ABSTRACT OF THE DISCUSSION OF PAPERS READ AT THE PREVIOUS MEETING

A SUGGESTED METHOD FOR DEVELOPING AUTOMOBILE RATES—HARMON T. BARBER

VOL. XV., PAGE 191

WRITTEN DISCUSSION

MR. WILLIAM J. CONSTABLE:

The presentation of Mr. Barber's paper on Automobile Rate Making came at a most opportune time, for the methods underlying the determination of Automobile Rates are being analyzed and studied from all sides.

In Massachusetts there is a Recess Commission engaged in a study of Compulsory Automobile Liability Insurance and this Commission has gone deeply into the rate making question. In Ontario there is a Royal Commissioner now investigating the question of Financial Responsibility and he too is delving into rate making. In other places too there are investigations going on which will necessarily require an analysis of rate making methods.

As Mr. Barber points out in his paper, the severest criticism of rates is always directed at the points which were determined on a more or less judgment basis. One of the weak points, of course, is the determination of what constitutes a dependable volume of exposure. For many years this dependable volume of exposure was measured wholly in terms of the number of car years insured. Mr. Barber points out that in addition to having an exposure in car years insured there must also be an exposure in number of claims before having a dependable volume of experience to determine a loss cost. The credibility formula used by Mr. Barber gives for varying claim frequencies the number of car years exposure needed so that in 99 cases out of 100 the pure premium indication will be within 5 per cent. of the true average pure premium. There may be a difference of opinion as to whether or not these are the correct limits to be used. Some may prefer a permissible variation of 10 per cent. instead of 5 per cent.,

while others may prefer a permissible variation of 5 per cent. in 90 cases out of 100 instead of 99 out of 100. Regardless of these varying opinions I believe the formula as worked out by Mr. Barber is satisfactory to nearly everybody, including company actuaries and state officials.

While having no official standing, the credibility tables based on this formula were used in the last Massachusetts Rate Revision. This formula was not followed absolutely, but was considered many times during the revision of rates.

The credibility tables shown in Appendix A of Mr. Barber's paper give the exposure necessary only to a claim frequency of 12 per 100. In Massachusetts we had some higher claim frequencies on fairly large exposures. I am attaching a table which we found helpful.

Column (1) shows the claim frequencies to 30 per 100.

Column (2) shows the number of car years exposure necessary for 100 per cent. credibility for the corresponding claim frequency.

Column (3) shows the factor to be used for determining the credibility of less than 100 per cent., using the credibility values shown for claim frequency of 5.

The procedure follows:

1. Multiply actual car years exposure by factor shown in column (3) at proper claim frequency.
2. The credibility percentage shown in table under claim frequency 5 for the modified exposure will be the proper credibility for the actual exposure at the actual claim frequency.

Example: Exposure 2474.8 car years at claim frequency 21.0 2474.8×5.051 (column (3) for claim frequency 21.0) $= 12500$. At claim frequency $5 - 12500 =$ 50 per cent. credibility. Therefore, 2474.8 car years exposure at 21.0 claim frequency is entitled to 50 per cent. credibility.

CREDIBILITY TABLES

(1)	(2)	(3)	(1)	(2)	(3)
1.0	260.500	.192	16.0	13.800	3.623
1.5	172.800	.289	16.5	13.300	3.759
2.0	128.950	.388	17.0	12.850	3.891
2.5	102.600	.487	17.5	12.400	4.032
3.0	85.100	.588	18.0	12.000	4.167
3.5	72.550	.689	18.5	11.600	4.310
4.0	63.150	.792	19.0	11.200	4.464
4.5	55.800	.896	19.5	10.850	4.608
5.0	50.000	1.000	20.0	10.500	4.762
5.5	45.200	1.106	20.5	10.200	4.902
6.0	41.250	1.212	21.0	9.900	5.051
6.5	37.850	1.321	21.5	9.600	5.208
7.0	34.950	1.431	22.0	9.350	5.348
7.5	32.450	1.541	22.5	9.050	5.525
8.0	30.250	1.653	23.0	8.800	5.682
8.5	28.300	1.767	23.5	8.600	5.814
9.0	26.600	1.880	24.0	8.350	5.988
9.5	25.100	1.992	24.5	8.100	6.173
10.0	23.700	2.110	25.0	7.900	6.329
10.5	22.400	2.232	25.5	7.700	6.494
11.0	21.300	2.347	26.0	7.500	6.667
11.5	20.250	2.469	26.5	7.300	6.849
12.0	19.300	2.591	27.0	7.100	7.042
12.5	18.400	2.717	27.5	6.950	7.194
13.0	17.600	2.841	28.0	6.750	7.407
13.5	16.850	2.967	28.5	6.600	7.576
14.0	16.150	3.096	29.0	6.450	7.752
14.5	15.500	3.226	29.5	6.300	7.937
15.0	14.900	3.356	30.0	6.100	8.197
15.5	14.350	3.484			

MR. CHARLES J. HAUGH:

The procedure outlined by Mr. Barber is designed to reduce to a minimum the element of judgment in rate making and to base rates for the individual state, so far as possible, on the state's experience. There is expressed at the outset the thought that the substitution of mechanical methods in lieu of judgment will go far towards allaying the "growing restiveness as regards automobile rates" on the part of both supervisory officials and individual carriers.

