ABSTRACT OF THE DISCUSSION OF PAPERS READ AT THE PREVIOUS MEETING

THE PROGNOSTIC VALUE OF SCHEDULE RATING—CHARLES N. YOUNG

VOL. XIII, PAGE 14

WRITTEN DISCUSSION

MR. ROY A. WHEELER:

I feel that Mr. Young has placed too great a stress upon the prognostic value of schedule rating as a justification for its continuance not only because of doubt as to a proper basis of measuring the schedule's prognostic value but also because of the possibility that either the fact or degree of approximation may at some time justify its abolition.

It is my understanding that the Schedule Rating Plan has been conceived as a refinement of the manual classification system differentiating by physical conditions rather than by process and product with the result that just as a manual pure premium requires for its justification the aggregate experience of all risks within a manual classification, so likewise a schedule pure premium requires for its justification aggregate experience on all risks having similar physical conditions. While we would expect some degree of correlation with individual risk experience the degree, however, would be affected by many other factors such as inadequate exposure, causes other than physical, relationship of present day physical conditions with the average physical conditions over the period during which the experience is accumulated.

Mr. Young has pointed out that his analysis of 60 risks shows a numerical balance of 10 risks and a monetary balance of $6,200 in favor of the schedule. If the schedule rate on these risks, which in the aggregate shows a 4.3% lower rate than that warranted by the experience, were increased to reproduce the aggregate experience, the resulting rates would show a numerical balance of 4 risks in favor of the manual and a reduction in the monetary balance from $6,200 to $4,477 in favor of the schedule. Of this monetary balance in favor of the schedule over one-half is due to a single risk whose rate is determined almost entirely by experience rating.

Since the most disturbing cause of an absence of correlation

is the element of inadequate exposure which is only to a limited extent eliminated by the use of normal losses, the thought occurs to me that this factor might still be further eliminated by substituting for the modified losses the expected losses underlying the experience rates, such experience rates to be computed with respect to the manual rather than the schedule. Even on this basis weight is given to the prognostic value of the Experience Rating Plan by assuming a degree of correlation between future and past experience.

I believe that Mr. Young's suggestions for further investigation should be given serious consideration.

AUTHOR'S REVIEW OF DISCUSSION

MR. CHARLES N. YOUNG

Mr. Wheeler's effort in ascertaining the effect of an increase in the premium at schedule rates on the ability of the schedule to approximate the experience on individual risks is deeply appreciated. It is a laborious task, and bears witness to his interest in checking the conclusions of the original paper. While he did not quote that paper with exactitute, his method of procedure appears to have been to add 4.3 per cent. to each entry under Item 19, Normal Expected Loss at Schedule Rate. While this is not quite accurate, for reasons given in the original paper, it will afford a sufficiently close approximation to be of interest. The author has, therefore, checked Table I very carefully with this revision, obtaining a monetary balance of $4,168 in favor of the schedule—a fairly close check on the figure given by Mr. Wheeler. However, this figure still produces a Monetary Coefficient of Risk Equity of plus .40 in favor of the schedule.

Up to this point the difference lies not so much in the facts as in their interpretation. Certainly, the larger risks are responsible for the larger part of the above monetary balance. Reverting to the original Tables I, II, and IV, it may be seen that the 25 risks which are evidence against the schedule develop a normal expected loss, at manual rate of only $57,579, an average of $2,303 per risk. The 35 risks, which are evidence in favor of the schedule, develop a corresponding figure of $100,003, or $2,857 per risk. If we eliminate entirely Risk No. 10, the heaviest evidence in favor of the schedule, we still have

an average of $2,601. This is not evidence against the schedule, it is rather evidence that the risk experience points to the schedule rate as the compass to its pole, swinging freely on either side if the risk is small, but with oscillations damped by the magnetizing influence of the law of averages, as the size of the risk increases.

However, the author was entirely unable to check Mr. Wheeler's finding that the revised numerical balance showed 4 risks in favor of the manual. He found 33 risks in favor of the schedule, against 27, a balance of 6 risks, supporting the original findings.

Mr. Wheeler's closing suggestion apparently loses sight of the fact that the very factor described by him has been used in the present investigation, as a common denominator for the computation of both Schedule Premium and Experience Premium Indices. It will be at once evident that as correlation involves the testing of two *variants*, it would be impossible to have this factor in the numerator. The manual premium for each risk is the logical norm for this test.

