ABSTRACT OF THE DISCUSSION OF PAPERS READ AT THE PREVIOUS MEETING

A 1940 VIEW OF NON-CANCELLABLE DISABILITY INSURANCE

JARVIS FARLEY

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WRITTEN DISCUSSION

MR. JOHN H. MILLER:

In his very comprehensive and thorough paper Mr. Farley has clearly expressed the important, yet intangible, factor covering non-cancellable accident and health experience; namely, that it is largely a function of human behavior. The difficulties that have arisen in the past in connection with this form of insurance have, to a considerable degree, been due to a failure to recognize this fact.

Non-can has its own arithmetic in which two and two may equal six, and five minus one may equal three. These relationships simply illustrate the fact that the average man will be disabled longer if he is indemnified at $50 per week than if at $25, usually not because he is dishonest, but because at the smaller indemnity economic necessity will send him back to work, perhaps too soon, while at the larger indemnity his doctor's and family's advice and his own desire may persuade him to remain at home until his recovery and convalescence are full and complete.

Mr. Farley questions whether lifetime indemnity can possibly be written on any adequate scale. There is good reason to believe that, with the knowledge of underwriting that has been acquired together with that which could be obtained through additional research, such coverage could be written. However, the selection would have to be so severe and the standards of acceptance so high that the venture would probably prove impracticable from the sales standpoint.

In connection with underwriting, there has been a considerable change over the years with regard to the occupational hazard. While there are wide variations between the cost of disability in different occupations, the cause seems to be not so much the

actual physical hazard of the occupation as other characteristics of the occupation, such as regularity of employment, stability of income, and whether or not the occupation involves regular hours at a definite location.

Mr. Farley explains the important part which the agent has in the successful underwriting of non-can. This feature of the business cannot be overstressed. There is perhaps no other line of insurance in which the character and good faith of the insured is more important. It is certainly obvious that policyholders of the desired type cannot be secured by agents who do not measure up to these standards themselves or who have not sufficient understanding and training to appreciate the importance of proper selection.

In non-can the field selection as well as the home office selection involve considerations different from those involved in life insurance selection. For this reason neither the agent, nor the lay underwriter, nor the medical examiner schooled in life insurance is competent to engage in non-can underwriting without considerable specialized training in the problems of disability insurance. The distinctions between non-can and life or any other form of insurance seem to require a special organization, both in the office and in the field, for its successful conduct. It is generally conceded that the unfortunate experience which the life companies had with disability insurance was due, in no small part, to the failure to underwrite the disability portion of the contract independent of the life insurance.

Along with increased underwriting knowledge and a desire to issue the broadest coverage that can be offered with due regard to conservative management, the trend in non-can policies has generally been toward fewer and fewer restrictions. Restrictions in the contract are, with few exceptions, merely a substitute for proper underwriting. As the underwriting becomes more effective, restrictions at one time felt to be indispensable are removed.

On page 49, Mr. Farley states that H_x is the equivalent of ${}^{\omega}C'_x$. A demonstration of the equivalence of the two may be of interest and may serve to illustrate the relationship between the two types of notation. In order to simplify the comparison, let us consider a benefit of 1 payable immediately upon disablement and annually thereafter during the continuance of disability.

Adapting formula (A)* on page 47 to the annual basis, without elimination period, we have

$$H_z^{o/all} = v^{z+\frac{1}{2}}\, l_{z+\frac{1}{2}} \cdot s_{(z)}^{o/1} + v^{z+3/2}\, l_{z+\frac{1}{2}} \cdot s_{(z)}^{1/1} + v^{z+5/2}\, l_{z+\frac{1}{2}} \cdot s_{(z)}^{2/1} + \text{etc.}$$

Defining $s_{(z)}^{n/1}$ as $\dfrac{r_z\ l_z}{l_{z+\frac{1}{2}}} \cdot \dfrac{l_{z+n+\frac{1}{2}}^{\iota}}{l_{z+\frac{1}{2}}^{\iota}}$† (using mixed life functions)

$$H_z^{o/all} = v^{z+\frac{1}{2}}\left[l_{z+\frac{1}{2}} \frac{r_z\ l_z}{l_{z+\frac{1}{2}}} \cdot \frac{l_{z+\frac{1}{2}}^{\iota}}{l_{z+\frac{1}{2}}^{\iota}} + v\, l_{z+\frac{1}{2}} \frac{r_z\ l_z}{l_{z+\frac{1}{2}}} \cdot \frac{l_{z+3/2}^{\iota}}{l_{z+\frac{1}{2}}^{\iota}} + \cdot\cdot \right]$$

$$= v^{z+\frac{1}{2}}\, l_z \cdot r_z \left[\frac{l_{z+\frac{1}{2}}^{\iota} + v\, l_{z+3/2}^{\iota} + \cdots\cdots \text{etc.}}{l_{z+\frac{1}{2}}^{\iota}} \right]$$

$$= v^{\frac{1}{2}}\, D_z \cdot r_z \cdot\ a_{z+\frac{1}{2}}^{\iota}$$

$$= {}^{\omega}C_z^r \text{ (annual basis)}$$

It follows that $K_z^{o/all}$, which is the summation of $H_z^{o/all}$, is the equivalent of ${}^{\omega}M_z^r$, which is the summation of ${}^{\omega}C_z^r$.

In the practical application of the two types of notation different approximations are used and, hence, exact equivalence of monetary results would not be achieved. The differences, however, will be negligible if the approximations are reasonably accurate.

Mr. Farley states the formula generally used in developing the active life reserve. In practice, there is little or no occasion to use the terminal reserve factors and accordingly it is often possible to minimize the computations by figuring the mid-terminal reserves direct. This can be done most readily by the following adaptation of Mr. Farley's formula (10).††

$$(10A) \qquad {}_{n-\frac{1}{2}}V_x = \tfrac{1}{2}\left\{ \frac{{}_yK_{x+n-1}}{D_{x+n-1}} + \frac{{}_yK_{x+n}}{D_{x+n}} \right\} - \frac{{}_yK_x}{{}_yN_x} \cdot \tfrac{1}{2} \cdot \left\{ \frac{{}_yN_{x+n-1}}{D_{x+n-1}} + \frac{{}_yN_{x+n}}{D_{x+n}} \right\}$$

* In the third line following formula (A) a typographical error was noted, $\frac{1}{2}p_x$ should read $\frac{1}{2}p_z$.

† This differs from Mr. Cammack's definition, P. C. A. S., VII, 276, which is in the British form and uses Hunter's r_x, which is actually $p_x{}^{ai}$. This formula is true only in case of an annual benefit, but is a fair approximation for monthly or weekly benefits after the first two years of disablement.

†† The last factor in formula (10) should read $\dfrac{{}_yK_x}{{}_yN_x}$ rather than $\dfrac{{}_yK_x}{{}_yN_t}$.