Unquestionably the rate making procedure followed prior

to 1928 is open to criticism on several points, among which might be mentioned the grouping of widely separated territories, keying to a countrywide level and failure to recognize variations in claim frequency in the determination of credibility. While the method suggested corrects these defects it also provides for certain other fundamental changes with some of which the writer must disagree.

Although one of the fundamental objectives underlying the suggested method is the elimination of judgment, the initial step in the procedure, namely, the assignment of states to districts appears to be influenced largely by judgment. Admittedly, the grouping of states to form districts must of necessity be influenced somewhat by judgment, but it appears to be a more orderly and logical procedure to establish as the criterion for a district the exposure required for 100% credibility rather than to adopt an arbitrary exposure of from 250,000 to 300,000 car years.

The second step in the procedure, the composition of rate groups, provides for the calculation of territory differentials for the purpose of assigning territories to rate groups. These territory differentials are calculated as the ratios of actual losses to the expected losses obtained by applying district pure premiums by class to the individual territory exposures and are designed to eliminate possible distortion due to variations in class distribution. While in theory such a procedure is required, it is doubtful whether in actual practice it would be found to be of any particular value, particularly where the district consists of a single state. Here we have little reason to expect a very appreciable difference in distribution by class among similar types of territories with the possible exception of territories which have an extremely limited exposure, and in such instances the value of a differential determined in this manner is doubtful. Where the district comprises several states it may very reasonably be expected that the exposures in individual territories will be extremely limited and here again the question arises as to the degree of credence which can be placed in the differentials.

In the calculation of pure premiums each district rate group is presumed to include sufficient exposure to be entitled to 100% credibility where the district is an individual state. The relativity among district rate groups is that indicated by the four-year

average pure premiums of the district rate groups and credibility is not introduced. Where the district comprises several states the district rate groups are broken into state rate groups and the indicated pure premium for the state rate group is modified by the application of credibility to the departure of the indication of the state rate group from that of the district rate group. This difference in treatment between a district which includes a single state and one which includes more than one state constitutes a very serious defect in the suggested method. It is difficult to see wherein 100% credibility should be presumed for each rate group where the district comprises only a single state. It is quite possible under this procedure that a rate group consisting of a given number of cars and developing a given claim frequency in a state which comprises its own district will be given automatically 100% credibility, whereas another rate group located in a district comprising two or more states will be given less than 100% credibility, although it may have as many or more cars and may have as high or higher claim frequency.

Relativity by class (WXY) is predicated upon the actual indication of the individual district rate group. It is stated, however, that "in certain instances where there was insufficient volume in a single district rate group to produce reliable results, the differentials were based upon a combination of two or more district rate groups, located, of course, within the same district." As has been previously noted, it is quite possible that district rate groups will not contain the exposure required for 100% credibility. If the district rate group as a whole is not entitled to 100% credibility, there is little reason to believe that the indicated class differentials are entitled to sufficient credence to warrant the adoption of the indications. It appears more reasonable to require 100% credibility for each individual class before adopting the indicated differentials of an individual district rate group. As a matter of fact, experience leads one to the conclusion that the territories in the country fall rather readily into four groups so far as relativity by class is concerned. To be sure there are exceptions, but in general, experience bears out the reasonableness of establishing a comparatively small number of basic differentials.

It may well be that some departures from these basic differentials should be made where the individual territory or district rate group contains sufficient experience to warrant a departure.

It is suggested that consideration might be given to applying credibility to the departure of the indicated differentials of the individual district rate group from basic differentials established for several classes of territories, such, for example, as those in use at the present time.

The pure premiums developed for the individual state rate groups are adjusted uniformly by means of a correction factor which represents the ratio of total actual losses for the individual state to the expected losses developed by the pure premiums. This uniform adjustment is made for each individual state having a sufficient exposure and sufficient exposure is defined as approximately 50,000 earned cars. Here again no account is taken of the degree of credence which can be assigned the individual state but instead an arbitrary exposure is established as the criterion. A very serious objection to this adjustment is that it applies uniformly to all state rate groups. Inasmuch as the need for the adjustment is brought about through the application of credibility, it would appear to be much more desirable to apply no adjustment to those rate groups which were assigned 100% credibility. This thought might be carried even further in order to vary the effect of the adjustment factor in such a manner as to recognize variations in credibility, although in practice this might be found to lead to the application of an extremely large adjustment factor applicable to territories with a small volume of experience where the great majority of the rate groups were assigned very high degrees of credibility.

The suggested method provides that in the determination of the so-called earned factors to be applied to the latest policy year, the factor shall be so determined as to recognize the variations by state so far as the exposure element is concerned and to combine this with the loss element developed on a countrywide basis. Under the existing procedure the earned factors are developed by comparing pure premiums at the end of 12 months, representing the ratio of losses incurred to written cars, with pure premiums at the end of 24 months. The ratio of the pure premium at the end of 12 months to that developed at the end of 24 months produces the earned factor which would have been required to exactly reproduce the 24 months' pure premium. It is obvious that this method provides for recognition of both the elements which affect the factor, the exposure element and

the loss element. The factors among individual states show an extremely wide range, much greater than that shown in Exhibit IV of Mr. Barber's paper. Recently a comparison of earned factors developed upon a basis similar to that outlined by Mr. Barber and the actual indications as followed in the existing rate making procedure was made and the results confirmed the opinion that the variations were not alone in the exposure element but were also found in the loss element. Certainly the development of earned factors wholly upon the indications of the individual district are more in accord with the objective of the suggested procedure than is the method described in that procedure.