SOME OBSERVATIONS ON ACCIDENT AND HEALTH INSURANCE—THOMAS F. TARBELL

VOL. XIII, PAGE 47

WRITTEN DISCUSSION

MR. EVERETT S. FALLOW:

Mr. Tarbell's paper brings out clearly the many obstacles which have been encountered in the development of accident and health insurance in this country. The subject is most important as is evidenced by the fact that accident and health premiums written by insurance companies in 1925 amounted to over one hundred and twenty-nine million dollars and those by benefit associations to nearly forty-one million dollars. Approximately eighty per cent. of these premiums were accident. It may readily be appreciated, therefore, that accident insurance and health insurance occupy very prominent positions in the list of the various lines written.

Accident contracts sold in this country in 1865, provided for the payment of a stipulated amount in the event of accidental death and a certain amount per week in event of non-fatal injury resulting in total disability. The weekly indemnity period was

limited to twenty-six weeks and the contract contained no other benefits. The evolution of the contract from that time is a most interesting story. A brief *resume* of the coverage provided in the present day contract indicates the drastic changes that have occurred. Specific payments are made for dismemberment and loss of sight. The weekly indemnity period for total disability has been increased from twenty-six weeks to life indemnity. Partial indemnity is paid for injury resulting in partial disability which prevents the insured from performing one or more important daily duties in connection with his occupation. The insured is allowed to elect lump sum payments for certain injuries—such as dislocation of the shoulder or fracture of the collar bone—in lieu of weekly indemnity. Payments are made in addition to other indemnity for certain specified surgical operations. Hospital indemnity or nursing indemnity is paid in case the insured is taken to a hospital or requires the attendance of a nurse. If injuries do not result in death or disability nor necessitate an operation but do require surgical treatment, payment is made for such treatment usually not exceeding an amount equal to one week's indemnity for total disability. Payments are very often increased in case the injury occurs in connection with public conveyance, elevator, burning building, and certain other specified causes of accident.

Accident risks were originally divided into several classes for rating purposes and those engaged in the least hazardous occupations were designated as belonging to the select or preferred class. In this class the original premium charged was $5 per $1,000 principal sum and $5 weekly indemnity. This same premium is charged at the present time but the insured, as previously indicated, obtains benefits which have been greatly increased when compared to the original coverage, that is, in place of changing the premium from time to time, the coverage was increased as indicated by the experience.

While it is true that no reports have been issued covering combined accident experience, nevertheless, on several occasions the larger companies pooled their experience, and this experience formed the basis of rating reviews and determined the classes into which the various occupations were placed. Previous to 1922 there were no standard codes for accident experience purposes, but at that time the Committee of Five on Statistics of the Bureau of

Personal Accident and Health Underwriters prepared a plan for compiling personal accident statistics, and practically all the larger companies writing accident insurance are using this plan. The Standard Manual Committee of the Bureau of Personal Accident and Health Underwriters is engaged in a review of the standard accident manual and will make use of the experience which has been tabulated by the companies on the basis of the Bureau Accident Plan.

An insurance company writing a large volume of accident premiums was one of the original companies to adopt the punch card system of compiling experience and the first line for which experience was tabulated was accident insurance. Some of the most important and most valuable analyses which that company has used in its underwriting and rating program are as follows:

(1) Classification and Policy Form,
(2) Classification and Age,
(3) Classification and Size of Policy,
(4) Occupation and Classification,
(5) Policy Form and Kind of Benefit, such as death, total disability, partial disability, double indemnity, hospital benefit, etc.
(6) Cause of Accident,
(7) Nature of Injury,
(8) Length of Period of Disability.

By means of the above experience this company is enabled to determine accurately the progress of its business and to make the necessary adjustments in underwriting practice.

A proper valuation of outstanding claims is of vital importance, both in connection with the Annual Statement and also in connection with the final deductions to be drawn from experience data. Death, dismemberment, and loss of sight claims call for specific payments for which there should be no difficulty in obtaining a proper valuation. On the other hand disability claims vary to a great extent, and it may not be amiss to outline briefly a method of valuing such outstanding claims used by one of the larger accident companies.

Disability claims incurred prior to seven months before date of valuation are reserved for on the basis of individual estimates where the policy period is limited, and on the basis of the table prepared by the Actuarial Committee of the Bureau of Personal Accident and Health Underwriters where the policy pays life

indemnity. Claims incurred within seven months prior to date of valuation are reserved for on the incurred notice average basis. The notice average is obtained by dividing the amount of claims incurred during a given period by the number of notices received during that period. Under this method the number of notices received during a given month is multiplied by the notice average to produce the initial reserve to be set up for claims incurred during that month. This reserve is reduced at the end of each month by the actual amount of claims paid during the month in connection with the particular notices. In the writer's opinion, the notice average basis for computing the reserve to be carried for temporary disability notices received under accident and health policies is much superior to the method of using individual estimates. The notice average should, of course, be tested at frequent intervals in order to make allowance for changes in the factors which cause it to vary. Changes in underwriting practice in regard to the amount of weekly indemnity granted would affect the notice average. Similarly variations in the cause of accident, such as the increased number of automobile accidents, require frequent study. However, the effect of all such factors would be taken care of by a notice average based on the latest possible statistics.

