogeneity.

Sample 2

The class excess ratios are an improvement in homogeneity over the hazard group excess ratio because each of the individual risks in each class should have similar expected costs. There is a greater chance that a subset of risks within a hazard group does have significantly different loss potential since a hazard group contains a wider array of classes, so it is more diverse.

Sample 3

Hazard groups are made up of classes, so the classes themselves will be more homogenous than combined classes.

Sample responses for Credibility

Sample 1

Each hazard group or class needs to be large enough to allow credible statistical predictions. Since hazard groups contain multiple classes, they are larger than the individual classes and their excess ratios will be more credible. Therefore, the class excess ratio technique is not an improvement over the hazard group excess ratios for credibility.

Sample 2

MDCT both improves & worsens credibility of excess ratio estimates, in different ways. Credibility is improved because each injury type is calculated using data from other, correlated injury types, so more information & credibility goes into the final MDCT

estimate. Credibility is worsened because the same data is subdivided much more finely by class by state vs by HG by state, so the sample size that each excess ratio is based off of is much smaller.

Note:
A candidate who said that the multi-dimensional credibility technique improves credibility could have also gotten full credit using a justification similar to sample 2.

Sample responses for Predictive Stability

Sample 1

The class excess ratios will be more responsive to changes in expected costs for the class than the hazard group excess ratios will be. However, since each class is volatile, the excess ratios will probably respond to unwarranted changes in expected costs. Since the hazard groups are larger, their excess ratios will be more stable. Therefore, the class excess ratios are not an improvement for predictive stability.

Sample 2

Balances the responsiveness of individual class injury type weights while maintaining stability by using the current hazard group excess ratio as the complement of credibility.

Sample 3

By incorporating information from more common minor injury types with the less frequent major injuries, the predictive stability will be improved because excess ratios will not be solely dependent on the less frequent major claims that can vary year-to-year. It is an improvement for predictive stability.

EXAMINER'S REPORT

We expected the candidates to demonstrate:

- an understanding of the concepts of homogeneity, credibility & predictive stability as described in the AAA Risk Classification Statement of Principles,
- an understanding of the difference between the hazard group technique and the class-level multi-dimensional credibility technique, and
- the ability to apply the concept of homogeneity, credibility & predictive stability in the context of these two classification methods.

All 3 of these pieces were required in order to obtain full credit for each of the subparts of the question.

The three statistical considerations are fundamental concepts from the AAA Risk Classification Statement of Principles. However, the application of these concepts to the

multi-dimensional credibility technique from the Couret & Venter paper adds a non-trivial complexity to the question. If the candidate did not have a good knowledge of the Couret & Venter paper but understood that their credibility technique is on a class level (which is mentioned in the question), and that hazard groups are made up of groups of classes, they may still have gotten full credit if they could apply the statistical considerations appropriately.

Most candidates showed an understanding of the statistical considerations and received credit accordingly, but candidates struggled with displaying the application of the statistical considerations to the methodologies. Many candidates did not have a good understanding of the multi-dimensional credibility technique and/or the hazard group method.

Common mistakes include:

- Commenting only on one of the two classification methods but failing to compare it with the other method.
- Misunderstanding the multi-dimensional credibility technique, for example saying that the multi-dimensional technique is a method of grouping classes.
- Failing to recognize that the multi-dimensional technique is looking at class level data, which is a subset of hazard group data and therefore has more similar risks but less volume.
- Confusing injury types, classes and/or hazard groups
- Arguing that combining injury type data increases homogeneity
- Discussing the credibility technique or methodology being used, as opposed to the credibility statistical consideration as described in the AAA Statement of Principles.
- Discussing the predictive accuracy of the methods alone instead of the predictive stability.