This formula can be applied by continuous process as follows:

$$(10B)_{n+\frac{1}{2}}V_{x-1} - {}_{n-\frac{1}{2}}V_x = \left(\frac{{}_yK_x}{{}_yN_x} - \frac{{}_yK_{x-1}}{{}_yN_{x-1}}\right) \cdot \tfrac{1}{2} \cdot \left\{\frac{{}_yN_{x+n-1}}{D_{x+n-1}} + \frac{{}_yN_{x+n}}{D_{x+n}}\right\}$$

The initial value can be obtained by use of formula (10A) and additional values can be obtained by successive multiplication of the premium differences, working upward on the diagonal. By this method each reserve factor, after the first year, is calculated by a single multiplication.

The table on page 56 shows an average reduction in premiums of about 2½% resulting from a one point increase in the interest assumption. Although this comparison assumes no interest on the claim reserves, the difference would be slight even with the claim annuities figured at interest. Under shorter term policies the saving would be still less, particularly if there is an increase in premium at attained age 50, or other age, and a subsequent reduction in benefits. This relatively small reduction certainly does not justify the taking of investment risks in the hope of securing a better yield. The author's admonition of conservatism in investment policy is very proper, particularly since there is so little to be gained and so much to be lost through any other course.

The reasons for the use of preliminary term valuation are ably presented in this paper. This basis of valuation simply recognizes the fact that acquisition costs and other disbursements in the first year leave no balance available for the establishment of a reserve, while, if the premiums are properly computed, adequate margin is provided in the renewal years for the accumulation of the necessary reserve.

Both the preliminary term and the net level premium method take into account the incidence of claim costs. The net level premium method ignores the true incidence of expenses while the preliminary term method makes allowance for the marked excess of first year over renewal expenses. There does not appear to be any more theoretical justification for ignoring the incidence of expenses than there would be for ignoring the incidence of losses. Both losses and expenses are taken into account in computing

the premiums to be charged. Both must be met if the company is to continue to fulfill its obligations and both should be provided for in the valuation method employed.

Mr. Farley has done the business a fine service in writing a paper which so thoroughly and carefully covers the field of non-can insurance. It should be used as a guide book by any who may consider entering this field.

MR. W. C. JOHNSON:

A distinguished citizen of New England once wrote a letter to the Chairman of the Committee of Admissions of a very conservative club, which, for brevity and clarity should appeal to the mathematical mind. It read:

> "Dear Sir:
>
> I have been requested to write a letter in connection with the application of Mr. X for membership in our Club. This is the letter."

An official of our Society has suggested that as an interested observer of the trends of disability insurance in this country, I should prepare a paper discussing the views of Mr. Farley on non-cancellable health insurance as presented at the November meeting. This is the paper!

You will realize, however, that the implications to be drawn from the two comments are entirely different, for whereas Mr. X was not listed among the elect, Mr. Farley, by his paper, has automatically enrolled himself among the select few who have an understanding of present problems and so may attain ultimate knowledge of how the business can successfully be handled.

Mr. Farley's paper, so thoughtfully prepared and so well expressed, to my mind opens all the nooks and crannies of all the problems affecting non-cancellable disability insurance, so that every corner is illuminated by the light of such experience as has been accumulated to date. Those who have read his paper with care, and then re-read it, as we have, will understand both our reluctance to *discuss* it, when the implications of experience as he clarifies it leave so little about which one could argue, and

our desire to *comment* on it, in acknowledment of the obvious intelligence with which he appraises non-cancellable disability insurance and the thoroughness which he brings into the light every facet of the problem, thus serving to guide, and to warn, others who have adventured into the business, out over previously uncharted seas. Those who warn of shoals and quicksands, and indicate the channels through which one can hereafter safely sail, definitely contribute to progress.

If it be understood that I am commenting for sake of emphasis, rather than discussing for purposes of argument, I will touch briefly on two points embodied in substance in Mr. Farley's paper.

The first is that an extremely valuable service to which the public is entitled, namely, that which can be granted by non-cancellable disability insurance, has, as illustrated by the unhappy experience of practically all the life insurance companies in dealing with life indemnity, been hampered or even endangered by the unwillingness of those insured (and the courts) to differentiate between actual physical disability and a desire to live without working. Low limits of indemnity, through careful underwriting, may help, though they may offset in part only the low standards of character many persons betray in their dealings with insurance companies. I venture the suggestion that if the total disability benefits granted by all the life insurance companies had been limited to the original waiver of premium, and not broadened to include the payment to the insured of cash indemnities, we would never have heard of "Class III."

All my observation leads to the belief that, to deal satisfactorily with non-cancellable health insurance, some form of "stop-loss" provision should be used to control those who endeavor to substitute an impairment of the will to work for actual physical disability, and that the business can be profitably and permanently conducted, at proper rates, if that one point can be kept under reasonable control.

Another subject which can well be mentioned to illustrate how the mind of the actuary can be used to illuminate the necessity of care in dealing with a lay function, is that of making anticipatory settlements of long term indemnity claims. Claim reserves may be figured from individual claims, but they are not so much an attribute of any single claim, or an illustration of what amount

may be needed to meet it, as a reflection of the sums needed on the average to meet a group of similar claims. Just as in dealing with human lives, some die sooner and some live longer than could in either event be reasonably expected, so in dealing with claims, some will naturally terminate, often by recovery, sometimes by death, earlier than might well be anticipated. To withdraw from a disabled life experience the better lives (those most apt to recover and therefore those most apt to accept anticipatory settlements) may not alter by a penny the claim reserve which will actually be needed to meet ultimate liabilities on the group, even though the anticipatory settlements are made for less than the reserves on the individual cases thus handled.

The light thrown by Mr. Farley's comments on these and all the problems which affect the underwriting and administration of non-cancellable disability insurance, should serve to guide all who seek to extend to the public the service which insurance of this type can grant, when soundly devised and administered; and we will be fortunate if from time to time future experience can be as clearly interpreted, as an aid to the safe conduct of the business.

MR. WARD VAN B. HART:

Mr. Farley's paper will appeal to two groups; the students who are seeking educational material will find it a veritable textbook on non-cancellable insurance, while those of us who had close connection with that line from 1915-1930 will find it a stimulating analysis whenever we happen to be trying to sharpen our wits on the vexatious problem of how to meet with safety the public's need for health insurance.

Whether we arrive at the same conclusions as Mr. Farley or not, it can do none of us any harm to re-examine any convictions we may have that the history of non-cancellable insurance became practically a closed book ten or more years ago. Is it possible that the absence of the cancellation privilege has been unjustly held responsible for the unfortunate results of non-cancellable in the 1920's and that the real culprit was perhaps the lifetime indemnity benefit?