During the past ten years health insurance has been one of the most troublesome lines of insurance with which casualty insurance executives have had to contend. Prior to 1916, the health policy paid full weekly indemnity while the insured was totally disabled and confined to the house, and fifty per cent. of the weekly indemnity while totally disabled but not confined. The disability period was limited to fifty-two weeks. Competition then brought forth policies which allowed full weekly indemnity while totally disabled, whether confined or not, and the indemnity paying period was increased from fifty-two weeks to life indemnity. In addition, partial indemnity, usually limited to twenty-six weeks, was paid for partial disability which prevented the insured from performing one or more important daily duties in connection with his occupation. These policies were issued at inadequate rates, and as a result companies became burdened with a rather large volume of unprofitable health insurance. In 1921, as stated by Mr. Tarbell, the Committee of Five on Statistics of the Bureau of Personal Accident and Health Underwriters devised a plan for compiling

health statistics. Three reports have been issued by this Committee and as a result of reviews by health underwriters of the statistics contained in them, the health insurance program of a majority of the companies writing this form of insurance has been placed on a sound basis.

MATHEMATICS FOR STUDENTS OF CASUALTY ACTUARIAL SCIENCE—
JAMES S. ELSTON
VOL. XIII, PAGE 55
WRITTEN DISCUSSION

MR. A. H. MOWBRAY:

When one finds one's self in complete general agreement with the author of a paper it is difficult to present a discussion that adds materially to it. After accepting an invitation to present a written discussion of this paper I find myself in that position. Indeed it seems odd that anyone should think it unecessary that a defense be presented for the mathematical requirements in our examinations. And yet I presume that in the absence of frequent evidence in the papers appearing in the *Proceedings* of its use this question may arise in the minds of students, especially in view of the bugbear non-engineering students in our American colleges make of mathematics. It may be remarked in passing, though not germane to this discussion, that an investigation of the origin of that attitude would appear to furnish a topic for an interesting study.

The best definition of the word Actuary I have found reads: "One whose business or profession it is to solve, for insurance companies or others, problems involving, separately or in combination, probabilities and interest." If we may accept this definition of our profession then we must realize that a thorough grasp of the theory of probabilities is fundamental to all our work, whether in a particular problem we give it conscious recognition as such or not. Since all of our rate making work must rest on analysis of statistical data we also require the technical equipment for this work and this also calls for thorough familiarity with the same theory of probabilities. Most of the bad errors which have been made in the use of the correlation theory could have been avoided by a careful consideration of the mathematical basis of that theory and the use of common sense in judging whether the conditions to which it was attempted to apply it were consonant with that theory.

Probably nowhere does the old adage, "A little knowledge is a dangerous thing" apply with greater force than in the field of applied theory of probabilities. A superficial knowledge apparently serves in many cases so far as the internal evidence of many of our papers and methods are concerned. But I think a more careful study will disclose that in the case of those methods which have stuck there has been in the background a careful recognition of sound principles and that those methods which have been weighed in the balance and been found wanting in practice have as their foundation a misinterpretation or misapplication of the theory of probabilities.

Mathematical technique will not take the place of commonsense. But the more thorough-going the understanding of the mathematics the less the likelihood of such observance of technique as against commonsense. In the pioneer days of workmen's compensation insurance many rough and ready methods had to be used but with the development of the business the tendency has been toward more refinement and with that developing refinement more thorough knowledge of fundamentals will, I think, be found requisite.

The recent presidential address of Col. Ayres before the American Statistical Association has pointed out one pitfall our students must avoid—the inability to so express themselves as to be thoroughly understood by those executives and others who have not learned the shibboleth of our own technique. It is requisite that we consider carefully our mathematics in seeking the solution of our problems. It is equally requisite that we interpret the resulting methods in the language of the man on the street for the benefit of laymen executives and assureds, for in the end they must approve our methods as sound until by the test of time they come to be accepted as are the calculations of engineers and architects without review by their clients because the professions have established the reputation of building well.

Probably no two members of the Society would make exactly the same recommendations as to source, material and methods of study as to the particular subjects set in the syllabus. Fundamentally this part of Mr. Elston's paper is sound and his recommendations good and the writer is not disposed to try to improve upon them.