The suggested procedure provides for keying the rates to the level of the latest year or the latest two years. There is no question but that in these lines of insurance which are developing rapidly and where conditions are changing constantly, it is essential that the rates reflect as nearly as possible current conditions. It might reasonably be expected that the indications of the most recent year for which experience is available would most closely approximate current conditions. Unfortunately, however, that year is on an incomplete basis and on this account is less reliable than any of the other years entering into the experience period. The indications of the incomplete year are apt to be unstable and to lead to constant fluctuations in rates. On the other hand, keying to the level of the latest two years introduces a greater degree of stability in the level but permits a less prompt recognition of changing conditions. Under existing conditions it is doubtful whether keying to the level of the latest year or the latest two years is in general an improvement over the existing procedure which provides for the selection of state-wide pure premiums for the purpose of determining rate level.

Mr. Barber very properly points out that in the determination of credibility recognition should be given variation in claim frequency, and in developing the credibility table shown in Exhibit V, such recognition is made of variations in claim frequency. The table, however, is extended to show the requisite exposures for a given claim frequency for varying degrees of credibility ranging from 1% to 100%. Heretofore, a minimum point below which no credibility will be given has been in effect and the establishment of such a minimum is desirable. Within certain limits the general formula followed in determining credibility

works well but it is doubtful whether any appreciable degree of credence should be assigned data wherein the probability is very small that the indications are reasonably close to the true values. For example, heretofore, no credibility has been assigned where the exposure is such that the probability is less than .90 that the indications are within 10% of the true value. This assumption fixes the minimum credibility at 32%. While it is conceded that the fixing of the minimum point must of necessity be influenced by judgment, it is contended that there should be some minimum point. If no minimum point is adopted then there seems to be no sound reason for combining statistical territories into state rate groups, since for any given exposure, however small, some degree of credibility can be assigned. The carrying of this process to its logical conclusion will have the tendency to greatly enlarge the number of rate schedules and to produce rate schedules which vary by comparatively small amounts.

The suggested method provides for applying credibility to the departure of the state rate group from the district rate group in contrast to the existing procedure wherein credibility is applied to the departure of the indicated rate for the individual territory from the existing rate in that territory. One may well question whether the suggested procedure in general represents an improvement over the existing procedure. As previously pointed out, no credibility at all enters into the determination of the average pure premium for the district rate group where the district comprises a single state. In other words, 100% credibility is assumed in such instances. Where the district comprises two or more states the district rate groups are subdivided into state rate groups and here credibility does enter in. One is inclined to doubt whether the application of credibility to the departure of the state rate group from the district rate group produces results which in the last analysis are more nearly indicative of conditions of the state rate group than would be produced by measuring the departure of the indications of the state rate group from costs as reflected in existing conditions. This is particularly true where rates have been reviewed periodically. In choosing between existing rates and an average indication of a group of territories located in different states as a base from which to measure departure, consideration should be given the fact that the former, by the virtue of its very existence, is at least of

equal value, if not greater value than the latter, which may be the result of a combination of more or less homogeneous data. As stated by Mr. Barber, the procedure followed in the past has tended to promote stability in rates. However, one cannot fully agree with Mr. Barber's further statement that the procedure outlined in his paper tends to strengthen the experience indications of an inadequate volume. Such a statement presumes a degree of homogeneity of data within the district rate group which may not be found in actual practice.

The objections to those features of the suggested method which appear to be particularly subject to criticism are summarized below:

1. The procedure is frankly intended as one which will substitute mechanical methods for judgment. In view of this fact it would appear feasible and desirable to eliminate judgment, at least, in determining what states shall be set up as individual districts; the exposure required in order for a given group of states to qualify as a district; and the exposure required in an individual state before correcting preliminary class pure premiums of that state.

2. It is quite possible under the suggested method to develop district rate groups which in themselves do not have sufficient exposure to be assigned 100% credibility, yet in every instance a credibility of 100% is assumed for the district rate group.

3. The procedure provides for the use of the indicated class differentials of the individual district rate group. While it is stated that in certain instances combinations of district rate groups within the same district were made for the purpose of developing class differentials, nevertheless, it may reasonably be expected that in an appreciable number of instances these differentials might be based upon individual class experience which in itself is not sufficiently broad to be indicative.

4. In correcting state rate group pure premiums a flat correction factor applicable to all territories within the state is developed, irrespective of the fact that some territories within the state may have been assigned 100% credibility. Such a procedure hardly seems defensible. A similar process had been included prior to 1928 in the rate making procedure but has been abandoned.

5. The calculation of territory differentials for the purpose of assigning individual statistical territories to rate groups is necessary in theory, but it is doubtful whether it would be found

to be of very great value in actual practice. As a matter of fact, a test of such a process in the State of New York showed that the assignment based on consideration of the average pure premiums differed from that produced by the application of territory differentials only in a few territories developing very small exposures, and in these instances it was necessary to inject judgment under either method. One is inclined to believe that the value to be derived from this particular part of the procedure is not sufficient to warrant the additional work involved.