The company with which I am connected issued non-cancellable as early as 1915. (It was then issued only with life insurance,

but legally and actually was a separate contract, and, in fact, several of our policyholders have taken advantage of their legal right to drop the life insurance and continue the disability income coverage.) In 1920 we commenced issuing it with a two weeks waiting period without life insurance, and in 1921 and 1922 our program was broadened to include a much wider choice of waiting periods. As far as my memory serves me, I can recall during those days considerable fear of the potential loss from "repeaters"; the "vacation hazard" was one of the underwriter's worries, and borderline cases were at times granted a policy with a three months waiting period instead of one with a two weeks waiting period at a considerably higher premium. Relatively, if not absolutely, we would have made money by accepting the more liberal coverage. The presence of a lifetime indemnity benefit in the policies did not cause any of us much loss of sleep. After all, many life insurance companies had been issuing total and permanent disability benefits for ten years or more, and a few of them for fifteen or even twenty-five years. The contract between the actual history of non-cancellable and the way some of us viewed it then would be amusing if it had not been so expensive.

During more or less the same period, while non-cancellable insurance was expanding in volume, we and other accident and health companies were also issuing lifetime indemnity with our cancellable health policies. The experience on these also ran into losses of perceptible magnitude, a situation which many companies proceeded to correct during the later 20's and early 30's by cancelling those policies with the lifetime indemnity feature.

Some of us were remarking semi-facetiously a few weeks ago that the ideal way to word a non-cancellable policy would be to limit the prohibition against the company's cancelling a policy to the situation where the company at the same time cancelled all policies of a given class. Theoretically, if such a policy could be written, the company could terminate a period of unfavorable experience at will, but the policyholder would likewise be protected against cancellation of his individual policy because of conditions peculiar to him and could not say, as he sometimes does, particularly regarding cancellable health insurance, "If you ever have a claim, the company proceeds to cancel your policy on you."

Seriously, however, the above remarks really bring to light the true distinction between non-cancellable and cancellable coverages. Although under the cancellable coverage the company occasionally can take steps to improve its experience by weeding out the poorest risks while the non-cancellable company still has to keep them on the books, that situation probably accounted for the less important portion of the financial loss which non-cancellable insurance exhibited several years ago. The essential distinction between the two coverages was that we were in a position to get rid of our exposures under one type overnight when we finally made up our minds to do it, while we still have the exposures with us of the other type.

Two characteristics of group insurance may serve to clarify our thinking in this respect:

1. Group insurance is usually written with a "formula," employees of a given concern being eligible only according to some fixed and predetermined rule. The factor of adverse selection, which is perhaps the greatest single stumbling block in health insurance, is thus practically eliminated.

2. The company has the right to readjust rates at periodic intervals.

The individual is protected against cancellation of his own coverage provided the entire group is kept in force, and the company (if we regard the privilege of imposing a prohibitively high rate as being practically equivalent to cancellation) is protected against the entire case continuing to be unprofitable. As we all know, group insurance has enjoyed a very marked degree of success.

The history of any line of insurance is likely to be a series of compromises between what coverage the carrier can soundly give and what coverage the economic life of the policyholder demands. Mr. Farley seems to make, if anything, a little too good a case for the adequacy of the policy with 100 months or 10 years limit. After all, while we may admit fairly that legitimate lifetime claims may be relatively rare, is it not exactly the rare event of a crushing and catastrophic nature which is the real danger against which most individuals wish to insure? Instead of claiming that present day non-cancellable insurance is adequate, would it not be sounder thinking to say that life indemnity would be

closer to the ideal economic coverage but is one which the company regretfully has to ask to be excused from granting?

In the last few years of disability income benefits incorporated in life insurance policies, several companies revised their clauses in connection with endowments maturing at ages 55, 60, 65, or 70 so that in event of disability the insured would receive an income only until maturity and at maturity the disability income ceased and the insured then picked up an annuity purchased by the matured value of his endowment. It is a pity that this direct attempt at avoiding the paying of superannuation benefits under the guise of disability was not tried earlier. While the scheme was particularly adaptable to disability benefits included in endowment policies, the same thought could have been carried over into other policy forms and even into the drafting of non-cancellable contracts.

As Mr. Farley points out on Page 23, fear of the superannuation motive is one of the underwriting reasons for the absence of the life indemnity in present day non-cancellable insurance, although not the only reason. It is interesting to speculate whether the criticism of not meeting the true economic need could be answered more gracefully if, instead of imposing a straight 8 or 10 year limit, the companies imposed a limit equal to the unexpired period from the date of disability to the time when normal retirement because of old age would occur. The imposition, as is quite prevalent today, of a limit of an arbitrary number of years may be regarded as a crude method of accomplishing what could be done in a more elaborate fashion.

Mr. Farley barely makes any specific mention of the use of an aggregate limit on all indemnities as distinguished from a limit placed only on any one accident or sickness. Apparently non-cancellable insurance issued with an aggregate limit is the prevailing type today.

Fundamentally, of course, either method is a means to an end, namely, to stop somewhere short of the payment of complete lifetime indemnity. The use of an aggregate indemnity limit introduces the concept that with each claim the contractual relation between the company and the insured is altered. Upon recovery, the policyholder finds himself, in effect, with a different contract than he had prior to the inception of the claim. A strictly

logical mathematical development for premiums and reserves as they are built up in Mr. Farley's paper is not entirely possible under such a type of contract. For instance, the net one year Term premium, which in one form or another forms the raw material of the net level premium, cannot be a function merely of attained age but will depend on the duration of the policy and the consequent portion of the aggregate limit which, in theory, has already been used up. Given sufficient volume of reliable experience exposed on the aggregate limit basis, sickness tables could be built up for each age at entry, provided that they were only to be used in calculations for policies to be issued in the future with the same aggregate limit as was used in the actual experience. This would be equivalent to using the assumption that disability occurring beyond the limit never actually occurred at all and would be one possible line of attack on a mathematical treatment of the problem.

A rough check of investigations into premiums and reserves for an aggregate limit policy could be made by assuming that a policy with m months' aggregate limit was equivalent on the average to a policy with n months' limit on each separate claim but with no limit in the aggregate. Obviously $n<m$ and n must bear some logical relation to m which may be approximated by judgment. An interesting point to explore is whether the active life reserve on any individual life should be adjusted by the portion of the aggregate limit actually used up in past claims or merely by the portion which should in theory have been used up on the group as a whole.

Another way to view the use of the aggregate limit, although one which is incapable of being translated into mathematical terms, is that it is a compromise between cancellable and non-cancellable insurance. Under cancellable insurance the company, after each claim, reviews the situation and cancels or modifies the insurance on some policyholders, leaving the policies of other claimants unchanged. Under the aggregate limit basis, with each claim there is an automatic reduction in the liberality of the future coverage irrespective of any individual consideration given to the particular claimant.

