DISCUSSIONS OF PAPERS READ AT THE NOVEMBER 1954 MEETING

PROLONGED ILLNESS INSURANCE

MARK KORMES

Volume XLI, Part II, Page 102

DISCUSSION BY J. R. BEVAN

The transactions of any self-respecting insurance organization encompassing the field of Accident and Health insurance would not be complete today without a treatise on some aspect of so-called Major-Medical coverage. Thanks to Mr. Kormes, we can now boast a creditable paper on the rate making approach to the Massachusetts Blue Cross-Blue Shield version of this catastrophic-type coverage called Prolonged Illness Insurance.

Unlike other carriers entering this field, the Massachusetts Blue Cross-Blue Shield elected an approach which is primarily scheduled in nature since it defines the diagnoses prerequisite to benefit payments. Having decided on the types of prolonged illnesses and serious conditions eligible for benefits as well as fixing more general conditions under which supplementary benefits would be payable, it apparently became the actuary's task to price the product. In so doing, Mr. Kormes has documented his item-by-item cost analysis in an orderly manner and has blended into useful statistical tables facts supportable by actual data and by judgment. Anyone who has addressed himself to the problem of establishing defensible accident and health rates for catastrophic coverages as evolved by his associates in the Underwriting and Sales Departments (particularly one who has been exposed to seemingly unlimited pure premium data in Workmen's Compensation insurance) will appreciate the complexity of the problem and recognize the time-consuming research which must have preceded the compilation of the numbers found in Mr. Kormes' tables.

For purposes of a more specific discussion, the pure premiums by selected coverages which comprise the total pure premiums are summarized below:

	Annual Pure Premium			
	Indiv.		*Family*	
	Amt.	*%*	*Amt.*	*%*
I. Cancer, Heart (Coronary & Heart Failure) Tuberculosis, Fractures, Rheumatic Fever, Cerebral Hemorrhage, and Mental	6.79	73%	11.72	69%
II. All Other Specific Conditions (10 Others)	.58	6	1.02	6
III. Unspecified Conditions				
—Nurses Benefits	1.38	15	3.35	19
—Extended Hosp. & Medical Benefits	.57	6	.97	6
TOTAL	9.32	100%	17.06	100%

In deriving the above figures, Mr. Kormes necessarily resorted to judgment in determining the estimated cost and incidence of specific conditions under Items I and II above but was able to rely on reasonably solid actuarial data in deriving costs for supplementary hospital and medical benefits for unspecified conditions under Item III. For example, a morbidity Table constructed from an analysis of about 9,200 individual and 59,000 family hospital claims and showing the number of cases by number of days' stay was used as a basis of forecasting the costs of extending room and board and medical benefits to claimants hospitalized beyond 21 and 60 days respectively. (This type of information is the actuary's delight and it is my selfish suggestion that the table which Mr. Kormes included in abbreviated form be included in its entirety in some future paper.) The point of discussing the methods of deriving costs for the categories of benefits shown above is only to underscore the fact that about 75% of the total pure premium (earmarked for specific conditions) was based primarily on judgment while the remaining 25% for supplementary benefits was based on statistical data of some substance. It was possibly this realization that led to the inclusion in the final family rate of a 12.5% contingency loading and the imposition of strict underwriting conditions, at least as measured by the more liberal underwriting conditions of other carriers writing this type of insurance. I refer specifically to the restrictions relating to the twelve months waiting period for all benefits (with a few enumerated exceptions) and to the blanket prohibition against paying benefits for pre-existing conditions. It is intended to discuss this aspect of the paper in more detail below.

Conspicuous by its absence in Mr. Kormes' rating approach, at least to those familiar with major-medical rating methods of other carriers, was any attempt to introduce rate differentials by age, by income, or by area. However, when it is considered that few Blue Cross-Blue Shield members are characteristically drawn from the executive level and since the Prolonged Illness Plan provides only nominal schedule benefits, i.e., benefits in most instances which are specific per service rendered as contrasted to the blanket variety of other carriers, the income problem is minimized. Area-wise, the Plan is limited to the State of Massachusetts and since the Plan is available only to members of Blue Cross groups of 100 or more where 75% of the total eligible personnel apply for this coverage or to groups of any size if underwriting requirements are met and the average age is 40 or less, it is reasonable to expect a sufficiently average age distribution such that actual experience results will not be distorted by a disproportionate number of older members.

Mr. Kormes' documentation of his techniques in pricing the product is straightforward, well-organized and beyond criticism. Yet, some conservative casualty actuaries will be slightly shocked to find that a pure premium to four decimal places can be obtained from what must have been a series of educated guessing games with hospitals

and doctors. However, this is the procedure that, of necessity, must be followed if actuaries are to assist the Accident and Health industry in substituting the facts of prolonged illness costs for the impressions thereof.

Quite apart from a discussion of Mr. Kormes' paper insofar as it concerns prolonged illness ratemaking, it is hoped that the writer will be allowed a few parenthetical remarks relating to the design of the product itself. It is my feeling that whereas most Accident and Health people may not question the fitness of the price for the product, they may question the fitness of the product for the insurance buying public. Such a reservation might logically stem from the schedule or specific condition approach of the Massachusetts Hospital Service Inc. An analysis of the table included above, for example, reveals that over 75% of the total cost is earmarked for 18 specific conditions and about 70% is for 8 conditions. Granted that such conditions occur with substantial frequency, nevertheless it would appear that we are dealing with something akin to a "Dread Disease" policy and it is doubted if the needs of the insurance buying public are best satisfied by such coverage. To offer one policyholder as much as $5000 for a cancer condition but to provide only nominal supplementary benefits to another who contracted a non-specified but equally expensive condition is an approach which has been rejected by most other carriers as not in the public interest, incompetent as most people are to foretell what prolonged illness may befall them. It was stated in the article that the schedule approach was followed among other reasons to prevent abuse. However, the coinsurance provisions and the nominal amounts scheduled for hospital benefits which have been built into the plan even for the specific conditions would appear sufficient for such control. Independent of price considerations, it would be a little difficult for me to foresee any serious abuse if the plan included benefits for *any* condition requiring a hospital stay beyond 22 days, given the same controls as for the specified conditions. It is questionable in my mind whether people malinger in the hospital and "ride" an insurance plan after a three weeks' internment.

My personal view (assuming that a $2.00 monthly rate for a family is as much as the traffic will bear for this coverage) is that a sounder insurance buy would be to offer to anyone meeting certain minimum standards relating to hospital confinement or out-of-pocket expenses, benefits scaled down to what they must be scaled down to for $2.00. In this way, eligibility for benefits would not depend on the happenstance occurrence of a particular condition but on the severity of the disability.

It is of interest to note that other Blue Cross organizations have resisted the specified condition approach in attempting to build a catastrophe plan. In an article appearing in the April 14, 1955 *Journal of Commerce,* a Blue Cross subcommittee headed by John Mannix of Cleveland reported as follows:

"Their early decision that it was impractical and undesirable

> to cover a limited listing of so-called catastrophic illness led to the extended benefits idea",

and further along in the article:

> "The subcommittee . . . emphasized it was desirable for the new extended health services to provide for all illnesses and accidents."

By way of further discussion of the product, I think it is appropriate to touch on the underwriting restrictions mentioned above relating to pre-existing conditions and waiting period. Specifically, the policy in question requires a waiting period of twelve months before the payment of any benefits except that immediate benefits are available for certain acute conditions such as infections, contagious diseases, traumatic conditions, inflammations unrelated to underlying pathology or defect, coronary or cerebral artery occlusions and certain primary malignant and benign neoplasms. Furthermore, no benefits will be payable for any condition which has exhibited signs or symptoms prior to the effective date of the coverage.