6. The establishing of territorial relativity by accepting the average indication of the experience period has a tendency to defeat one of the fundamental objectives of the suggested method, namely, the assurance that rates are neither redundant nor inadequate, and the elimination of any temptation on the part of individual carriers to depart from standard practice. As Mr. Barber points out, automobile public liability and property damage lines are susceptible to rapidly changing conditions which have a material influence on loss costs. These changing conditions may or may not be uniform state-wide and it is quite possible that they may vary appreciably among territories within a given state. For example, it is quite conceivable that within two different territories within a given state, each developing an appreciable volume of experience, there may be directly opposite trends. In one, conditions may have been improving consistently throughout the experience period—in the other, conditions may have been consistently growing worse. It is not possible, however, under the suggested procedure, to recognize these trends within the individual territory, yet an individual carrier who was aware of these conditions might very logically reach the conclusion that rates developed under such a procedure were redundant in one territory and inadequate in another, despite the fact that for the state as a whole, the rates might be neither redundant nor inadequate.

7. The procedure outlined in the suggested method for developing the earned factor to be applied to the latest policy year is very much influenced by countrywide experience and disregards entirely any possible variation by state in the loss element of that factor. It would appear preferable to develop these factors by districts.

8. In the determination of credibility no limit is set on the

minimum point below which no credibility will be assigned. The adoption of such a point seems not only desirable but essential, otherwise, there appears to be no particular justification for including in state rate groups more than one statistical territory, since it might well be argued that credibility could as well be applied to the departure of the indication of that individual territory from the district rate group.

The procedure as outlined by Mr. Barber and as discussed herein has been considered only in its application to private passenger public liability. The application of such a procedure to commercial public and property damage liability undoubtedly would raise problems which would not be encountered in its application to private passenger cars due to a greater refinement by classification and a much more limited volume of experience.

While the writer does not agree that the suggested procedure is as a whole a feasible one, he does believe that Mr. Barber's paper is a timely one and that it serves an extremely useful purpose in directing attention to the subject of automobile rate making. It is hoped that Mr. Barber's lead will be followed and that future volumes of the *Proceedings* will include additional papers on this subject.

AUTHOR'S REVIEW OF DISCUSSION

MR. HARMON T. BARBER:

The interesting discussion which Mr. Haugh has prepared reflects careful analysis and study of the suggested method for determining automobile rates. While the writer regrets that we are not in agreement on numerous points which are largely matters of opinion, he is grateful for the liberal criticism, which should serve to stimulate others to further thought on an important subject.

Under present day circumstances an acceptable plan for making automobile rates of necessity is a strange combination of theory and expediency, and this occasionally leads to noticeable deviations from a rigorous treatment of experience data. The writer freely admits that there are several points in the suggested method where precedence is given to practicability at the expense of theoretical exactness. It is probable that several of the deficiencies in the suggested method for developing automobile rates noted by Mr. Haugh arise from this choice of alternatives. As a matter of fact Mr. Haugh's remarks show evidence of this

same type of apparent inconsistency. He questions whether or not the suggested method exceeds the limit of sound practice in using various rate-group data at face value and yet later recommends that the experience of a still smaller unit—policy year experience by territory—be followed in recognizing experience trends. Since automobile rates unlike life insurance rates are usually short lived, it is not of great consequence whether an approximation is accepted in lieu of an exact treatment of the data, providing the interests of the public do not suffer by the less exact process.

Referring specifically to Mr. Haugh's remarks, the point is made that the composition of districts and rate-groups is not founded on a sufficiently definite statistical basis under the suggested method. It is expected that the composition of these subdivisions would be more or less permanent if the suggested method were to be followed for a period of years and that precedent would be a substantial factor in this phase of rate making.

Objection is raised to the use of a flat correction factor applicable to the rate-group pure premiums of each state. In the study which resulted in the development of the suggested method it was found that in no instance was this factor of appreciable size. If a projection process is superimposed on pure premium selection for rate level purposes as is provided for in the suggested method, it becomes necessary to know what experience level is represented by the final pure premiums. The flat correction factor accomplishes the purpose of tying the final pure premiums to a definite experience level. Also it provides a welcome argument in justifying rates to supervisory officials and others since it can be stated that the adopted pure premiums are exactly equivalent to the actual losses per unit of exposure experienced within the state.

The value of calculating territorial differentials for purposes of assigning territories to rate-groups has been questioned. While the writer agrees with Mr. Haugh that this step is not essential in most instances the retention of the step is justified on the grounds that it might uncover an unusual situation which would otherwise be overlooked. It is true that the elimination of this step might result in the saving of some labor, but in the opinion of the writer this advantage is offset by the assurance that an unusual distribution of cars by classification has not influenced the assignment of a particular territory to its rate-group.