Mr. Farley stresses the importance of giving every attention to sound underwriting and, in particular, to the matter of moral

hazard. One may agree most heartily with this without necessarily endorsing a point of view which Mr. Farley, perhaps unintentionally, assumes, namely, that the importance of sound underwriting and of watching the moral hazard is peculiar to non-cancellable insurance, or, in particular, non-cancellable insurance as it has been administered in the past ten years. After all, no line of insurance is immune from the dangers of lax underwriting and insistence on elimination of the moral hazard is a prerequisite in the handling of any line. Although probably plenty of mistakes were made in underwriting the non-cancellable lifetime indemnity contracts of the 20's, even those contracts were underwritten by and under the direction of trained underwriters and yet the experience was unfavorable. The difference between the underwriting standards of that period and those of today, possibly, should be emphasized as one of degree rather than one of kind. As mentioned in connection with group insurance, the elimination of adverse selection is an important factor in any form of health insurance, and one of the reasons for the necessity of underwriting at all is to set up methods to combat this danger. It remains to be seen whether under non-cancellable insurance as written today this and other problems have been satisfactorily solved.

With regard to some of the specific underwriting points mentioned, we are, however, in complete agreement, in particular, the necessity of watching the amount of insurance granted, both in relation to the income of the applicant and in absolute dollars and cents. Many of us have seen claims where the original underwriting had restricted the amount of income granted to what seemed a reasonable amount at the time, and yet the claimant, by investing a small amount in a trailer or by renting a very modest cottage in Florida, was apparently able to live for the rest of his life in what actually turned out to be a modest degree of luxury by a readjustment of his standards.

If revised standards of underwriting are able to eliminate situations of that type, we feel it should be emphasized that the results will have been achieved as much by the change in the type of contract offered as by the ability of the companies to accomplish the results merely through changes in underwriting standards.

If time were available for a discussion of Mr. Farley's treatment of claim administration, legal considerations, mathematical and accounting practice, many interesting points could be explored. It has seemed to me preferable, however, to confine this discussion to bringing out some of the underlying philosophy of non-cancellable insurance.

While non-cancellable insurance furnishes protection both against disability resulting from accident and that resulting from disease, the health insurance aspect of non-cancellable insurance is the one which presents the most numerous problems. Today Accident policies sold on a cancellable basis generally furnish broader coverage and probably do a very good job of furnishing protection against loss due to accidental injuries. The cancellation feature is of relatively less importance than under health insurance and does not seem to be objectionable to the public. If it develops that the non-cancellable policies being sold today can be profitably underwritten by the companies, they will serve to some extent to meet the needs of the public for more complete health insurance. I have to conclude, however, as Mr. Farley does, that only time holds the answer.

MR. K. B. PIPER:

Mr. Farley has given us a scholarly picture of an important and intricate subject. This is one field where practical approximations are valuable to reduce the labor of calculation and are justified by the fact that morbidity rates vary widely with economic changes, underwriting practices and other factors. We may be especially grateful that the author has taken the trouble to cite alternative formulas and show how they differ.

Mr. Farley's emphasis on a gross premium valuation is especially timely. Net premium reserves have a deceptive appearance of accuracy. Because they are readily defined and may then be calculated without requiring more use of judgment than is necessary to choose an economical working formula, they are convenient and practical as a guide to the supervising authorities as well as for the ordinary use of management.

But the facts lie deeper. Actuaries in the life field have long

recognized the need for the gross premium method of valuation in considering reinsurance of a block of business. The experience with reinsurance of insolvent life companies indicates that conditions in the past have been such as to make the usual net premium valuation of life insurance somewhat redundant, because the interest and mortality assumptions were conservative.

Under present conditions of low interest return and particularly if there should be a long-term trend toward higher living costs, we might find it desirable to strengthen net premium reserves in the light of a realistic gross premium valuation or an equivalent study of asset shares. As Mr. Farley points out, the obligation to meet future expenses is just as binding as the liability to pay future claims. In fact a company cannot provide the benefits promised in its contracts unless it can meet the expenses incurred in the process.

MR. JOHN M. POWELL:

Mr. Farley is to be highly congratulated upon his paper on the subject of non-cancellable disability insurance. It is exceptionally complete and there is very little with which one can take any great exception.

He places great stress, and rightly so, upon the factor of moral hazard. Except for that factor, the writing of non-can disability insurance would offer few difficulties.

My own valuation of the moral hazard would be fully as high —and possibly higher—than Mr. Farley has brought out, although his strong position has been indicated in many places throughout the paper. One of the strongest is his reference under the subheading "Adequacy of Limited Non-can Policies." He brings out that the Conference modification table shows about two-thirds of all disability occurs within two years, and one-third beyond the end of two years. He goes on, however, to say, "If it were possible to get a table which expressed true physical and mental disability, eliminating all malingering and superannuation, it would show that there is only a very small proportion of true total disability which cannot be covered by the policies available." It is quite obvious, therefore, that the author considers that a substantial portion of the disability beyond two years is due to the effect of moral hazard; how much, of course, it is impossible

to measure. Some interesting observations may, however, be reached by reference to the Combined Health Experience covering a period of five years prepared by the Committee of Five on Statistics of the Bureau of Personal Accident and Health Underwriters.

According to that experience, of 118,323 persons disabled, 579, or only .49%, were still disabled at the end of the year. Among that group of 118,323, there was experienced a total number of 2,484,678 disabled days, or a total of 4,291 days or 12 years of sickness for each of the 579 remaining disabled persons. As the Class (3) select life annuity value at the end of the first year of disability is equal to approximately six years of indemnity, this would indicate almost exactly one-third of the total morbidity as occurring beyond one year, instead of beyond two years. Further, as no doubt life indemnity would contain a greater percentage of border-line disability than would the first year's experience indicated above, where in the main the policies upon which the Bureau experience was based were limited to one year, the conclusion could easily be reached that far less than one-third of the total true morbidity was experienced beyond the end of one year.

The author brings out the different effects of moral hazard upon short-term policies, medium-term policies and those paying life indemnity. I agree in general with his observations although I believe it is possible that this factor may be substantially more serious on medium-term policies than his statements would indicate. There is a general feeling that at some indefinite time in the future, following completion of our Defense Program, a serious business reaction is likely to be experienced. If we should have a group of—let us say—ten policyholders who would give up an unprofitable business for what appeared to be a chance to obtain life indemnity, how many of that group would refuse to give up that business for an assured income that would in all probability carry them beyond the depression? Or if that group of policyholders were nearing retirement age and as border-line cases would claim indemnity on a life annuity basis, how many of them would refuse to claim indemnity where it was limited to—let us say—five to ten years? There would in each case be some difference, of course, but the difference may not be as great as might be assumed. That Mr. Farley has given consideration to such possi-

bilities is brought out in his comments under the heading "Effect of the Limit on the Moral Hazard."

