CAN WE IMPROVE THE COMPENSATION RATE-MAKING METHOD?

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The title of this paper implies that a critical review of the compensation rate-making method might result in definite benefit in the form of an improved procedure. The suggestion may seem untimely to some who choose to regard the present plan as a permanent program to be preserved indefinitely in statu quo. To others, the present plan merely represents the latest stage in the gradual evolution of an ideal rate-making method which will approach its ultimate form only by occasional amendment. In accord with this latter thought, it is the aim of the writer to point out a few imperfections in the present plan and to suggest ways of correcting them. The comments relate particularly to the determination of classification rate relativity rather than to rate level as the latter phase of the rate-making procedure has been improved recently and apparently is operating satisfactorily. Inasmuch as a complete appraisal of the rate-making method is beyond the scope of the present writing, it may be expected that certain unfavorable aspects of the plan will receive undue emphasis and that the many advantages and merits of the present method will be neglected. However, the following comments are offered in a spirit of constructive criticism and not without due appreciation of the intrinsic value of the present rate-making method.

The compensation rate-making method has been described and discussed in several excellent contributions appearing in previous issues of the *Proceedings*. A review of the theory and the mechanics of the method will disclose that the propriety of many of the operations is actually contingent upon the assumption that the distribution of experience by year, by industry group, and by classification is static or, at least, that these elements are affected simultaneously and to the same degree by general trends in the volume of exposure. It is this qualification that is responsible for some of the difficulties to which reference will be made, for unfortunately for the compensation rate-making method, economic laws do not apply uniformly to all industrial operations. Few will dispute the truth of the observation that the acceleration and subsidence of industrial activity and the timing and extent of wage

changes undoubtedly differ between even broad groups of industries. These variables are important in compensation rate-making because of their effect on premium volume and because practically every form of industrial activity is covered by the compensation manual. Not knowing how to gauge successfully the probable character of future trends for subdivisions of industry, the rate-makers have elected to follow the indications of the experience of the recent past and have abandoned attempts at projection to estimated future conditions. This attitude is commendable so long as a sufficient period of time is taken to establish the true character of the past experience apart from the influence of temporary fluctuations. The use of five policy years' experience for the determination of classification pure premiums, for example, results in the submergence of minor variations in experience which are not worthy of preservation and reflection in the rates. To use seven or ten years of experience might increase stability but practical considerations, plus the fact that industrial processes are continually changing, make it appear inadvisable to extend the period further.

Conversely, a shorter period of years serves to accentuate whatever erratic indications may be present in the abbreviated period. This fact was undoubtedly appreciated at the time the permanent rate-making method was being formulated, but in the quest for responsiveness and adequacy, which were primary objectives then, probably insufficient recognition was given to this point, at least such is the opinion of the writer.

The following table outlines the classification experience period used as the basis for the important steps in the development of compensation rates for an average state.

Element	Basic Period
(a) Total medical rate level	Latest single year
(b) Total indemnity rate level	Latest two years
(c) Industry group rate levels	Latest three years (balanced to a and b)
(d) Classification pure premiums	Latest five years (balanced to c)

Let us examine how a changing volume of experience by industry group may affect the medical rate level, keeping in mind the fact that, although the medical rate level is determined by the shortest period, the same tendencies are present to a less degree in connection with the other elements of the rate revision which are based on longer periods. An extreme but simple example, will

serve to illustrate the apparent defect in the present method. It is not unusual to find a consistent variation between industry groups in the amount of the medical loss ratio because, for instance, serious losses occur in greater or less profusion in the different industry groups. In the following figures it has been assumed that the ratio of medical losses on the present law level to total premiums at current rates is the same for all years for each group and is .20 for Manufacturing, .15 for Contracting, and .25 for All Other. The premium volume for two of the industry groups changes materially during the period resulting in a varying total loss ratio for all groups. The three years are intended to represent the period used for establishing industry group rate levels according to the present rate-making method.

	Manufacturing		Contracting		All Other		Total	
Policy Year	Premium	Loss Ratio	Premium	Loss Ratio	Premium	Loss Ratio	Premium	Loss Ratio
1	1,000	.20	500	.15	1,500	.25	3,000	.217
2	1,000	.20	1,000	.15	1,000	.25	3,000	.200
3	1,000	.20	1,500	.15	500	.25	3,000	.183
3 Yr. Total	3,000	.20	3,000	.15	3,000	.25	9,000	.20

Note: Premium is the premium at current rates in thousands of dollars. Loss Ratio is the ratio of medical losses on present law level to these premiums.