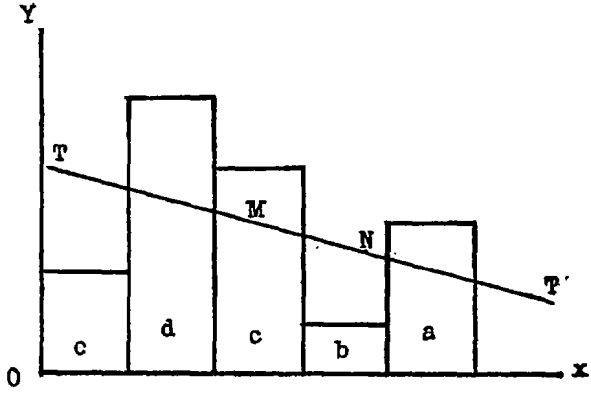
The suggestion that the loss element in the earned factor should be based upon district experience rather than on countrywide experience represents a desirable change if arrangements can be made to secure the basic data in appropriate form. Such a program would probably require a series of annual reportings of detailed experience on open claims. The countrywide basis was followed in the suggested method largely because of a lack of more refined experience.

Mr. Haugh suggests that it might be advantageous to recognize the trend of experience within individual territories in establishing pure premiums. The principal objection to such a plan lies in the fact that the experience of most territories is too limited in volume to give much significance to the experience indications of each policy year. Also since the actual exposure of an insured automobile is not confined to the territory wherein it is principally garaged, it is felt that the territory to which a car is assigned is one of the less definite characteristics of the risk hazard. For these reasons the recognition of trend in territory experience may represent an unwarranted refinement in the rate making plan.

The recognition of experience trends within rate-groups or districts appeals to the writer as a distinct improvement to the suggested method. As a matter of fact if the trend of experience by district is established by a definite process the trend might be incorporated in the rate making procedure in connection with the determination of rate levels in lieu of using the latest or two latest years of experience as the key to the level of revised rates. With the trend of experience definitely established by a sequence of four or five policy years' experience it would be possible to extend the trend indication for another year beyond the latest for which experience is available with conservative results. This would have the effect of partially bridging the gap of two or more years which now exists between the period of time for which actual experience is available and the period during which revised rates are to be effective. These are matters for the further deliberation of those responsible for making automobile rates, for undoubtedly there are certain disadvantages as well as benefits which might result from such a procedure.

As mentioned previously it is highly desirable that a definite basis be selected for recognizing trend whether the trend is that for territory, rate-group, or district. To depict the trend of a

group of statistical data use is frequently made of a straight line drawn through the graphical representation of the data in such a way as to bisect the area or field covered by the data. To apply a similar treatment to the pure premiums for a series of five policy years the pure premiums may be plotted as in the following diagram as a series of adjacent rectangles, each with a unit base (representing a policy year) and with altitudes corresponding to the amount of the pure premium.



If the trend line ($T\ T'$) is constructed so that the area between the trend line and the pure premium curve for the five years is equally distributed on either side of the trend line, it will be found that the trend line passes through the point (M) whose coordinates are 2.5 and m, where m equals the mean of the five pure premiums. Likewise if it is further stipulated that the trend line shall be so constructed that the area between the trend line and the pure premium curve for the last half of the five year period shall be equally distributed on either side of the trend line, it will be found that the trend line passes through the point (N) whose coordinates are 3.75 and n, where n equals the mean pure premium for the last two and one-half years of the period. The trend line is definitely established by these two points.

It is a simple matter to derive an algebraic formula to obtain the policy year or annual change represented by the trend line.

For if a = 1928 pure premium
b = 1927 " "
c = 1926 " "
d = 1925 " "
e = 1924 " "

Then $$m = \frac{a + b + c + d + e}{5}$$

and $$n = \frac{a + b + c/2}{2.5}$$

By a comparison of the coordinates of the two points it follows that: Annual change

$$= \left[\frac{a + b + c/2}{2.5} - \frac{a + b + c + d + e}{5}\right] \frac{1}{3.75 - 2.5}$$

$$= \frac{a + b - d - e}{5} \times \frac{1}{1.25}$$

$$= .16\,(a + b - d - e)$$

Knowing the annual change indicated by the trend line, it is possible to progress from the mean pure premium for the five year period to any point in the future on an extension of the trend line. For example, if it is desired to ascertain what pure premium is indicated by the trend line for the policy year just subsequent to the latest of the five for which actual experience is available, three times the annual change should be applied to the mean pure premium for the five years. The accompanying exhibit illustrates graphically the results obtained by this procedure under various circumstances.

It will be found that the trend established by this formula is responsive to consistent experience trends. On the other hand if applied to a series of widely varying pure premiums the formula will produce conservative results. In its application in automobile rate making a formula of this nature has the advantage of providing a definite and standard method of giving recognition to the trend of experience for each rate-group or district in place of relying on a designedly consistent use of judgment for this purpose.