Under the heading "Underwriting the Moral Hazard," he has covered this subject splendidly. A new factor, however, is developing which should make an underwriter somewhat more conservative on the larger incomes, that is, the matter of substantially heavier income taxes. If a top limit of $500 indemnity per month is rigidly adhered to, a 75% of established steady income may not be dangerous although it does seem very high. The granting of $500 per month, or $6000 per year on an $8000 income would, with the heavy income tax in prospect, leave a very small margin of safety. This income could easily shrink to five or six thousand dollars per year or even lower. As there would still be a substantial tax, this safety margin of 25% becomes very low. With incomes and indemnities above those amounts, a wide margin of safety between earned income and amount of indemnity becomes increasingly important very rapidly. In the company with which I am connected, we have followed, with few exceptions, a limitation for indemnity carried in all companies, decreasing from 80% for incomes of $250 per month or less down to 50% where the incomes are in excess of $750 per month. Except in very unusual circumstances, the top limit of $500 has been followed.

The author discusses the question of non-forfeiture values and rightly concludes that they have no place in this type of insurance. The maximum value that can ever be justified on any insurance policy is the true prospective reserve less the cost of securing a new policyholder of equal value. These true prospective reserves, even for policies issued at the same age and having the same duration, will have an extremely wide variation, but with a large group of policyholders, their sum would be equal in the aggregate to the sum of their individual tabular reserves. Each one (on a net premium valuation basis) would consist of the present value of future prospective claims, giving effect to the physical conditions and the other factors pertaining to the individual that tend to affect claims less the present value of future premiums. These values would vary from one extreme on poor risks where the true reserve would be many times the tabular reserve to the opposite extreme on the best risks where there

would actually be a negative reserve. If it were feasible to construct such true reserves, it would be feasible to allow a cash value on those policies in the worst category, but there would be no value for the policies in the favorable category. As there is little likelihood of a policyholder in the unfavorable group permitting his policy to lapse, particularly where there is a grace period, it would follow that there are extremely few cases where injustice is done due to there being no non-forfeiture values.

In conclusion, the student of non-cancellable disability insurance should find this paper exceedingly valuable. The author has used language which conveys very clearly the ideas which he has set out to express. He has dealt not only with the theoretical aspects of the various problems, but has discussed also numerous practical factors which should be very helpful not only to the student but also will give a new and interesting viewpoint on many matters to the experienced accident and health official whether interested in non-cancellable or cancellable business.

AUTHOR'S REVIEW OF DISCUSSIONS

MR. JARVIS FARLEY:

To those who participated in the discussion the author extends sincere thanks for the generosity of their comments and for their contributions in emphasizing and expanding a number of important points. Beyond that, there is little to say in review of the fine discussions. It is interesting that two of the written discussions were submitted by men who were directly concerned with the last paper before this Society on the subject of non-can underwriting problems—Mr. Laird's paper presented exactly twenty years ago. Mr. Johnson contributed to the discussion at that time, and Mr. Hart was in close daily association with Mr. Laird. Mr. Powell, too, has been active in this field almost since its inception.

To me, the most striking feature of the written discussions is the emphasis which they lay upon the moral hazard in connection with non-can underwriting. In the opinion of those now active in the non-can field, no other field presents a moral hazard so subtle and so pervasive. As Mr. Miller said, "There is perhaps

no other line of insurance in which the character and good faith of the insured is more important." It is true, as Mr. Hart said, that "no line of insurance is immune from the dangers of lax underwriting and insistence on elimination of the moral hazard is a prerequisite in the handling of any line." In the field of non-can, however, the moral hazard is immeasurably greater than in most fields and, accordingly, less easily eliminated. The standards of underwriting must be correspondingly higher and more diligently applied. The fundamental principle applies to all lines, but in different degree, and I believe that it is very difficult for a person schooled in the underwriting of regular life or casualty insurance lines to appreciate or even to conceive of the extreme degree with which the principle applies to non-can underwriting. Such an underwriter might believe that he was applying rigid standards to non-can risks when in fact his standards were not sufficiently high, or his application thereof was not adequately searching. For this reason, among others, I believe that non-cancellable disability insurance will in practice be developed most successfully by companies devoting their major attention to that field, rather than by companies who might write it as a sideline. This accords with Mr. Miller's statement that "the distinctions between non-can and life or any other form of insurance seem to require a special organization, both in the office and in the field, for its successful conduct."

I would be less than fair if I accepted for my own the kind comments of the discussions without giving the credit where it is really due—to those actuaries of other companies who, by their frequent advice and assistance, have helped me to organize what actuarial education I may have accomplished, and to the executives of my own company, who have patiently and completely shared with me their knowledge and experience in this field of non-cancellable disability insurance.

EXCESS COVERAGE (PER ACCIDENT BASIS) FOR SELF-INSURERS: WORKMEN'S COMPENSATION—NEW YORK

JAMES M. CAHILL

VOL. XXVII, PAGE 77

WRITTEN DISCUSSION

MR. H. G. CRANE:

As stated in Mr. Cahill's paper, the proposed formula for computing rates for New York for excess coverage over a $10,000 per accident limit is as follows:

$$\text{Excess Rate} = \frac{\frac{\text{Ser. P. P.*}}{\text{Total P. P.}} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}} \times .598 \times \left(1.000 + \frac{.080 + .020 + .103}{.598}\right) + .010}{(1.000 - (.150 + .039)} \times \text{Manual Rate}$$

$$= \left(\frac{\text{Ser. P. P.*}}{\text{Total P. P.}} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}} \times .9873 + .0123\right) \times \text{Manual Rate}$$

* For Class.
** For Hazard Group.