On these underwriting restrictions I would comment as follows:

(1) To the extent that Accident and Health rates are based on averages, it is elementary that underwriting results will be average only if there is a bona fide chance selection of persons covered. That is, if a hypothetical Utopia could be visualized composed of people known to be free from all signs or symptoms of any disease, an ideal group exposure (assuming proper age and sex rate loadings) would be composed of, let's say, 75% of such a group selected at random. To my mind, the prohibition of benefits on pre-existing conditions assures the selection of such an average group without the further necessity of a twelve month waiting period. Although the waiting period device is used to some extent on basic policies to assure that marginal and postponable surgical operations will be minimized and to control maternity claims, it is not felt that the presence of insurance will tend to increase the average frequency of the specified prolonged illnesses. As respects this coverage, I do not share the view of some cynical underwriters who feel that all the insured needs to become a claimant is a policy. Furthermore, I feel this restriction is overly severe if designed to control benefit payments on claimants who denied having signs or symptoms as of the effective date but were in fact and without their knowledge, going through the initial stages of one of the prolonged illnesses.

(2) Although I would not quarrel seriously with eliminating benefits on pre-existing conditions and accept the premise that caution should be the keynote in this venture, I would have some misgivings about the use of the phrase "exhibited signs or

symptoms" in the determination of pre-existing conditions. Possibly, the actual wording in the policy is more definite and provides a more explicit yardstick. If it does not, however, it would appear that the use of this phrase in the handling of claims spells potential difficulty on such questions as what signs and symptoms are associated with what prolonged illnesses and who reads the signs. Some carriers have attempted to word similar exclusions more objectively as follows:

"any illness for which the individual has received medical care within .... months prior to becoming insured."

I think such language can be used as a better separator, both from a company's and a claimant's point of view.

(3) The twelve month waiting period is waived for certain specific conditions. To be fully informed as to policy coverage, therefore, a policyholder must understand:

a) He is not covered after the effective date for any conditions which exhibited signs or symptoms prior to the effective date, and

b) Of the conditions contracted after the effective date or contracted prior to the effective date but which did not exhibit signs or symptoms at the time of the effective date, some conditions are eligible for benefit payments before the twelve month waiting period and some conditions are not eligible for benefit payments until after a twelve month waiting period.

Can prospective buyers be made to understand these benefits as readily as benefits offered under less restrictive blanket major medical policies, keeping in mind the importance of such comprehension in the eyes of Insurance Departments whose law is founded, in part, on the premise that the public is not competent to judge an insurance contract?

Note: In Table IX, Page 114, an apparent error in the final printing was noted. The Blue Shield Individual rate of $2.6113 for Specific Diagnoses-VIII should be $1.5786.

DISCUSSIONS

AUTHOR'S REVIEW OF DISCUSSION

MARK KORMES

Mr. Bevans' sympathetic discussion of my paper raises several questions which require some clarification as they touch upon a fundamental difference between the Blue Cross-Blue Shield approach and that of other carriers of this coverage.

The principal criticism of Mr. Bevan is the selection of a number

of specified diseases rather than a blanket coverage. In the first place it is the opinion of the medical profession that the specified illnesses are the only known illnesses where there is need for the coverage. In the second place, should a particular case arise where it would appear that such a condition should have been included in the coverage, due consideration will be given by the medical director and coverage might be well granted even though not specifically listed. This liberality of interpretation produces better underwriting results than a blanket coverage. Finally, under a standard Blue Cross-Blue Shield coverage, there is no need to provide blanket coverage. Thus, for example, a Blue Cross $12.00 a day Room and Board contract covers all extras and a Blue Shield contract is a service contract in most instances. A case hospitalized for 20 days in an $18.00 room where the extras (assuming no private duty nurse and no blood plasma) amounted to $800.00 and the surgeon's fee would be normally $500.00, would have to pay only $120.00. Under a standard insurance company contract with $12.00 Room and Board and $240.00 for extras allowance and a $300.00 surgical schedule, the assured would be faced with an additional bill of $880.00. Even with a major medical ($100.00 deductible and 75% coinsurance) payment of $585.00, the assured would still have to pay $295.00.

The question of public acceptance can be easily measured by the fact that at the end of a five-month period from the date the coverage became available, there were more than 60,000 persons covered with an annual premium of almost $600,000.00.* The present indications are that approximately 5,000 new contracts are written each month covering about 12,000 persons.

To continue with underwriting restrictions one must also bear in mind the fact that while an insurance company will not write a group unless there is a 75% participation and all new employees must be covered, Blue Cross groups of 100 or more may reflect a participation of as little as 50% of the total number of employees (new employees may join or not) and, therefore, much more strict precautions are needed to avoid anti-selection. The pre-existing conditions are also liberally interpreted by the medical director so that cases where the claimant would not have been aware of any such conditions would be in most instances covered.

To conclude this phase of the discussion, it was felt that with a new and experimental coverage, the best approach is that of caution and restriction so that when favorable experience develops it will be possible to reduce rates or increase the scope of benefits, or both.

Turning to other elements of the discussion, I have used four decimal places in the calculation, first in order to show some cost figures for certain low cost elements, and second to follow the established procedure of filings with the Massachusetts Insurance Department.

*At the end of August the annual premium was over $1,000,000.00.

It is readily seen that two or even one decimal place would produce identical final results.

I quite appreciate Mr. Bevans' desire to see a publication of duration tables. Perhaps this will be done at some future time as far as Massachusetts is concerned. In the meantime, I would like to refer an interested reader to the paper by Arthur Hunter and Alan Thompson in the Transactions of the Actuarial Society of America** where there are published rather extensive tables based on the experience of the New York Blue Cross.

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Note: In Table IX on page 114 the individual Blue Shield Pure Premium on the first line should be $1.5786 instead of $2.6113.

GROUP ACCIDENT & HEALTH HOSPITAL THERAPEUTIC BENEFITS—MEASUREMENT OF LOSS COSTS FOR RATEMAKING PURPOSES

P. M. OTTESON

Volume XLI, Part II, Page 116

DISCUSSION BY HAROLD F. LACROIX, JR.

My first reaction to Mr. Otteson's paper is one of welcome. There have been too few papers on Group Insurance subjects presented for publication in the *Proceedings*, perhaps because, until the advent of compulsory disability benefit laws, Group Insurance was principally written by Life Insurance companies. I hope that this paper is only the first of many on this general subject which can well benefit from the attention of casualty actuaries.

Mr. Otteson's paper is certainly a fine introduction to the measurement of Group Accident and Health loss costs for ratemaking purposes. I do not intend to make any comment on Part II of this paper dealing with a "basic plan for developing ratemaking statistics" since this plan undoubtedly functions satisfactorily for Mr. Otteson's company. I believe each carrier must develop a statistical plan which is consistent with its rating and accounting practices, which seem to vary considerably from carrier to carrier. I might mention that The Travelers would find it difficult to adopt this statistical plan to its accounting and rating procedures.

I will confine my comments to Part III of this paper which considers "the analysis, interpretation and use of loss experience statistics for ratemaking purposes." Mr. Otteson suggests considering for ratemaking purposes loss statistics by geographical region, age, cause of hospitalization and "newness" of policy separately for male employees, female employees, adult dependents and children. We have found that the separate analysis of total experience by any one of these

factors, as outlined in this paper, is misleading since the variations in experience within the classifications of the factor being studied which are due to the other factors are not measured. For example, the variations in experience shown by geographical region in Tabulation C might be due to the variations in experience by age shown in Tabulation D unless the age distributions in the various regions are similar. Thus we have found it necessary in analyzing the effect on our experience of any one variable to eliminate the effect of the other principal variables as much as is possible through more detailed breakdowns of the experience and application of standard statistical procedures. In addition, we have found it necessary to recognize some variables which Mr. Otteson has ignored, such as the percentage of female exposure on the risk, the size of the risk, the level of the benefits, and the degree of coinsurance. For instance, we have found that the hospital claim frequency per female employee increases as the percentage of females exposed on the risk increases. Also, with respect to coinsurance, we have found that the frequency of short term hospitalization increases appreciably as the percentage of the total cost borne by the employee decreases. Because of the necessity of studying the experience in such detail, The Travelers, with over $150,000,000 in Group Accident and Health premiums, has found it difficult to develop a sufficient volume of experience in many categories. Therefore I question whether the experience of any one company with only a moderate volume of Group Accident and Health business can be used successfully for ratemaking.