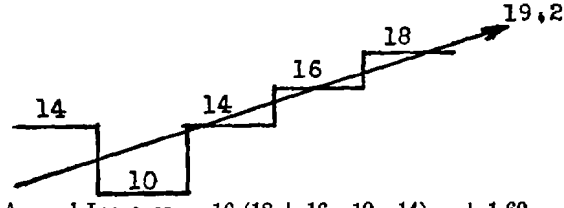
APPLICATION OF TREND FORMULA TO PURE PREMIUMS FOR FIVE POLICY YEARS

To Obtain Pure Premium Indicated for the Subsequent Year

Indicated Pure Premium equals Mean plus three times annual change

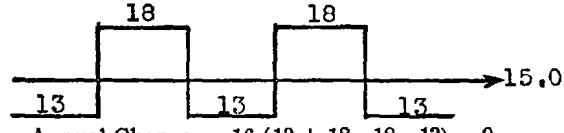
Annual Change$=.16\ (a+b-d-e)$

No. 1



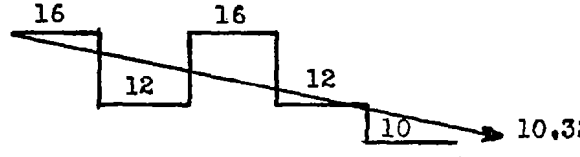
Annual Increase = .16 (18 + 16 − 10 − 14) = + 1.60
Mean Pure Premium = 14.40
3 × Annual Increase = 4.80
Indicated Pure Premium = 19.20

No. 2



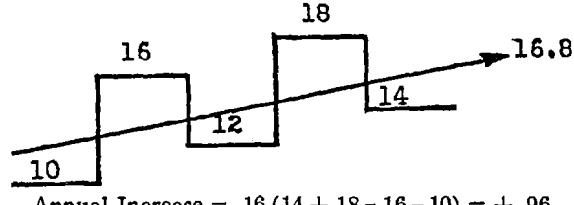
Annual Change = .16 (13 + 18 − 18 − 13) = 0
Mean Pure Premium = 15.00
3 × Annual Change = 0
Indicated Pure Premium = 15.00

No. 3



Annual Decrease = .16 (10 + 12 − 12 − 16) = − .96
Mean Pure Premium = 13.20
3 × Annual Decrease = −2.88
Indicated Pure Premium = 10.32

No. 4



Annual Increase = .16 (14 + 18 − 16 − 10) = + .96
Mean Pure Premium = 14.00
3 × Annual Increase = +2.88
Indicated Pure Premium = 16.88

CASUALTY INSURANCE ACCOUNTING AND THE ANNUAL STATEMENT BLANK—THOMAS F. TARBELL

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WRITTEN DISCUSSION

MR. E. ALFRED DAVIES:

In his paper on "Casualty Insurance Accounting and the Annual Statement Blank," Mr. Tarbell has tackled right well a difficult matter, and one of exceeding importance. There is at present no textbook on casualty insurance accounting, in the sense of a complete covering of that subject. The Society has approached the question through the medium of individual papers appearing in its *Proceedings* as follows:

"Cost Accounting in Casualty Insurance," by Claude E. Scattergood (Vol. II).

"The Allocation of Administrative Expenses by Lines for Casualty Insurance Companies," by R. S. Hull (Vol. IX).

"Allocation of Expenses," by James D. Craig (Vol. X).

"The Allocation of Adjusting Expense to Line of Insurance", by William B. Bailey (Vol. XIV), as well as two earlier papers by Mr. Tarbell himself:

"Determination of Acquisition and Field Supervision Cost by Lines of Business for Casualty Insurance" (Vol. X).

"Accounting Methods for Casualty Companies by use of the Hollerith System" (Vol. XII).

However, these papers cover principally the expense angle, and only parts of that; they do not handle the whole problem of the accounting work, both that which is required for purposes of the annual statement, and that which is needed to give additional data for the companies' guidance. Mr. Hull had material in preparation I believe, for such a text, and I know that another accounting man in the casualty insurance field has prepared a manuscript on the subject. There is, therefore, a "moving of the waters" in connection with the proposition, and Mr. Tarbell's paper is welcome, as an introduction by one who is thoroughly familiar with the requirements of the annual statement. It is interesting to note that some of the companies are meeting, at intervals, to exchange views on various aspects of casualty insur-

ance accounting—as first one company, and then another, experiments with other methods, and can pass on the experience gained, the whole field of insurance is benefited. For men whose primary purpose is the working out, the checking, and the assurance of adequate rates and income, actuaries are surely well within their field in fostering and encouraging the acme of accuracy, combined with simplicity and promptness, in the accounting work of their companies.

A knowledge of general accounting principles and practice, while not essential to the peculiarities of the annual statement, yet is very valuable in aiding comprehension of the reasons back of the statement as it is now drawn up, and in following the relationships established between the different sections and schedules. It is probably true that men whose only knowledge of casualty accounting is derived from years of work on the "Convention" blank, would be more hostile to change, and more set in their views, than would men whose approach is that of accountants familiar with all phases of accounting. To the former, a change of wording, of location, or of set-up, alters what has been done for years, and to them the result cannot be foreseen; to the latter group, however, the principle is recognized, and the medium of presentation is always open to improvement. For these reasons one would suggest to Mr. Tarbell a little more emphasis on the value of all-around accounting training for the casualty insurance accountant.