This formula can be restated:

$$\text{Excess Rate} = \frac{\frac{\text{Ser. P. P.*}}{\text{Total P. P.}} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}} \times .598 \times \text{Manual Rate*}}{.6057} + .0123 \times \text{Manual Rate*}$$

In this form the expression $\left(\frac{\text{Ser. P. P.*}}{\text{Total P. P.}} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}} \times .598 \times \text{Manual Rate*}\right)$ may be considered the excess pure premium and the formula can then be written thus:

$$\text{Excess Rate} = \frac{\text{Excess Pure Premium*}}{.6057} + .0123 \times \text{Manual Rate*}$$

Now I believe it is approximately correct to say that .598 of the manual rate for a given class equals the class pure premium. (It would not be true to the extent that the $.01 catastrophe loading and the occupational disease loading of between $.01 and $.05 have not been removed from the manual rate before applying the factor of .598, but this inaccuracy should be relatively unimportant.) Hence the following should be approximately correct:

$$\text{Excess Pure Premium} = \frac{\text{Ser. P. P.*}}{\text{Total P. P.}} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}} \times \text{Total P. P.*}$$

$$= \text{Ser. P. P.*} \times \frac{\text{Excess Cost**}}{\text{Ser. Cost}}$$

The propriety of this method of determining excess pure premiums is open to question in two respects. First, there may be some question as to whether the ratio of excess cost to serious cost which has been determined from full coverage experience is representative of the corresponding ratio which would be shown by self-insurers' experience, if an adequate volume of the latter could be compiled. However, I am inclined to believe that this possibility can be ignored. The second question is as to whether this ratio of excess to serious cost can be appropriately applied to the full coverage serious pure premiums in order to produce excess pure premiums. I believe this is extremely doubtful. It is common knowledge that loss experience is much more favorable on large insured risks than on small ones.* Self insurers are almost invariably large risks and it is reasonable to expect that the experience of a self insurer of a given size would be at least as favorable as that of an insured risk of equal size. Accordingly it would seem that the class serious pure premiums used in deriving excess pure premiums ought to be considerably lower than the class average. Perhaps this could be taken care of by the introduction into the formula for computing excess rates of a factor to allow for the better than average experience to be expected on self insured risks by reason of size of risk.

The expense loading provision in the formula proposed by the New York Board seems to me to be extravagant. I have worked out the excess pure premiums for the fifteen classifications for which the proposed excess rates over a $10,000 per accident limit are shown in Mr. Cahill's Exhibit 11. The proposed expense loading varies by classification because it is based in part on the excess pure premium and in part on the full cover manual rate. For these fifteen classifications the loading ranges between 45.8% and 51.8%. Thus the ratio of proposed excess rates to proposed excess pure premiums ranges between 1.845 and 2.075. This is in contrast to an expense loading in the full coverage rates of 40.2%, equivalent to a ratio of rate to pure premium of 1.672. For the reinsurance companies which are providing excess cover-

* In this connection see paper by Mr. Charles J. Haugh entitled "Recent Developments with Respect to the Distribution of Workmen's Compensation Insurance Costs," *Proceedings,* Volume XIV, page 262, and paper by Mr. Mark Kormes, "Small Risks versus Large Risks in Workmen's Compensation Insurance," Volume XXIII, page 46.

age to self insurers an expense loading of 35% is certainly ample. This requires a factor of only 1.538 to mark up the pure premium to the rate.

The difference between the expense loading proposed for excess rates and that included in the rates for full coverage is due entirely to the fact that part of the proposed expense loading is derived as a percentage of the full cover manual rate. Mr. Cahill does not explain the reason for this procedure other than to say that it is provided for "fixed company administration and payroll audit expenses." The rates for full coverage insurance contain a percentage allowance for home office administration and payroll audit expenses which applies uniformly to every premium dollar regardless of manual classification or size of risk, except to the extent that in addition a small expense constant is imposed on policies where the premium is less than $500. It is difficult to see why the rates for excess coverage should be more heavily loaded. In fact the expense loading should be lower for excess coverage than for full coverage. The 2.0% loading for Department of Labor assessments should not be included because self insurers are assessed directly by the Department of Labor, and excess carriers are not so assessed. It is doubtful whether the 1.0% provided in taxes for the Security Fund tax should be included. The Security Funds are not for the benefit of self insurers or employees of self insurers and the law levies the tax only against premiums written for policies which insure payment of compensation pursuant to the Workmen's Compensation law. Furthermore there is virtually no claim expense attached to this form of insurance. The self insurer has its own claim organization and is responsible for the investigation and settlement of all claims. The excess carrier has the right to participate in the negotiations for settlement or defense of any suit, but in practice this right is seldom exercised. Inspection expense is another item which exists only to a limited extent in handling excess insurance. Inasmuch as self insurers ordinarily have adequate safety organizations excess carriers do not make inspections except in the case of the occasional extra-hazardous risk.

Preliminary to outlining the proposed rate making method, Mr. Cahill alludes to the actual excess coverage experience for policy years 1928-1937. This experience, which he presents in

his Exhibits 1 and 2, shows that the loss ratio was 35.7% for Board members and 91.5% for non-member reinsurance carriers, or a combined loss ratio of 70.8% on a total premium volume of $670,097. The author states that this was a very adverse loss ratio considering that the permissible loss ratio would average less than 50%. It should be noted, however, that the non-member reinsurance carriers could have well afforded a permissible loss ratio as high as 65%. Furthermore, it is unfortunate that Mr. Cahill did not bring out the fact that had the experience on a single large risk with very adverse results been excluded, the picture would have been entirely different with a loss ratio of only 36.7% for the non-member reinsurance carriers and only 36.3% for all carriers combined. The effect on the experience of the results on this single risk is shown below:

ACTUAL EXPERIENCE FOR POLICY YEARS 1928-1937

BOARD MEMBERS

	Earned Premium (1)	Incurred Losses (2)	Loss Ratio (3)
As shown in Mr. Cahill's Exhibit 1	$248,633	$88,839	35.7%
Result attributable to a single risk	..	..	..
Result adjusted to exclude above risk	$248,633	$88,839	35.7%

NON-MEMBER REINSURANCE CARRIERS

	Earned Premium (4)	Incurred Losses (5)	Loss Ratio (6)
As shown in Mr. Cahill's Exhibit 1	$421,464	$385,770	91.5%
Result attributable to a single risk	111,364	271,847	
Result adjusted to exclude above risk	$310,100	$113,923	36.7%

ALL CARRIERS

	Earned Premium (7)	Incurred Losses (8)	Loss Ratio (9)
As shown in Mr. Cahill's Exhibit 1	$670,097	$474,609	70.8%
Result attributable to a single risk	111,364	271,847	
Result adjusted to exclude above risk	$558,733	$202,762	36.3%

There is considerable justification for excluding this risk from the experience for the reason that it covered a large construction project written on virtually a non-cancellable basis and therefore on a form of coverage materially different from that contemplated by the proposed rates.

Exhibit 11 of Mr. Cahill's paper presents a comparison of the proposed rates with the rates actually charged on risks covered on an excess basis in policy year 1937. The proposed rates in most instances are substantially higher than those actually charged, but Mr. Cahill states that the actual premiums do not serve as a good basis for comparison because over a period of years the actual premium charges have been grossly inadequate. As indicated above, the ten year actual experience excluding one risk was not at all unfavorable. Furthermore, the comparison of the actual with the proposed rates is rather misleading in certain respects. Excess coverage is frequently written for self insurers with operations in several states at a rate applying to the entire operations rather than at separate rates for each state. In such cases a rate which may be adequate for the risk as a whole will appear low for the New York operations by themselves because of the fact that the New York Compensation Act is more liberal than that of other states. Moreover the rates now being charged to self-insurers for excess coverage in most cases apply to the entire payroll of the self insurer regardless of manual classification, with the result that clerical office and similar employees take the same rate as do employees in the governing classifications, whereas the proposed rates contemplate payroll segregation in accordance with the manual rules. This point is not recognized in Mr. Cahill's Exhibit 11.