I might add, although it does not bear directly on this paper, that the compilation of industrywide Group Accident and Health statistics might well be a subject for consideration of this Society, since, in my opinion, the only Group Accident and Health statistics now being published are not of an industrywide nature and are certainly not in a form suitable for determining experience differentials for ratemaking purposes.

THE BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN

ROBERT B. FOSTER

Volume XLI, Part II, Page 135

DISCUSSION BY RONALD L. BORNHUETTER*

Mr. Foster has done an excellent job of describing the intricate details of the Boiler and Machinery Premium Adjustment Rating Plan of the National Bureau of Casualty Underwriters. Although this plan has limited use, it is a very important part of the Boiler and Machinery line of insurance because, as Mr. Foster points out, at the present time this plan is the only type of formula rating plan

*By request.

offered, through which a risk may develop a premium more in keeping with the actual costs incurred under the policy. As this paper is explanatory by nature, any discussion must be limited to emphasizing various points made and, perhaps adding a little information which will help complete the study made of this plan.

During the discussion of the steps involved in determining the rating values, Mr. Foster states briefly that the loss element for Boiler and Machinery Direct Damage Insurance varies by type of object insured and, in order to facilitate the calculation of the expected losses for the risk, various expected loss factors are set forth in tabular forms as illustrated on pages 159 and 160. In this connection there is some question as to the adequacy of the provision that is now included in the fixed charge for the portion of the incurred losses between an accident limitation less than $25,000 and the $25,000 point. In effect, the only provision for such under the present plan is the loss portion of the location and portable object charges. This results from the method used in developing the expected loss factors. Although $5,000 is the basic limit for Boiler and Machinery Direct Damage Insurance, the loss pure premiums used for the development of revised expected loss factors in the latest revision reflect all incurred losses of $25,000 or less excluding that portion of such losses provided in the portable object and location charges. This procedure was followed throughout the rate revision as an alternative to the establishment of a number of separate excess limits tables varying by type of object for the range from $5,000 to $25,000. It should be noted that for accident years 1948-1952 approximately 14% of the modified direct damage incurred losses are between $5,000 and $25,000. Also 94% of the risks rated under the Premium Adjustment Rating Plan, which were filed with the National Bureau between January 1948 and June 1954, have direct damage accident limitations less than $25,000. These few facts indicate that the problem is not one to be passed over without some thorough examination.

Without entering into a detailed discussion several possible solutions are apparent after a cursory examination. One possibility, assuming the eligible risks purchase policy limits of $25,000 or higher, is to provide for a minimum direct damage accident limitation of $25,000. Under the present plan the combined limits for all coverages for any one accident cannot be greater than 80% of the selected maximum loss ratio multiplied by the Standard Premium, except that the Direct Damage limit must be at least $5,000 which is the basic limit. (As Mr. Foster points out, the purpose of the 80% limitation is to prevent any one loss from producing the Maximum Premium.) Approximately 66% of the risks rated are not eligible for a $25,000 accident limitation under the present 80% rule. For risks whose incurred losses are large but infrequent any increase in the minimum accident limitation would provide the carrier an opportunity for reflecting a greater portion of the loss under the plan.

Another possible solution would be to develop several tables of expected loss factors for the various accident limitations less than $25,000, i.e. $5,000, $10,000, $15,000 and $20,000. As a result of any change along this line of reasoning the present procedure for determining rating values would have to be modified in order to provide an increment in the fixed charge to cover the portion of direct damage incurred losses between the accident limitation and $25,000. This increment would not be easily calculated as the expected losses for the risk would have to be determined twice, once for the expected losses within the accident limitation and again for the expected losses contemplated by the manual object rates ($25,000 accident limitation). As an alternative to this possibility the expected losses could be determined as presently done and then this value could be reduced by an appropriate factor which would decrease the expected losses to the true value contemplated by the direct damage accident limitation. Separate factors for each accident limitation could be developed from an analysis of the incurred losses by size of loss for a given period of years. One drawback to this procedure would be the error introduced by the grouping of various objects in order to determine the appropriate factors. The reason for this error is that the probability of incurred losses over $5,000 will vary by object and any feasible set of factors would have to incorporate some large groupings of objects. These few ideas are by no means intended to exhaust all the possible solutions; however, they should serve as an introduction to this problem which should be resolved in order to provide a more balanced plan.

Mr. Foster mentions that one of the essential differences between this Plan and Plan D is one set of rating values as compared with three (or more) for Plan D. This is made possible because the Standard Premium can be accurately determined in advance. I would like to point out that relative accuracy in the Standard Premium for the objects initially insured under the plan can be obtained at the inception of the rating period; however, recognition is not given to the fact that the final Standard Premium may differ from the initial Standard Premium by a significant amount. One reason for this variation is that during the rating period large risks may add or subtract object or coverages which could alter the final Standard Premium considerably, which would be very significant during any expansion period. Another reason is that some forms of the Use and Occupancy coverage with daily indemnity and all forms with no daily indemnity provide for the annual adjustment of premium through the use of reporting forms. Having two or three sets of rating values would minimize the error in rating values resulting from the variation between initial and final Standard Premium. Another error, however, is introduced whenever a risk changes exposures or coverages, in that the expected loss factor under the plan for the risk may be altered considerably, which is due to the range of expected loss factors from 4% to 44%.

At the end of the paper Mr. Foster briefly mentions the possibility of adopting tabular plans for risks with Standard Premium less than the present eligibility point. Supplementing this point it would be well to note that, based on a standard premium distribution for calendar years 1948-1950 adjusted to the present level, less than one half of one percent of the total Boiler and Machinery risks written are eligible for the Plan. If a supplement to the Plan was made available to risks with Standard Premium sizes of $3,000 or more, this would provide opportunity for approximately three percent of the total number of risks written to reflect a premium that is more in keeping with the actual costs. At the present time Retrospective Rating Plan M, a loss ratio type of retrospective rating plan filed by one carrier in most states for Boiler and Machinery Insurance, has introduced an eligibility point of $3,000 Standard Premium for a three year policy. Besides the possibility of a retrospective rating plan with wider application, I believe the introduction of some form of an experience rating plan would be a worth-while supplement to the Boiler and Machinery line of insurance.

As the details of this retrospective rating plan are unfamiliar to many due to its limited use as compared to some other rating plans, the completeness of Mr. Foster's contribution will definitely aid in the future value placed upon his paper.

A CREDIBILITY FRAMEWORK FOR GAUGING FIRE CLASSIFICATION EXPERIENCE

ROBERT L. HURLEY

Volume LXI, Part II, Page 161

DISCUSSION BY C. H. GRAVES

Mr. Hurley in his paper "A Credibility Framework for Gauging Fire Classification Experience" which appeared in the 1954 Proceedings has made an important step forward on a very difficult problem. As he pointed out "the literature on this subject is scanty." This is somewhat an understatement. I would say the literature relative to credibility of fire insurance experience is non-existent.

In 1946, at the time the National Association of Insurance Commissioners adopted the "Uniform Statistical Plan" for Fire and Allied Lines Insurance, the report of the Fire and Marine Committee of the NAIC contained the following comment on the question of credibility of fire experience:

> "No exact standard for credibility of fire insurance experience has ever been established. Long and serious study has been given to the subject with the following conclusion. Any exact yardsticks established at this time, either as to the number of risks or the premium volume that would provide credibility, would be

arbitrary, and only after this classification system has been in operation for some time will it be possible to give consideration to the development of such standards.

