A METHOD FOR SETTING RETRO RESERVES

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DISCUSSION BY ROY K. MORELL

All actuaries, I believe, would agree that a reserve formula of any kind which eliminates the need for actuarial judgment will never be devised. The author of this paper, I am quite sure, would be the first to agree. Nevertheless, this does not stop actuaries from developing formulae and procedures to help us with our work. This is because a formula helps us to organize our thoughts and exercise our judgment in an orderly manner. The procedures and formulae in this paper are no exception.

Before I attempt to make some constructive comments on the paper, I want to emphasize that I think the paper is a valuable addition to our literature. The method proposed for setting a reserve for retrospective rating adjustments is theoretically sound, easy to understand and apply, and very practical. It is a significant improvement over the method described in an earlier CAS paper. The remainder of this review will begin by raising some rather theoretical questions and then turn to some practical comments on the use and construction of the *DR1* and *DR2* formulae contained in the paper.

Theoretical Considerations

In discussing the relationship between deviation ratio and loss ratio, the paper states that this relationship is not perfect. This is in reference to the graph of these ratios using policy years 1967–72 (Exhibit I), in which the points, although highly correlated, do not all lie perfectly on the line. Is it possible that each of these points does lie perfectly on a line which describes the relationship between deviation ratio and loss ratio for the group of policies or set of circumstances which existed for that policy year? In other words, is it the subtle differences between the components and conditions of the various years which cause the points not to all lie on the same line? It is possible that the *DR1* formula is perfect but unknowable for a given year. What this suggests is that, prior to graphing, the points should be adjusted for any known differences of significance between the years. From a practical point of view, such adjustments would be very difficult, if not impossible, to make. The procedure suggested in

the paper is reasonable and should generally provide an excellent estimate of the relationship between deviation ratio and loss ratio for future years.

Although possibly of theoretical value only, consideration should also be given to the perfect method of setting a reserve for retrospective rating adjustments. By this I mean a procedure which establishes a retrospective reserve for each individual account. Such a method could explicitly recognize all the individual characteristics of the policies which make up the group of policies for which a reserve is being set. Since any method which develops a reserve for a group is unavoidably imperfect, such an ideal system at least deserves mention. Obviously such a system would have many practical and some theoretical obstacles to it. However, given the computer technology available, these obstacles may be overcome.

The DR1 Formula

When developing the *DR1* formula values, there are several pitfalls for which one must be alert when using the proposed method. The hazards are those changes in the conditions or characteristics of the policies which will affect the relationship between deviation ratio and loss ratio. Recognizing and adjusting for these changes requires the use of actuarial judgment. It will be sufficient to merely list some of the changes which will affect the *DR1* formula:

1. A major change in expense program, such as the one introduced by the National Council on Compensation Insurance in 1980.
2. A major change in the distribution of policies written by premium size.
3. A change in the distribution of loss limits purchased which would affect the percentage of total losses eliminated.
4. A major change in the distribution of minimum or maximum premium ratios purchased.
5. A sudden and significant change in Table M values used to determine insurance charge.
6. A change in the distribution or interaction of three year plans versus one year plans.
7. A change in the distribution or interaction of multi-line plans versus monoline plans.

One other comment on the *DR1* formula is appropriate. I think it is correct to set a minimum deviation ratio for the same reasons that a maximum is needed. Loss ratios on occasion can be extremely low and it is common practice to have a minimum premium for a retrospective policy.

The DR2 Formula

If earned standard premium (*ESP*) were being booked perfectly, one would expect to have less than 100% of the policy year *ESP* booked at any time prior to the end of the 24th month. Thus if the deviation projection factor (*DPF*) does in fact represent the reciprocal of the portion of first adjustments paid at a given time, it should be reduced at months 21, 22 and 23 to reflect the portion of total *ESP* earned at that point in time. For example, if at 21 months only 95% of the total *ESP* is earned and one sixth of all first adjustments are paid, then the *DPF* should be 5.70 (6.00 × 0.95) rather than 6.00.

The author is technically correct to include both a deviation projection factor (*DPF*) and a loss projection factor (*LPF*) in his *DR2* formula. However, a simpler and equally effective formula, for most situations, would be one which combines the *DPF* and *LPF* into a single *DPF* which would project deviations paid-to-date to ultimate deviations paid. This combined *DPF* would be greater than unity for early months and become less than unity around the 28th month for most companies. This simplification should be considered for use by those companies with very consistent patterns of paid deviation development.

For those who choose to retain the *LPF*, it should be pointed out that this factor relies heavily on consistent reserving by the claims department as well as a consistency in the emergence of late reported cases. For this reason, it deserves not only an annual retrospective review, but a review in prospective terms as well.

As in the case of the *DR1* formula, there are some changes to be aware of when developing the *DR2* formula values. One must be watchful for such changes and make appropriate adjustments when necessary. These are some of the changes which will affect the *DR2* formula values:

1. A change in the rate at which adjustments are processed.
2. A change in the use or magnitude of retrospective rating development factors.
3. A significant change in the distribution of policy anniversary dates.

A comment on the weight (*W2*) used to combine the *DR1* and *DR2* indications is also appropriate. The paper has chosen a weight which increases linearly between 21 and 60 months. However, the value and accuracy of the *DR2* indication increases very rapidly at first and then at a more gradual rate during the later months. Certainly by 33 months, when nearly all first adjustments have been processed, the *DR2* indication deserves an equal weight with *DR1*.

Conclusion

In conclusion, the author is to be commended for a well written paper of practical value. Despite some potential hazards in determining the formula values, the method outlined is technically sound and very reasonable. It does need to be emphasized that the values derived in the paper are only appropriate for the company whose data was used in the analysis. However, for those companies with their retrospective rating data separately available, the procedures outlined are easy to implement and will result in sound reserves.