Thus there are several reasons why the present rates are not nearly as susceptible of criticism from the standpoint of adequacy as would be indicated by Mr. Cahill's paper while the proposed rates appear too high with respect both to the pure premium basis and the expense loading. In fixing rates for excess coverage the carriers have nothing to gain by establishing a scale of rates which is too high. Such rates do not discourage self insurance, but merely provide an incentive for securing excess coverage from unlicensed insurers.

EXHIBIT SHOWING EXCESS PURE PREMIUMS AND EXPENSE PROVISION IN PROPOSED RATES FOR COVERAGE IN EXCESS OF $10,000 PER ACCIDENT FOR CLASSIFICATIONS FOR WHICH DATA SHOWN IN MR. CAHILL'S EXHIBIT II.

Manual Code No.	Proposed Excess Cover Rate (a)	Full Cover Manual Rate	Ratio (1) ÷ (2) (c)	Proposed Excess Cover Pure Premium [(3) − .0123]x.598x(2) .9873	EXPENSE PROVISION IN PROPOSED EXCESS COVER RATES							% Expense Loading Included In Proposed Excess Cover Rate (11) ÷ (1)
					Acquisition (1)x.150	Taxes (1)x.039	Dept. of Labor Assessment .020 / .598 x(4)	Adjustment .080 / .598 x(4)	Fixed Company Administration and Payroll Audit .010x(2)	Inspection and Remaining Company Administration .103 / .598 x(4)	Total Provision For Expenses (5)+(6)+(7)+(8)+(9)+(10)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1421	$.630	$6.56	.096	$.333	$.094	$.024	$.011	$.045	$.066	$.057	$.297	47.1%
1463	.352	4.75	.074	.177	.053	.014	.006	.024	.047	.031	.175	49.7
1624	1.112	9.93	.112	.600	.167	.043	.020	.080	.099	.103	.512	46.0
1701	.212	2.62	.081	.109	.031	.008	.004	.015	.026	.019	.103	48.6
2095	.170	2.83	.060	.082	.025	.007	.003	.011	.028	.014	.088	51.8
3883	.321	4.79	.067	.159	.048	.013	.005	.021	.048	.027	.162	50.5
4000	.949	8.87	.107	.509	.142	.037	.017	.068	.089	.087	.440	46.4
4511	.091	.95	.096	.048	.014	.004	.002	.006	.009	.008	.043	47.3
4527	.152	1.65	.092	.079	.023	.006	.003	.011	.016	.014	.073	48.0
4683	.395	4.25	.093	.208	.059	.015	.007	.028	.042	.036	.187	47.3
4720	.204	2.87	.071	.102	.031	.008	.003	.014	.029	.017	.102	50.0
6260	2.249	19.39(b)	.116	1.218	.337	.088	.040	.163	.194	.209	1.031	45.8
7309	.750	12.29	.061	.363	.112	.029	.012	.049	.123	.062	.387	51.6
8742	.041	.47	.087	.021	.006	.001	.001	.003	.005	.004	.020	48.8
8810	.008	.10	.075(c)	.004	.001	....	....	.001	.001	.001	.004	50.0

(a) As shown in Column (7) Mr. Cahill's Exhibit II.
(b) This classification (a) rated; amount shown obtained by dividing proposed excess rate by percentage shown in Column (7), Mr. Cahill's Exhibit II.
(c) Equivalent to percentages shown in Column (7), Mr. Cahill's Exhibit II.

MR. MARK KORMES:

I

On previous occasions I have written discussions of several papers and I must confess that each time I had to be prompted out of my inertia by a more or less urgent request of the then vice-president. The subject of this paper, however, was always of great interest to me and the study of excess cost was undertaken by the Compensation Insurance Rating Board only after a considerable prodding on my part of the members of the Actuarial Committee to whom it presented merely an academic problem.

In view of the decision of Superintendent Conway* I felt all along that eventually stricter supervision and perhaps mandatory rates would replace the rather chaotic and highly competitive methods used in the underwriting of this form of coverage. The average excess rate being close to 9% of the manual rate and the Self-Insurers accounting for approximately one-fifth of the state's exposure, I saw the possibilities of an annual premium volume from one to two million dollars. The disparity between the rates actually charged and the advisory rate was considerable and the experience underlying such advisory rates ancient so that I felt that a thorough study was warranted. I have, therefore, kept this matter continuously before the Actuarial Committee of the Board and finally succeeded in getting its approval to go full steam ahead. Alas, I was not fortunate enough to stay with this work to its conclusion and so it became my successor's privilege to present to the Society a paper on this subject. I enjoyed therefore reading the paper and digesting its contents and it is with zest and relish that I am preparing this discussion.

II

It will not be amiss to begin with some aspects of historical nature which will have a bearing on certain elements of the discussion. The advisory rates published in 1931 were calculated on the basis of experience of policy years 1922 and 1923. The excess cost was not computed on the basis of deferred annuities

* See Mr. Cahill's paper.

but the amount of retention ($10,000) was deducted from the total incurred cost (indemnity and medical combined) on cases where such cost exceeded $10,000. This produced the following results:

TABLE I

Hazard Group	Ratio of Excess to Serious		
	Single Cases	Catastrophes	Combined
1. High	.075	.085	.160
2. Medium	.079	.026	.105
3. Low	.053	.005	.058
Total	.062	.014	.076

Based on the study of the effect of using deferred annuities conducted by one company member of the Committee* it was found that a multiplier of 2.0 should be applied to the excess cost of single cases. No adjustment was made in the excess cost of catastrophes. This action is somewhat justifiable by the fact that in cases of catastrophes the amount of retention will be quickly exhausted and that therefore over a short period the value of temporary annuities will not differ greatly from the sum of annual payments.

III

Another element which was covered rather briefly in the paper is the method used in the calculation of excess costs on a deferred annuity basis. The formulae are rather elementary to a seasoned actuary but the student who seeks enlightenment or who prepares for the examinations will appreciate the following remarks.

In connection with the evaluation of permanent total disabilities (or permanent partial disabilities awarded life benefits) the formula used for calculation of deferred annuities was:

$$ {}_n|\bar{a}_x = \frac{\overline{N}_{x+n}}{D_x} \qquad (1) $$

The bar over the annuity symbol indicates the fact that continuous annuities are being used and it only remains necessary to explain the meaning of the symbol $\overline{N}_x$.