"While in many states the classified fire experience over a five year period will possess credibility, particularly in the residential and mercantile classes, there may be conditions when the use of a longer period may be considered desirable. It should be emphasized that in perhaps an equal or larger number of states and classes single state credibility will not exist. With this thought in mind the classification plan here proposed will make available consolidated experience over broader territories by groups of states and nationally and also by groupings of similar classes of risks."

Although nine years have gone by since this NAIC report, there is still no standard for credibility of fire insurance experience. Mr. Hurley's paper makes a start towards establishing a standard. His definitions however of "100% credibility experience as a summary of loss experience based on such a number of independent risks that in fewer than 3 in 100 instances one would expect that the true loss ratio would be more than 10% above the indicated figure" is subject to the following objections:

(1) The definition is not related to objectives in considering fire experience. (Would the experience have, for example, 100% credibility for rate making, rate review, use by underwriters or use by management)? In other words, credibility for what purpose.

(2) The selection of "3 in 100" is admittedly arbitrary. But why the choice of 3 in 100? Why not 5 in 100, or 1 in 100? The reference in the paper to a need for "personal assurance" is not very helpful in justifying a rate revision.

(3) The credibility standard is geared to a restriction in the swing of the loss ratio on solely the "top" side of the "true" figure. Surely the fact that Mr. Hurley's formula produces a greater credibility because of this limitation to the top side only is no reason why one should be unconcerned with the "true" ratio being lower than that indicated by the experience. If the data was used for ratemaking, I would assume that the rate maker and rate reviewer would be just as concerned with the "under" side of the "true" ratio as with the "top" side.

As Mr. Hurley stated however, these standards can be varied, and different credibility tables established. I would refrain therefore from referring to the values of the parameters in the definition of 0% credibility and 100% credibility as "standards" until such time as they have been utilized by rate makers and "approved" by rate supervisors. Of course, one must realize that Mr. Hurley is thinking of the "underwriter" looking at some "loss ratios" and trying to figure out

what to do about it and he is not thinking of a rating bureau attempting to establish and justify rates.

Mr. Hurley is too apologetic for his use of mathematics. There is a need for credibility standards in fire insurance, and mathematics is a valuable tool to be used in determining credibility formulas and tables.

In the June 1953 issue of Best's Insurance News there is an article on "Classified Fire Experience" which lists the following objectives of a fire insurance statistical plan:

"a. To enable adjustment of class or tariff rates in accordance with actual loss experience.

b. To provide a measure by which supervisory authorities can judge whether rates are adequate, reasonable, and fairly discriminatory.

c. To provide a measure by which individual companies can judge their underwriting performances and practices and decide what changes may be needed.

d. To give some indication if rates produced by schedules are accurate and, to a very limited degree, to suggest necessary adjustments in the schedules."

I believe that in establishing credibility standards it is necesary to give consideration to the purposes for which the experience data is being collected.

As an illustration of the difficulty of the problem, what "credibility" should be given to the Extended Coverage loss experience due to Hurricanes *Edna* and *Carol?* In 1954, stock and mutual companies paid out on claims associated with these two hurricanes, more than had been received in extended coverage premiums for 10 years.

I hope that I am not giving an unjust criticism of Mr. Hurley's paper. He has made a valuable contribution towards solving an important problem but these first words on credibility should not be taken to be the last words on the subject.

DISCUSSION BY M. H. McCONNELL

Rarely do we find an article dealing with a mathematical subject that is written in such delightful English as Mr. Hurley's paper on fire insurance credibilities, but this is only an incidental benefit, an extra dividend, if you please. The truly significant aspect of the paper is that for the first time an attempt has been made to deal with fire insurance credibilities on a rational basis supported by mathematical reasoning.

The standard for minimum credibility adopted by Mr. Hurley is the point at which we would not expect the true loss ratio to exceed the incurred loss ratio by more than ten percent in more than one case out of three. The standard adopted for full credibility is the

point at which in not more than three cases in one hundred would the true loss ratio be expected to be more than ten percent above the indicated figure. Mr. Hurley points out that his methods will permit the adjustment of these standards, although it seems to me that few persons would be disposed to claim they were unreasonable. Between these selected minimum and maximum points, credibilities are obtained from a hyperbola of the type $\frac{P}{P+K}$ except that the upper values are taken from a straight line passing through the minimum and maximum. The results so obtained are perfectly satisfactory. Nevertheless, other interesting possibilities suggest themselves.

Prior to 1940, credibilities for the Compensation Experience Rating Plan were obtained from a hyperbola of the type $\frac{P}{P+K}$. At that time the upper values were obtained from the tangent to the curve from the point of self-rating since, of course, $\frac{P}{P+K}$ would never result in 100% credibility.

The determination of a similar tangent to Mr. Hurley's hyperbola has been worked out in the attached appendix.

It is only because we have chosen to use a hyperbola of the type $\frac{P}{P+K}$ that we must take the upper values from the tangent or some other straight line through the point of self-rating. A parabola of the type $Y = -X^2$ with its vortex at the point of self-rating would make this unnecessary. We can impose the further restriction that the parabola must intersect the "X" axis at N_o. The curve will then pass through the selected maximum and minimum and the result will be a smooth graduation from minimum to maximum. The equation of such a parabola is:

$$Z - 1 = \frac{(N - N_t)^2}{(N_o - N_t)^2}$$

There is a very simple curve that can be made to pass through the selected minimum and maximum points although its use is likely to horrify mathematical purists. It is an ellipse. If the center of the ellipse is place at N_t,0 its equation will be:

$$Z^2 - 1 = \frac{N^2}{(N_t - N_o)^2}$$

If it is desired to flatten the above curve so it will more nearly coincide with a straight line, this can be accomplished by moving the center of the ellipse to the right and dropping it below the "X" axis.

Mr. Hurley has taken his upper credibilities from a straight line passing through the minimum and maximum. It would be possible to take all the values from this line. One advantage of this method would be its simplicity. Furthermore, it might be argued that this method

is desirable since it will result in uniform increments in credibility for uniform increments in the exposure.

Values for all these possibilities are compared in Exhibit I for the case where p = .003 and the focal point is 66 2/3%. They have also been compared graphically in Chart A.

Mr. Hurley does not claim that his methods are appropriate for casualty insurance problems. Nevertheless, it would be an interesting experiment to apply these methods to a casualty line. Since there is in the same issue of the Proceedings an article on Workmen's Compensation Rate Making by Mr. Marshall, we have at hand a guinea pig. Of the classifications quoted by Mr. Marshall, the one with the largest exposure is Bakeries, Code 2003 for which the exposure (payroll) is $29,771,600.00. For this classification there were 289 non-serious losses or a frequency of .001 per $100 of payroll. Using this frequency and applying Mr. Hurley's methods, we find that the resulting credibility is 70% instead of the 90% which it received in the rate revision.

Classification 2003—Bakeries, was chosen for this comparison because it was the classification with the largest exposure and the non-serious portion of this classification was selected because it developed more losses than the serious portion. Our frequency of .001 was determined from the actual number of losses during the rate level period. It would have been better to have used the number of expected losses but this figure was not available.

In Exhibit II the credibilities for Bakeries, Code 2003 derived by Mr. Hurley's methods, based upon both the straight line and the tangent, have been compared with the credibilities actually used in the rate revision and quoted by Mr. Marshall in his paper. This comparison is for non-serious only.

One practical difficulty in applying Mr. Hurley's procedures to Workmen's Compensation rate making is that a separate credibility table must be computed for each classification whereas under the present procedure one table can be used for all classifications. On the other hand, it might be contended that different loss frequencies should require different credibility tables.