Applying the principles of the rate-making method to these data, the medical rate level would be determined by the 18.3% ratio for the latest year for all industry groups. Industry group rate levels for medical would be obtained by applying the ratio of .183 to .200 (which is .917) to the three-year loss ratio for each group. Observe that this results in an 8.3 decrease in medical losses when it is apparent from the underlying experience that no modification in medical cost is necessary. The inaccuracy is due to the failure to recognize the changed distribution of exposure between the latest year and the three years used for industry group rate levels. Exactly this same influence may be at work in connection with the other parts of the rate level calculation—whether one year, two years or three years is employed, unless specific measures are taken to adjust for changing distributions.

The preceding illustration was purposely designed to magnify the distortion which might be created by differing trends in exposure. In actual practice it is improbable that an exactly similar

situation would be encountered. However, a review of medical projection factors developed in actual rate revisions in states with limited premium volume seems to lend support to the implication that the method is faulty in some important respects. These factors, which are intended to apply to actual medical losses of the state to adjust them to the established rate level, frequently do not appear to conform to any reasonable interpretation or logical explanation. The following medical projection factors taken from a recent compensation rate revision illustrate the point:

Policy Year	Manufacturing	Contracting	All Other
1930	.749	1.529	1.145
1931	1.101	1.391	1.189
1932	1.069	.939	1.015
1933	.932	.864	.992
1934	.991	1.171	.920

Bearing in mind that medical cost is commonly considered to possess a high degree of stability from year to year, and also between industry groups in the same year, it is difficult to rationalize the wide departure between the 1930 manufacturing factor of .749 and the 1930 contracting factor of 1.529, a variation in the proportion of 1:2. Note that two years later the situation is reversed and manufacturing has a factor of 1.069 while the contracting factor is .939. Also, note the wide swing in the contracting factor in the adjacent years of 1931 and 1932 with factors of 1.391 and .939. This latter comparison is even more disconcerting when it is remembered that approximately half of the actual period of time embraced by each policy year is common to both policy years. Other instances of a similar nature could be readily cited but would serve no useful purpose.

A study of indemnity projection factors in states with moderate exposure shows similar situations which cannot be satisfactorily explained without concluding that varying trends in classification exposure have a more pronounced effect on the projection factor than is desirable. It might be noted in passing that the indemnity projection factors in some states may be too sensitive to the occurrence of serious losses. In two states of limited premium volume the number of serious losses in the reviewed classifications was related to the corresponding payroll exposure for several policy years to obtain rough indices of the trend of serious losses. A

comparison of this trend with the indemnity projection factors showed evidence that the latter were appreciably affected by the incidence of serious losses. At a later stage in the rate-making process the serious losses of many classifications receive a very moderate measure of classification credibility. It might be advisable to similarly modify or discount their effect in the calculation of the indemnity projection factors. Otherwise the non-serious division of indemnity losses, which is usually subject to greater credibility, is unreasonably modified by the use of a single average indemnity projection factor for each year. The possibility of using separate projection factors for serious and non-serious indemnity losses is another alternative which might overcome this difficulty.

There is one other point in connection with the treatment of classification experience which makes the development of proper classification pure premiums under the present method a difficult task. The medical losses of the classification experience are usually subject to a high degree of class credibility on the theory that these losses consist predominantly of an aggregation of small individual losses. Whereas this may be true in most instances, no provision exists to take account of the occasional medical claim involving a substantial amount. A review of the incurred medical estimates on outstanding claims of one carrier for several recent years revealed more than a score of individual losses with medical amounts in excess of $5,000 each. The most extreme case was a New York permanent total with an indemnity incurred estimate of $23,895 and a medical incurred cost on the same claim of $26,875. While this claim happened to occur in New York, the same medical estimate might easily be incurred under any compensation law providing unlimited medical benefits. If such a medical cost were incurred in a classification with a moderate volume of exposure, it might happen that the serious losses which include the indemnity estimate of the claim would be subject to a small degree of class credibility, while the medical estimate might be assigned 100% class credibility. An instance of this kind would demonstrate the ineffectiveness of the rate-making method in minimizing the effect of the infrequent severe cost case. Every other medical loss of several thousand dollars in amount is a potential source of trouble in the development of proper classification pure premiums for a similar reason.