In his paper, Mr. Tarbell has not indicated the type of individual for which he planned it—did he visualize the young clerk, working in and around the accounting department, who will, in course of time, step up into the accountant's shoes?; or had he in mind the alert clerk, taking time to study outside of office hours, and planning to become of greater value to his organization?; was it written for the actuary, familiar with several of the schedules, but perhaps not so well acquainted with the rest of the statement?; or perchance, for the executive, knowing, in a general way, all about the Statement but not sure, specifically, of some portions of it? The question comes to mind because there seems a lack of definitions for certain of the terms and phrases, *e. g.*, "Ledger Assets"; while some of the explanations are very elementary (the fourth paragraph on page 141); and, yet, again, certain points are left incomplete. The large amount

of detail in this subject is doubtless the answer, and probably Mr. Tarbell has already incorporated changes in his manuscripts, if he is preparing them for wider distribution. This discussion deals mainly with the angle of presentation, since the subject-matter is so well handled in the paper.

On page 145, the reference to Item 3 omits the explanation that for a mutual company this item is left blank. A cross-reference would be helpful to Mr. Tarbell's further discussion of the treatment of capital stock, on page 147, Items 31-34. Similarly, Items 4-20 on the same page, might be tied up with Item 48, Page 162, to bring out at once, instead of the suggestion on page 146, the fact that 90-day accounts are later excluded from Assets. Items 22-28 on Page 146 could perhaps include an explanation of what would be the treatment if "Bond interest accrued" had been debited, as is suggested.

Item 37, Page 148 might be cross-referenced to Page 154, Item 55, and vice versa; in both instances of course, the posting would be done in such a way as to indicate on the individual agent's ledger account that while he had, at one time, been closed out as a bad debt, yet payment, partial or in full, as the case may be, had been received on the stated date; if this is not done, then the record on the particular ledger card would not tell the true story, and future business, if deemed desirable, might be refused, or an incorrect answer given in case of character-inquiries. It is shown on page 145 that premiums are charged to "Premiums in course of collection" (or, as it is sometimes known, to "Premiums receivable"), but the bad debt and the bad debt salvage are marked as credits to "Agents' balances"; maybe a short paragraph would bring out the method whereby the premiums are recorded as Agents' balances.

On this same page (148), Item 38 might be helped by an inclusion of, or reference to, the amortization discussion which comes in three later places in the article, as those arguments would explain the parenthetical statement "not the actual cost." In speaking of the amortization principle (pages 149 and 155), Mr. Tarbell makes his adjusting entries as credits or debits to Profit and Loss; on page 170 he mentions that the net of these adjustments is carried to Interest in Item 43, page 9. But this latter Item is a transfer from Item 30, page 2, and on page 146 of the article it is said that these receipts are the net cash from

interest, although he adds, on page 149, that this treatment is an exception to the "cash basis." Would there not have to be an adjusting entry, so that these amortization items were recorded as Interest, in which case, Item 30, page 2 of statement, would have to be other than net cash. This would mean also, that the matter entering into the annual statement can be varied from the form, in which case the uniformity is not complete. Probably, in a later paper Mr. Tarbell will explain the fitting-in of these interest adjustments to Schedule D, Part I, *i. e.*, in what way the amortization adjustments are recorded in the "Gross interest received" so that the insurance departments can check this amount of interest by applying the Rate to the par value; also, how the footing of the column of Interest, so adjusted, is made to agree with Item 30, page 2. However, the amortization method is not universally used by companies, because there is quite a bit of work involved, and the benefit is relatively small.

The remark, on page 149, that some companies adjust, at each year end, to bring book values up to approximate market values, is of course made in order to cover all phases of this particular section—however, probably it should be added that such practice is not common, and that, as described on page 161 of the article, there is a special section of the statement in which any excess of market price may be shown as a non-ledger asset. And there might be mentioned, also, the special reserves established by most of the more conservative companies, to take out of assets the market appreciation on securities.

In the reference to the cost accounting principles involved in an analysis of expense (page 153), Mr. Tarbell modestly refrains from referring to his own previous papers on the subject, although that might well have been done, with the added references to the other articles in the *Proceedings*, as listed in the first paragraph of the present discussion. A few more words of explanation would perhaps bring out more clearly just why it is obvious that the salaries, traveling expense, and so on, will not agree with the trial balance—as a matter of fact, do all companies charge all salaries to one salary account, all travel to one travel account, etc., and then split those accounts once a year to claim, inspection, or whatever it might be, or is it not sometimes arranged that the expense is split as it is paid, and charged directly to the departments? On the method used will depend whether or not

the trial balance is to agree with the figures used in the annual statement.

Items 6 and 7, page 158, Mr. Tarbell differentiates cash and checks to an extent which seems almost over-emphasis, since the term cash is fairly universally used to include checks, money-orders, and so forth. The general practice is probably to record every receipt, cash or check, in one "Cash-book" and then through columns to do the analysis into accounts to be credited, as well as to show the bank in which the deposits are made; sometimes subsidiary books are kept for the banking records. It is evidently the *effect* of this analysis which Mr. Tarbell had in mind when he says "Checks received are usually charged to cash, through the medium of the cash-book, and subsequently credited to cash and charged to the bank of deposit," because actual entries of that nature are probably rare. It is not clear what the author had in mind by the sentence "Debit may be and frequently is, made direct to the bank without the intermediate step of passing through the cash-book." On its face that would imply a multiplicity of posting media, depending on the number of banks, and to cause difficulty in getting controls with which to balance.