APPENDIX

Determination of Tangent to Hyperbola

The equation of the line which passes through the point where Credibility (Z) is unity and the number of risks is N_f (i.e. the point of self-rating) and which is tangent to the hyperbola

$$Z = \frac{N - N_o}{N - N_o + A}$$

is

$$Z - 1 = \frac{A}{(N - N_o + A)^2}(N - N_f)$$

Solving the equation of the tangent and the equation of the hyperbola simultaneously for N at the point of tangency gives

$$N = \frac{N_o + N_f - A}{2}$$

When chance of non-trivial loss (p) is .003

$$\begin{aligned} N_o &= 8{,}300 \\ N_f &= 132{,}800 \\ A &= 41{,}500 \end{aligned}$$

substituting we find

$$\begin{aligned} N &= 49{,}800 \\ \text{and } Z &= .50 \end{aligned}$$

at the point of tangency.

EXHIBIT I

COMPARISON OF CREDIBILITIES

Z	N *from straight line*	N *from hyperbola & st. line*	N *from hyperbola & tangent*	N *from hyperbola with vortex at* N_f	N *from quadrant of ellipse thru* N_o *&* N_f
0	8,300	8,300	8,300	8,300	8,300
10	20,750	12,911	12,911	14,687	8,922
20	33,200	18,675	18,675	21,447	10,815
30	45,650	26,086	26,086	28,632	14,039
40	58,100	35,967	35,967	36,362	18,696
50	70,550	49,800	49,800	44,766	24,983
60	83,000	70,550	66,400	54,054	33,200
70	95,450	95,450	83,000	64,611	45,600
80	107,900	107,900	99,600	77,124	58,100
90	120,350	120,350	116,200	93,433	78,530
100	132,800	132,800	132,800	132,800	132,800

p = .003 and the focal point is 66⅔% in all cases.

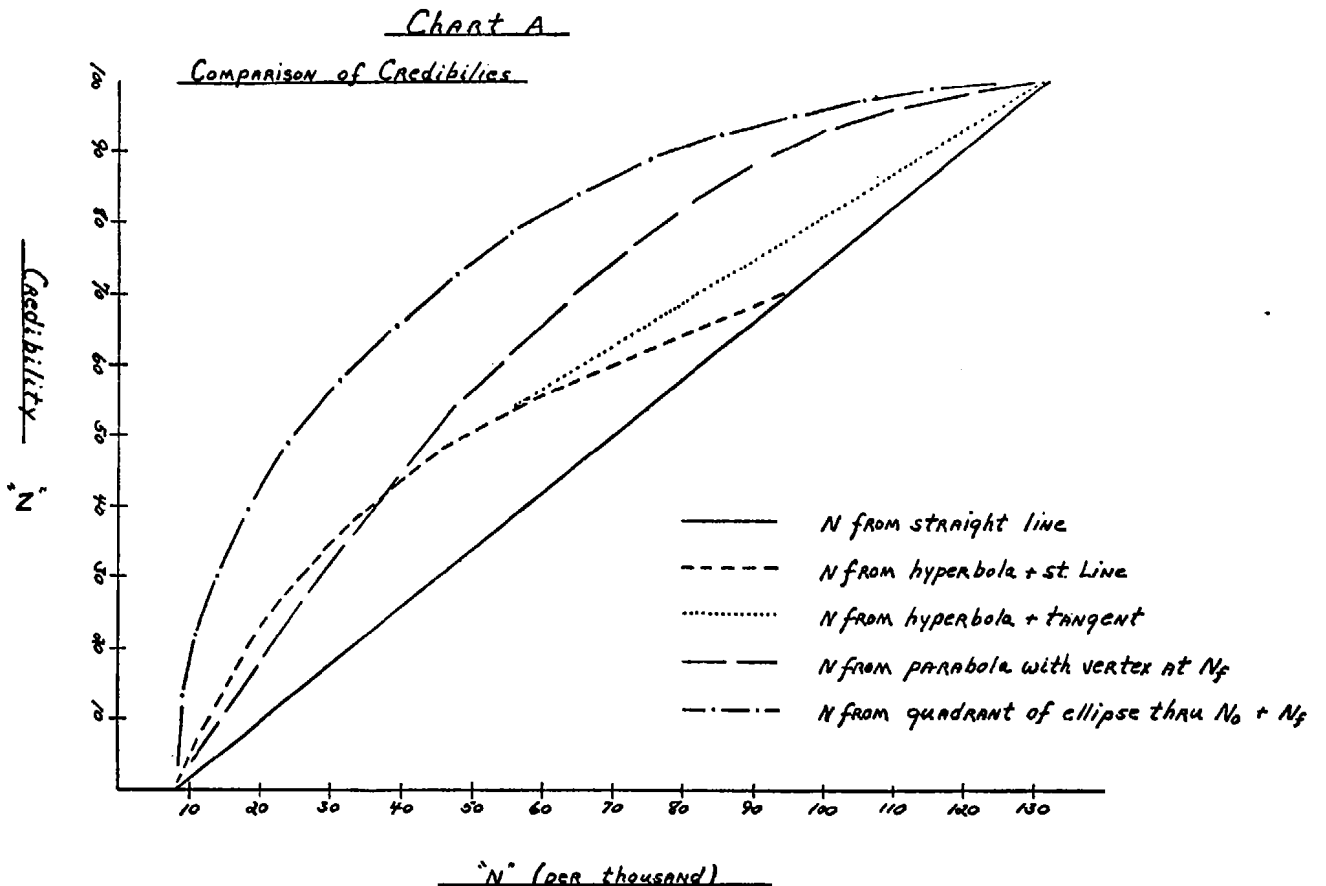
Chart A
Comparison of Credibilities
Credibility "Z"
100
90
80
70
60
50
40
30
20
10
10
20
30
40
50
60
70
80
90
100
110
120
130
"N" (per thousand)
N from straight line
N from hyperbola + st. Line
N from hyperbola + tangent
N from parabola with vertex at Nf
N from quadrant of ellipse thru No + Nf

EXHIBIT II

COMPARISON OF CREDIBILITIES

Bakeries — Code 2003
(*Non-Serious Pure Premium*)

	Loss Frequency .001, *Focal Point* 66⅔%				*Nat. Council Expected Losses*
	Hyperbola & st. line		*Hyperbola & tangent*		*P.C.A.S.*
Credibility	*Payroll* 00 *omitted*	*Expected Losses**	*Payroll* 00 *omitted*	*Expected Losses**	*Vol. XLI page* 39
0	2,497,5	11,239	2,497,5	11,239	13,800
10%	3,383,6	17,476	3,383,6	17,476	13,800
20%	5,619,4	25,287	5,619,4	25,287	13,800
30%	7,854,6	35,346	7,854,6	35,346	25,400
40%	10,826,7	48,720	10,826,7	48,720	39,200
50%	14,985,0	67,433	14,985,0	67,433	54,800
60%	21,228,7	95,529	19,980,0	89,910	72,000
70%	28,721,5	129,247	24,975,0	112,388	90,700
80%	32,467,8	146,105	29,970,0	134,865	110,800
90%	36,214,1	162,963	34,965,0	157,343	132,200
100%	39,960,0	179,820	39,960,0	179,820	154,700

*Payroll x .45 (the pure premium underlying the present rate for code 2003)