These deficiencies in the rate-making method have been cited, not to condemn the present method, which represents the best thought on the subject to date, but with a view to provoking interest and study which eventually might lead to an improvement in the rate-making procedure. For example, consideration might be given to a simple remedy for avoiding the effect of severe individual medical losses. Since most of these high medical costs are associated with serious indemnity claims, it might be desirable to segregate medical losses into three subdivisions according to the kind of injury of the accompanying indemnity loss, e.g., serious, non-serious and non-compensable medical. Each of these three parts could be modified by the factors which would apply to total medical but, in the determination of classification formula pure premiums, the serious medical pure premium might take the class credibility of the serious indemnity losses and similar treatment might be accorded to non-serious medical. Whether such a procedure would complicate the operations too greatly and how national experience on a comparable basis might be immediately obtained are questions which require further investigation.

The problem of how to project the older classification experience to a rate level more nearly equivalent to current experience without encountering the identical obstacles of the present procedure is a more intricate one. The writer is hopeful that better results may be obtained with less complications by an adaptation of a principle which was under consideration in 1925 at the time that the present method was originally formulated. This principle involves the use of a weighted five-year average for rate level purposes in lieu of the average of the two latest policy years of experience. When both of these methods were under consideration the present rate level formula was judged to be preferable because it produce rates more nearly equivalent to current cost levels. However, since the time the choice was made the "permanent" method has been amended in two important respects, the contingency factor has been introduced in the rate level determinant to insure equitable results over a long period and industry group rate levels have also been injected into the rate-making process. The contingency factor has leveled off to some extent the advantage of the present plan over the weighted plan and as pointed out previously, the changing distributions of exposure in

connection with industry group rate levels may have a definitely harmful effect under the present method.

One version of the weighted average rate level may be briefly described in the following outline:

1. To convert the state experience to the proposed rate level, apply the following weights to classification payrolls and classification losses on the present law level:

Latest year . . .	1.00
Second year . . .	1.00
Third year . . .	.75
Fourth year . . .	.50
Fifth year . . .	.25

2. Calculate reversion factors by industry group, indemnity and medical separately, using the excluded amount of weighted losses according to present classification credibility standards.

3. Determine formula pure premiums for each class as at present, assuming the weighted five-year pure premium to be on the proposed rate level.

4. If pure premiums other than formula indications are adopted for any classification, apply the adopted pure premiums to the payroll distribution of the two latest years and determine correction factors by industry group to apply to adopted pure premiums in order to correct the latter to the equivalent of formula pure premiums.

5. In states with limited exposure combine all industry groups which produce less than $1,000,000 premium over the five-year period.

There are a number of apparent advantages to recommend this method for serious consideration as a substitute for the present method. The procedure is materially less complicated than the present. By using a common weighted period for all elements of the rate level and by assuming that the five-year experience of each industry group is entitled to 100% credibility it avoids a separate calculation of rate level for indemnity, medical and industry groups and the use of industry group credibility.

The weighted method will produce a rate level which in point of time is not far behind the present method. The continued use

of the contingency factor in the rate level determinant minimizes whatever disadvantages that may accrue from this source. In the case of an industry group with a rapidly growing exposure the resulting rate level is advanced in point of time by the operation of the weights and conversely the rate level is retarded in point of time in the event that exposure is diminishing. In the case of a single classification entitled to 100% class credibility on all three parts of the pure premium, the rate level for the classification is determined solely by its own experience.

The weighted method avoids the situation where rates for one industry group are improperly affected by changes in the distribution of business or by the unusual experience indications of other groups.

The writer does not presume to propose in this paper a definite and complete substitute rate-making method since such a program would have to be developed with considerable care and investigation. Rather, it is hoped that the comments set forth will suggest the wisdom of reviewing some discarded principles and some new possibilities as avenues of approach to a more nearly perfect solution to the rate-making problem. Even though countrywide underwriting results in the compensation line show unmistakable signs of improvement there is ample evidence to indicate that compensation rating methods are far from perfect. New York State is a state in which compensation rates are subject to regulation, a state where rate-making procedure has kept pace with each new improvement and a state which produces a large volume of compensation premiums. Even under these ideal conditions, it is disturbing to note that a differential in compensation loss ratio of as much as thirty points exists among the principal insurance carriers. Such a wide range in loss ratio cannot be entirely attributed to differences in method of administration. Presumably, a share of the disparity is due to uncommon distributions of risks by size, industry group, classification, etc., in conjunction with existing inaccuracies in compensation rating methods. If there is truth in this conclusion, the situation constitutes a challenge to the rate-making organizations and particularly to those of us in the actuarial profession. Why should we not begin with a deliberate and studied analysis of the method used in deriving manual rates?