Page 159 brings out the practice, at time of collection, to debit cash and credit Premiums in course of collection; at the same time, of course, the individual agent's account is credited—or, for a mutual company, the policyholder's account.

Item 39, page 161, could give the explanation that, in compiling these market figures the companies use the prices set forth in the Insurance Commissioners' volume, which, as an interesting fact, has become a book of considerable size.

Mr. Tarbell's comment on Items 46 and 47, page 162, is to the point, and his conclusion well phrased. There is, as a result of this attitude toward inventories, an additional reserve in the hands of the companies, and one which might well be substantial in amount, considering the large number of expensive machines which are used in the modern offices. A few companies do set up their purchases as Assets, and then offset them as Non-admitted; of course, if this be the method adopted, then the companies should charge into each year's expense a depreciation item, the asset being reduced accordingly, and the non-admitted changing correspondingly.

In his subsequent papers, Mr. Tarbell will doubtless discuss

the subsidiary books of account which are necessary in order to give the companies a knowledge of income and expense and net profit, by districts or offices, or whatever be the unit adopted; and also by the separate lines of insurance. Control amounts of premiums and of losses have been handled in the current article—but there are break-ups of those amounts into months and years of issue as well as into lines, and these call for many books of record. There is the difference in earned premium methods to be explained—the method used in the annual statement as contrasted with the company estimate way of estimating the increase or decrease in outstanding audits, for workmen's compensation principally. Statutory versus company estimate loss reserve brings the subject into a wide field. In the handling of expense records, there are the varying plans to be weighed, and the bringing down-to-date of the papers already given on this phase of the accounting. The budget is also a section of the general question which might receive attention. Yes, Mr. Tarbell has well begun, and all will listen with great interest and profit as he continues.

AUTHOR'S REVIEW OF DISCUSSION

MR. THOMAS F. TARBELL:

The author appreciates the careful and thorough consideration of his paper as evidenced by the criticisms and suggestions contained in the discussion of Mr. Davies.

No doubt many of the points brought out and questions raised would have been answered had the purpose of the paper, as set out in the third paragraph thereof (page 141), been somewhat elaborated upon and the intended "audience" defined. Considering these points in reverse order, the paper was prepared primarily for students of our Society engaged in statistical and actuarial work and having some text-book knowledge of bookkeeping and accounting but little, if any, contact with the company books of account. The paper was intended to show briefly the rationale of the annual statement and the application of bookkeeping and accounting principles to the various insurance accounts. The author purposely avoided a consideration of the many various books of account and accounting forms, mainly, as indicated by Mr. Davies, because other texts are now in preparation which

will give particular attention to these phases of the subject and also because even a brief consideration of them would have extended the paper to an undue length. The paper was, in fact, intended to temporarily supply the need for some text which would briefly cover the transition from general accounting procedure as treated in the ordinary variety of text-book to insurance accounting procedure, with its many peculiarities, and fill the gap until better and more extensive texts are available.

The author heartily endorses Mr. Davies' comment upon the value of all-around accounting training for the casualty insurance accountant. He is a specialist in his line and, like all specialists, should be thoroughly grounded in all features of his particular business or profession.

With regard to the treatment of bond interest accrued referred to in connection with Items 22-28 (page 146), the entries upon collection of the coupon as illustrated apply to the case where a single bond interest account is maintained. If two accounts are maintained—one for bond interest received and another for paid bond interest accrued—the entries upon collection of the coupon become:

Debit: Cash $25.00
Credit: Bond interest $12.50
Credit: Bond interest accrued $12.50

The use of a single bond interest account is to be preferred because of its simplicity. In fact, the use of a separate account for paid bond interest accrued is rarely met with and the reference to such an account might well have been omitted.

Item 37—"*From Agents' Balances Previously Charged Off*" (page 148) and Item 55—"*Agents' Balances Charged Off*" (page 154) were not treated along the lines suggested because of their relative unimportance. The ledger account "Agents' balances" may arise from two sources; agents' sundry balances, referred to on page 160, and premiums collected by an agent but not remitted by him to the company (defalcations). Since in the second instance the premiums have been paid, they must be taken out of "Premiums in course of collection." This is done by means of the following entries (supported by a dummy paid premium report):

Debit: Agents' balances
Credit: Premiums in course of collection

To subsequently clear the ledger asset account the following entries are necessary:

Debit: Profit and Loss (Agents' balances)
Credit: Agents' balances

It should be pointed out that one set of entries will cover the whole transaction without the necessity of setting up an asset account. The entries in such case would be:

Debit: Profit and loss (Agents' balances)
Credit: Premiums in course of collection

The agents' balance account is sometimes used to charge off premiums which the agent has been unable to collect from the assured. The more usual practice, however, is to handle such premiums through the return premium account, although, strictly speaking, they are not return premiums. In such cases the entries are:

Debit: Return premiums
Credit: Premiums in course of collection

Mr. Davies raises the point that in case of some companies the various items of disbursement may check directly with the trial balance. If so, this, from the author's experience and observations, would be the exception rather than the rule.

There are several other points of interest and importance which have been raised, some of which could be discussed in considerable detail. Most of them, however, are beyond the intended scope of the paper and will be left for those contemplating a more detailed and comprehensive treatment of the subject of casualty insurance accounting.