GRADUATION OF CREDIBILITIES

Hyperbola with vortex at Point of Self-Rating								Quadrant of Ellipse with Center at N_f, O				
Z	N_f	N_o	N_o-N_f	$1-Z$	$\sqrt{1-Z}$	$(N_o-N_f)\sqrt{1-Z}$	N = $N_f+(N_o-N_f)\sqrt{1-Z}$	Z^2	$1-Z^2$	$\sqrt{1-Z^2}$	$(N_f-N_o)\sqrt{1-Z^2}$	N = $N_f-(N_f-N_o)\sqrt{1-}$
.0	132,800	8300	–124,500	1.00	1.0000	–124,500	8,300	0	1.00	1.0000	124,500	8,300
.10	"	"	"	.90	.9487	–118,113	14,687	.01	.99	.9950	123,878	8,922
.20	"	"	"	.80	.8944	–111,353	21,447	.04	.96	.9798	121,985	10,815
.30	"	"	"	.70	.8367	–104,168	28,632	.09	.91	.9539	118,761	14,039
.40	"	"	"	.60	.7746	– 96,438	36,362	.16	.84	.9165	114,104	18,696
.50	"	"	"	.50	.7071	– 88,034	44,766	.25	.75	.8660	107,817	24,983
.60	"	"	"	.40	.6325	– 78,746	54,054	.36	.64	.8000	99,600	33,200
.70	"	"	"	.30	.5477	– 68,189	64,611	.49	.51	.7000	87,150	45,650
.80	"	"	"	.20	.4472	– 55,676	77,124	.64	.36	.6000	74,700	58,100
.90	"	"	"	.10	.3162	– 39,367	93,433	.81	.19	.4359	54,270	78,530
1.00	"	"	"	0	0	0	132,800	1.00	0	0	0	132,800

AUTHOR'S REVIEW OF DISCUSSION

ROBERT L. HURLEY

The reviews by Mr. Graves and Mr. McConnell treat of two different but equally significant criticisms of the paper on Fire Credibilities. Mr. Graves has noted that the paper is oriented more from the point of view of an underwriting evaluation of fire experience rather than from the attitude which the Industry must take in discharging its responsibility for official standards for credibility.

This is a perfectly logical and just observation and reminds the writer that it is through the exchange of different points of view, as in the *Proceedings* of the Casualty Actuarial Society, that formal standards for fire credibilities will ultimately be founded.

Mr. McConnell's review has afforded a number of very pertinent comments on the graduation methods. The suggestions which he has made on the mathematics will be very helpful since he has shown with precise examples how alternative approaches might work.

WORKMEN'S COMPENSATION INSURANCE RATEMAKING

RALPH M. MARSHALL

Vol. XLI, Part II, P. 12

DISCUSSION BY J. J. SMICK

This article gives in great detail the actual procedures followed by the National Council on Compensation Insurance in the making of a set of rates for workmen's compensation insurance. For illustrative purposes, the most recent filing for Connecticut rates has been used, and throughout, the data applicable to this state and this revision are consistently followed.

In many ways the article is praiseworthy. I could find no important omission of any salient step or procedure. Throughout the article there are brief notes explaining steps, there is a glossary of terms, there are actual working sheets, there are actuarial formulae explaining the derivation of factors and values. The article could easily serve as a manual on the current ratemaking process.

Those who know and have worked with Mr. Marshall, will realize that he has presented the matter in the self-effacing manner typical of him. From reading the article it would be almost impossible to gather that many of the procedures, many of the niceties of calculation have been developed by him during the approximately 30 years he has been with the Council. The method of explaining the distribution of business over calendar year and policy year periods by means of parallelograms is the same method he explained to me in 1929,

when first I started as an actuary. Many other steps I know were personally evolved by him.

I find fault with the article, not for what it says, but for what it leaves unsaid. Perhaps, this statement is not a valid criticism. Nevertheless, this is what I find deficient in the article.

The article does not emphasize the fact that this is the current method of making rates by the National Council. It does not give the evolution of some of the steps, nor the background. The article, as written, is excellent for the purpose of explaining the specific details of a current rate filing. The raising of issues as to alternate methods of procedure, either in general, for the specific state or for the specific revision are carefully avoided.

The article clearly specifies that this is the way it is done. Often it also gives a reason for the procedure, but there is never an indication that there may be a better method, that the reason is often a rationalization, that exactness is sometimes sacrificed in the interest of expediency.

To consider only one of these steps, let us examine the correction for off-balance due to the experience rating plan. In this revision this factor accounts for 8.7% of the manual rates. The total annual premium volume for the latest policy year at manual was close to $23,000,000. The correction for off-balance of 8.7% can therefore be considered as equivalent to approximately $2,000,000 (not all of it realized, to be sure) due to an imbalance in the experience rating plan. Yet the statement (p. 27) is made, "Please note that this is a correction for the off-balance of the experience rating plan; it is not intended to make the experience rating plan balance within itself."

The correction for off-balance program has been in effect over 25 years. It seems to me that an amount of $2,000,000 a year in one state should be given more careful consideration. It would appear to me that this aspect would be of particular importance to companies specializing in large risks.

In connection with this subject it seems to me that every special rating plan, either experience or schedule has always developed a credit off-balance and required a correction. What about the Retrospective Rating Plan? Does that develop premium exactly as anticipated and if not, why are no correction factors imposed?

Again development factors are obtained for indemnity and medical losses separately, using a third reporting as ultimate. Yet in New York a much longer period has been found necessary. Also, it seems to me that as far as death and permanent total cases are concerned development occurs mainly as a result of the effect of discounting reserves and that the real development can be allocated to the permanent partial cases, and the medical connected with them. While in the current Connecticut revision the factors are relatively slight, only some 4%, they are none the less important.

Again, are expenses really equitably apportioned? The employer, who pays the premium is accustomed to compute labor and related

costs on a man or a cents per hour basis. On the basis of the data shown on page 41 for code 2070, Creameries and code 2157, Bottling, it can be easily computed that the annual premium for an employee working 2000 hours a year at an hourly rate of $2.50, which is typical of skilled or strongly unionized labor will be about $100 for code 2070 and about $200 for code 2157. Translated into costs per man per year the major insurance expense groupings are as follows:

	Code 2070	Code 2157
Acquisition and Taxes	$20.00	$40.00
Claim Adj. Expense	8.20	16.40
All Other Co. Expense	10.30	20.60
Profit and Contingencies	2.50	5.00
Total Expense	$41.00	$82.00

The allocation of loss costs are in the main equitable and can be justified. The allocation of expenses follow standard and recognized insurance practices, but are they equitable, and can they really be justified? Why should an employer in the bottling industry contribute $40 a year per man for acquisition and taxes, and $5 for profits and contingencies, while an employer in the dairy industry need contribute only half these amounts?

Furthermore, is the expense loading really adequate for low rated classes? I doubt it.

It has been found that the experience of large risks and especially so called self-rated risks have a very marked effect both on manual rates and rating factors. In some jurisdictions such experience is excluded from the compilations.

No mention is made of this aspect of rate-making.

It appears to me that this article is an excellent one if its purpose is to show how rates are currently made. However, if it is aimed at the candidates for membership, it could be accompanied by a critique and an appraisal, by comparisons with alternative procedures, by an explanation of the compromises that have led to the current method. I know very well that Mr. Marshall could give a fine analysis of alternative methods, of improvements, of the background leading to some of the procedures. Maybe he will do it in a subsequent article.

AUTHOR'S REVIEW OF DISCUSSION

RALPH M. MARSHALL

My paper, by request, was designed to be no more than a factual description of the current ratemaking program of the National Council on Compensation Insurance, with the thought that such paper

would be of interest to the membership generally, and of value, in particular, to students studying for Part IVb of the Society examinations dealing with "General Principles of Ratemaking."

With this background as to the genesis of my paper, I am of the opinion that the inclusion of any discussion of alternate methods, exploration of weaknesses, the use of judgement, etc. should only come after the student has gained some knowledge of current procedures, and therefore that the inclusion of such material in this paper would have been out of place as this paper was intended.

Mr. Smick has suggested several phases of the ratemaking procedure which might be expanded into an additional article, or several. I have no intention of doing so here, but brief comments on some of these features may be in order.

Mr. Smick touches on the question of special procedures for certain states. When it is considered that the National Council works on rate revisions for approximately 38 states each year, I believe it will be understood why our goal is uniformity. However, recognition of special industries peculiar to a state is given by establishing special industry groups for ratemaking purposes, as for example "Mining" in Colorado, and "Oil" in Texas.

In the discussion regarding the correction for off-balance, it was pointed out that for a risk large enough so that its own experience receives 100% credibility in the ratemaking procedure, none of the corrections for off-balance will be reflected in the premium collected for the risk. Under these circumstances it would seem that the carriers specializing in large risks would be less concerned regarding the correction for off-balance factor than carriers writing mostly small risks where the factor is reflected almost 100% in the adjusted rates. Experience by size of risk has demonstrated that in general they "need the money" for the small risks. Without the correction for off-balance the loss constants would have to be greater.

Another observation of Mr. Smick's is the lack of any correction factor for the effect of retrospective rating. Actually (and this is a rationalization) retrospective rating serves as a correction on the adopted rate level. Our ratemaking procedure says if the exposure, accident frequency and accident costs continue as in the past, we will need so much premium. The retrospective rating procedure says we will wait until the policy expires and then see how much premium we actually did need. This of course is a broad generalization — a portion of a retrospective premium, required for expenses (except claim expense), is established as a percentage of the predetermined risk's standard premium, and the remainder varies with the actual incurred losses, subject of course to the stop limits provided by the minimum and maximum retrospective premium ratios. As a result of studies extending over a period of more than a year, action was taken recently to increase the insurance charge of the retrospective rating plans, that is the loading included in the basic premium ratio to compensate for the excess of loss and claim expense incurred by

the carrier over the provisions for such losses and expenses in the maximum retrospective premium ratio.

The reviewer also touches on the question of adequacy of the expense allowance for small risks. Studies of expenses by size of risk, as described by Mr. McConnell in his paper in volume 39 of the Proceedings, have shown that the $10 expense constant is seriously inadequate for risks below $100 annual premium size. However, rather than increase the expense constant on the small risks, which are estimated to represent about 50% of the number of risks but less less than 5% of the premium volume, it has been decided to try to work out more economical methods of handling these risks. The Council's committees are currently considering the possibility of allowing a three-year fixed rate policy to be written for these small risks, and of permitting the experience to be reported on a block basis.

Finally, reference was made to the New York procedure of eliminating the experience for self-rated risks from the ratemaking procedure. Up to the present time this procedure has only been talked about in the Council states. There are a number of aspects to this procedure, particularly for states with only moderate premium volume.

It would seem that these would be problems for the advanced student rather than the freshmen for whom my paper was designed. The student can hardly judge the merits of the present or alternate procedures without knowledge of the present procedures. As previously stated the author's purpose was merly to set forth the details of the present procedure.

DISCUSSIONS OF PAPERS READ AT THE MAY 1955 MEETING

NEW YORK DISABILITY BENEFITS LAW INSURANCE EXPERIENCE 1951-1954

MAX J. SCHWARTZ

Volume XLII, Part I, Page 8

DISCUSSION BY MATTHEW RODERMUND

Mr. Schwartz's paper is a sequel to his thorough review of the New York Disability Benefits Law presented to this Society in November 1950. Equally thorough, this paper describes changes in the Law since 1950, explains the New York Insurance Department's recommendations regarding minimum reserves for assessments for the Special Fund for the Disabled Unemployed, presents the combined experience of all companies under statutory coverage as reported to the New York Department, and speculates as to why the experience was so much better than expected.

The factual material in the paper needs no comment. Mr. Schwartz's speculations on the experience have more than routine interest, however, because the male morbidity rate developed under statutory coverage (.284 weeks) is 40% lower than the lowest group rate (.48 weeks) assumed at the inception of the Law. The male rate of .284 is calculated by Mr. Schwartz from the indicated male and female rate of .326, using the reasonable assumptions that female exposure is about 22% of the total and that the ratio of female morbidity to male is about 1.7.

The reasons for the remarkably low morbidity are thought by Mr. Schwartz to be as follows:

(1) 8-8-13 plans under group insurance policies provide slightly broader coverage than under statutory policies.

(2) Group plans, because they generally do not require 100% participation, invite a certain amount of adverse selection.

(3) Groups of fewer than 50 employees, relatively scarce prior to the compulsory law, seem to develop more favorable experience than larger groups. Employers of very small groups generally provided only the statutory coverage, whereas large groups more often had Plan coverage, the experience of which is not included in Mr. Schwartz's compilation.

The reader is left free to indulge in his own speculations as to why small groups develop better morbidity experience than large groups. The best answer lies probably in the realm of philosophy, and this reviewer is not inclined here to venture into that realm. It is to be hoped, however, that Mr. Schwartz, if he continues to keep us informed on the progress of New York disability benefits insurance, will give us the benefit of his thinking on the philosophy of disability benefits claims.

Interesting implications and equally interesting portents are to be found in the average male and female morbidity rate of .326 weeks derived from the experience under statutory coverage (the disability benefits experience called for by the New York Department and summarized by Mr. Schwartz does not show male and female experience separately).

For, using the indicated average weekly benefit rate of $24.69 for 1954, and the 1954 average taxable annual payroll of $2,577, an average male and female pure premium of .31% of taxable payrolls is obtained. If this pure premium is used, it is not likely that a reasonable loading for industry hazard, expenses, or statutory assessments will bring the final average rate up to .50% of taxable payrolls, except perhaps for groups with a high percentage of females or in hazardous industries.

It is clear therefore that under the present law, if the rates are to reflect prevailing experience, many carriers will be able to charge less than .50% of payroll, and many employers who are unwilling to provide more than statutory benefits will be faced with the problem of returning to their employees a portion of the employees' contribution.

To most employers, probably, such a complication would be intolerable, even though the elimination of their share of the expense might be welcome. But the elimination of the employer's share of the expense is contrary to an enlightened public policy in insurance of this type. The alternative, of course, is for the Legislature to increase the statutory benefits. At this writing it has already been proposed that the maximum weekly benefit be increased to $36 and the maximum benefit period be extended to 26 weeks.

If the proposal is adopted, and it seems likely to be, the developed 8-8-13 male morbidity rate of .284 might be about 20% higher, or .341. (The 20% is taken from the New York Labor Department's 1949 "Studies in Disability Insurance," which cites 120 as the probable percentage relationship between male morbidity rates on an 8-8-26 plan and those on an 8-8-13 plan.* However, the excellent New York statutory 8-8-13 experience suggests that the 120 relationship for a statutory 8-8-26 plan may be too high.) Estimating that under a 26-week plan the female morbidity would be about twice that of the male, and taking Mr. Schwartz's assumption of 22% for female exposure, it is possible to convert the estimated male rate of .341 under a 26-week plan to a rate of .416 for males and females combined. The average weekly benefit under a $36 maximum probably would be less than $26.00. Neverthless, the $26.00 figure and the average annual payroll of $2,577 mentioned above would produce an average male and female pure premium as low as .42% of taxable payrolls.

Loadings for industry hazard and expenses and contingencies will vary, of course; but, unless the national economic picture changes, the loading for assessments for the disabled unemployed, for most carriers, will be considerably less than it was in 1950. In any case, the average payroll rate is not likely to be a great deal higher than the employees' contribution. Thus the share of many employers in the cost of this social benefit might be considerably less than the public would regard as desirable.

It is apparent that the experience during the first years of the New York Disability Benefits Law, as revealed by Mr. Schwartz's excellent paper, could have considerable influence on future legislation.

In his conclusion Mr. Schwartz hopes "that members of the Society will furnish experience to confirm or refute some of the assumptions made." This reviewer echoes that hope.

*In a personal communication, Mr. Schwartz informed this reviewer that current thinking sets this percentage relationship nearer to 125.

COMPULSORY AUTOMOBILE INSURANCE RATE MAKING IN MASSACHUSETTS

BY M. G. McDONALD

Volume XLII, Part I, Page 19

DISCUSSION BY L. W. SCAMMON

The important thing which Mr. McDonald's paper reveals is the very great difficulty encountered by an actuary in fulfilling the rate making requirements of a compulsory law which arouses as much ill-informed public discussion as the Massachusetts Compulsory Insurance Law. We see portrayed a whole series of attempts to do a rate-making job which as far as possible relies on indisputable loss data and probably more accurate expense data than are available elsewhere, by applying to these data a series of actuarial formulae which make for as much mechanical precision as possible. This method is one which obviously he feels, in the face of criticism from every direction, reduces the area of judgment to a minimum. But the unhappy fact which he has discovered over a period of years is that a purely mechanical application of formulae just won't work. He has had to abandon the traditional three-year average loss level and has had to reflect into his loss level data which are much more nearly up to date. He has felt it necessary (although the insurance industry does not like it) to take a new look at traditional expense ratios. Whether insurance companies will fare better in the long run by purely mechanical application of the same formula year in and year out or whether some tempering of mathematical precision with judgment is better can only be told by the unfolding problems and pressures of the future.

In breaking the ice with a paper on compulsory automobile insurance rate making in Massachusetts, light is shed by Mr. McDonald on what is going on in rating matters in a very important state—the only one where compulsory automobile insurance is law—and the door is thereby opened to other possible papers to follow. To some of us who might write in this area it is much better to have the public official rate maker move first.

In embarking on my task of reviewing Mr. McDonald's paper, I will criticize only to a minor extent. I will not participate in extensive technical discussion because much of the exact rate making technique which he describes has been made obsolete by the changes he has made in preparing 1956 rates. The paper covers so much ground and variety of subject that I will only try to point out a few highlights. I will emphasize broad methods used by Mr. McDonald in a very difficult field which become guides to successful ways and means of doing a job acceptably to both public and private interests.

The rate maker of the private organization may by second nature completely take for granted that the way to make provision for expenses in rate is to make them a direct function of the losses. Mr.

McDonald has had to justify completely this method as against a "flatting" method advanced by spokesmen for high rate territories as a means of producing lower rates. I commend his careful analysis of each of the items of expense in justification for what the industry regards as customary procedure.

One of the touchiest subjects, the matter of company reserves in rate making, is handled via the application of development factors. The clinching proof is his exhibit of the test of results of development factors applied to incurred losses at first reporting vs. actual losses after ten reportings. No one could ask for a more convincing test that use of company reserves with properly computed development factors applied deflates any charges of over reserving. The justifiable pride shown by Mr. McDonald in this test indicates how hard he is striving for the right answer.

When you work closely with public rate making authorities you begin to realize how tremendous is the force of inertia, the tendency not to make changes, the relative ease of doing again that which has been done before simply because to do a "repeat" on an acceptable procedure is fraught with less danger. Let me say that one of Mr. McDonald's strong points, as is plainly visible in his paper, is his open-mindedness and susceptibility to change.

In his discussion of rate level and trend factors, Mr. McDonald cites the reluctance of the Department to adopt trend factors until the unfavorable underwriting results of 1951 and 1952 and the tight market, as evidenced by very greatly increased numbers of assigned risks, forced modification of the rate making procedure. Perhaps it was inevitable that first use of trend devices by the Massachusetts Insurance Department would be on the conservative side. Certainly with the best insurance statistics available anywhere one might ask why there has not been a more realistic use of these statistics in Massachusetts, especially those showing trends in average claim costs. In making 1956 rates Mr. McDonald has been much more realistic in his recognition of recent statistics. He has had to scrutinize latest experience very closely to note what trends may be developing.

In Exhibits I-1 and I-2 Mr. McDonald sets forth separately the experience of the stock and non-stock companies under the compulsory law from 1927 through 1948. These exhibits will come in for a good deal of attention and study by interested parties everywhere. Many will wish that the picture was more nearly brought up to date.

Exhibit I-1 clearly shows that the Stock Companies, taken as a whole, have lost money consistently on Compulsory Automobile Insurance in Massachusetts since the inception of the law. Very much more money was lost in the six years, 1949-1954, immediately following this exhibit especially in the early 1950's. The way that losses have consistently outdistanced provision for losses, in sixteen of the twenty-two years exhibited, and the way that the sum of losses and expenses have exceeded premiums in nineteen of the twenty-two years hardly makes exciting reading to Stock Company executives. It may well be

asked why there hasn't been a provision for contingencies in Compulsory rate making?

From Exhibit I-2 we find that the Non-Stock companies, writing just under one-third of the business, have experienced favorable loss ratios but why should the spread here between the sum of losses and expenses, and premiums be classed as profit when large amounts are returned to policyholders in the form of dividends?

Also many will consider Exhibit I-3 to be both subject to misconstruction and unnecessary. This is because it combines Stock and Non-Stock Company expenses in a manner not valid for rate making purposes. It not only takes no account of the dividends paid back to policyholders in reduction of premiums, but also any such combination, at best an approximation, requires careful explanation if it is not to be misused.

The explanation of the development and testing of formulae for the selection of territories shows the manner in which Mr. McDonald is constantly striving for improvement. He inherited methods which contained certain weaknesses. The territorial formula for private passenger car territorial adjustment I consider contained a makeshift arrangement adopted under wartime conditions for limiting the number of towns which would be subject to change of territory in accordance with credibility groups and varying percentage deviations of these credibility groups. The experience of war-time years was not considered acceptable for territorial changes, but successive reportings of prewar years would have caused some towns to be moved if the limiting device had not been hit upon. But once a part of the formula, the limitation stayed in long after the original purpose it served was accomplished. Suggested changes to improve this weakness in the formula he turned aside, but he was open-minded to complete revision of the formula. He explains in his paper that initial studies of a new formula method disclosed weaknesses of too much emphasis being placed upon each town's latest year of experience, 60% of the losses of which were reserves and subject to considerable change on settlement. In place of the latest year the average of the two latest years tended to stabilize the experience of the cities and towns and with this improvment he tried out a revised formula on commercial cars first in 1953 then as soon as he was satisfied that its application to this smaller classification was satisfactory he applied it to private passenger cars. Actually that opportunity presented itself this fall and territorial changes for 1956 are predicated on this new formula. It is a distinct step forward and provides an eminently satisfactory formula basis of fairly realigning the cities and towns of the Commonwealth into proper relativity if the experience of these cities and towns develop sufficient credibility to warrant recognition. Those of us working close to this problem expect continued use of this new formula method in the years ahead thus insuring uniform market conditions throughout the Commonwealth.

The age involvement graphs given in Exhibits K and L shed light

on an area extremely vital to current underwriting. It is quite obvious that the several samplings of Massachusetts data have given somewhat varying results when attempt has been made to pinpoint year by year age involvements and that further studies may point to the need for other age groupings. I believe that we all must be open-minded to these statistical indications.

Of his reference to the electronic computer and real machine rate making, I can only suggest that many of us with a welter of compilations to perform once each year probably will continue to perform them with hand methods in the foreseeable future with electronic computer costs where they are.

One of the most interesting parts of the paper relates to the innovations of the Massachusetts Demerit Rating Law. While I could add some material on this subject, the law is still in a formative stage and I prefer to wait to see if a paper may not be forthcoming completely covering the subject if the law proves effective.

Automobile rate making in the compulsory law Commonwealth of Massachusetts is an extremely difficult task. That the man responsible in this area of rate making is willing to commit to writing an explanation of problems he faces and methods used in making the automobile rates speaks highly of his courage and fundamental honesty and integrity. Those who work with him do not always agree with his decisions but they invariably respect his independence, objectivity and constant purpose to be wholly fair and accurate.