The value of a continuous annuity is given by:

$$ \bar{a}_x = a_x + \tfrac{1}{2} \qquad (2) $$

* Aetna Life Insurance Company.

If we substitute for a_x the usual commutation symbols we obtain:

$$\bar{a}_x = \frac{N_{x+1}}{D_x} + \tfrac{1}{2} = \frac{N_{x+1} + \tfrac{1}{2}D_x}{D_x} \tag{3}$$

or:

$$\bar{a}_x = \frac{\bar{N}_x}{D_x} \tag{4}$$

where:

$$\bar{N}_x = N_{x+1} + \tfrac{1}{2}D_x \tag{5}$$

The transition from formula (4) to formula (1) does not present any difficulties.*

As respects the valuation of death cases, it was quickly recognized that an attempt to make exact calculation of deferred annuities would introduce considerable amount of clerical labor. For this reason the Actuarial Committee decided to consider the full reserves for children as a part of payments made and to be deducted from the amount of retention. It should be observed that this procedure tends to *reduce* the amount of excess cost. For cases where the attained ages of the children as of the valuation date are advanced, the reduction is small but for cases where the attained ages are low, the reduction is rather substantial as may be seen from the following table:

TABLE II**

Age of Widow	Ages of Children	Present Value of Excess over $10,000		
		As Used in Study	Exact Calculations	Percentage Difference
40	14, 15, 16 & 17	$4,019	$4,046	+ .7%
40	6, 7, 8, 10 & 15	6,903	7,559	+ 9.4
26	1, 2	4,022	5,138	+ 27.7

Whether and to what extent the method used has produced too low excess costs depends on the distribution of both the number of children and their ages as of the valuation date. In any case, the conclusion that the calculated excess cost is rather on the low side seems warranted from the above considerations.

* The writer wishes to call attention to the fact that tables showing the values of $\bar{N}_x$ at 3½% are included in the December 1, 1938, edition of the New York Workmen's Compensation Statistical Plan.

** The values in this table are based on annual wages of $1,800.

These remarks will also serve to illustrate the considerable amount of labor required for the computation of excess costs over three distinct retentions for the 2,323 accidents included in the study.

IV

Let us now compare the results of the study with the data underlying the old advisory rates as shown in Table III below:

TABLE III

Hazard Group	Ratio of Excess (Over $10,000) to Serious Cost)					
	Single Cases		Catastrophes		Combined	
	Old	New	Old	New	Old	New
1. High	.150	.174	.085	.055	.235	.229
2. Medium .	.158	.179	.026	.019	.184	.198
3. Low	.106	.149	.005	.009	.111	.158

The above table brings out an increase in the excess cost of single cases and a decrease in the cost of catastrophes. Whether this reflects the general trend or is merely due to the peculiarity of the experience periods is a question worthy of further research. If my information is correct, the experience period underlying the new rates does not include the famous "Observation" disaster.

This table also serves to emphasize the fact that the hazard groups were selected on the basis of catastrophe hazard. The excess cost of single cases naturally depends on the wages of the injured employee and the ages of the beneficiaries and therefore this cost should not vary substantially by hazard groups.

In general, it may be concluded from the comparison that the results of the study modify only slightly the original values.

V

Having thus touched upon some of the technical phases of the "pure" excess cost, let us turn to the element of expense loading. I am gratified to note that Mr. Cahill and the Actuarial Committee of the Board found it advisable to reduce the expense loading but I do not think that they have bridged the gap between the advisory rates and the rates actually charged. From Exhibit XI of Mr. Cahill's paper one can readily find that the advisory rates

are practically 100% higher than the rates used in actual practice and apparently with moderate success. The application of such rates to the experience shown in Exhibit I of Mr. Cahill's paper would produce for Board members a loss ratio of approximately 18%, for non-member Reinsurance Companies a loss ratio of 46% and over-all a loss ratio of about 36%. This, of course, under the assumption that the ratio of 2 to 1 would hold for the entire experience period. If my recollection does not fail me, the rates charged were on the whole considerably less than 50% of the then advisory rates. Bearing in mind that about 20% of the premiums and about 15% of the losses were incurred under policies with a retention of less than $10,000, it would be difficult to justify rates producing such a substantial margin of profit.

It therefore, deems proper to examine the expense loading formula in detail with the object of ascertaining whether or not it meets the tests of reasonableness and adequacy.

Mr. Cahill presents the expense loading formula in the following form:

$$\text{Excess Rate} = \text{Manual Rate} \times \left(\frac{\text{Serious P.P.*}}{\text{Total P.P.*}} \times \frac{\text{Excess Cost**}}{\text{Serious P.P.**}} \times a + b \right) \quad (6)$$

where a and b are constants. The difference between the old and this proposed method of expense loading lies in the value of these constants, as explained in the paper, viz:

$$\text{Old Advisory rates:} \quad a = \frac{.600}{.80 \times .80} = .9375$$

$$b = \frac{.030}{.80} = .0375$$

$$\text{New Advisory rates:} \quad a = \frac{.598 \times \left(1.000 + \frac{.080 + .020 + .103}{.598} \right)}{1.000 - (.150 + .039)}$$

$$= .9873$$

$$b = \frac{.010}{1.000 - (.150 + .039)} = .0123$$

---

* For a given classification.
** For a hazard group to which the classification belongs.

Equation (6) indicates that the expense loading is a function of two variables, namely, (a) the manual rate and (b) the ratio of the serious cost to the total cost for the given classification. Equation (6) does not disclose readily what is the loss portion and what is the expense portion of the rate and for this reason I have developed below a different form for the expense loading formula which is more familiar in its appearance.

Let

$$\epsilon = \frac{\text{Serious P.P.}}{\text{Total P.P.}} \times \frac{\text{Excess Cost}}{\text{Serious Cost}} \tag{7}$$

It may be readily seen that the excess cost per \$100 of payroll or the "excess pure premium," E is given by

$$E = \epsilon \cdot r \cdot (1 - L) \tag{8}$$

where r is the manual rate and L is the expense loading percentage in rates. To demonstrate equation (8) consider that:

$$\epsilon \cdot r \cdot (1 - L) = \frac{\text{Serious Cost}}{\text{Total Cost}} \cdot \frac{\text{Excess Cost}}{\text{Serious Cost}} \cdot \frac{\text{Total Cost}}{1 - L} \cdot (1 - L)$$
$$= \text{Excess Cost} = E$$

From (8) we find that

$$\epsilon = \frac{E}{r\,(1 - L)} \tag{9}$$

Let ζ represent the *excess rate* and λ the expense loading percentage in such excess rate, we have then:

$$\zeta = \frac{E}{1 - \lambda} \tag{10}$$

Let us now write equation (6) by means of the symbols introduced above. We obtain

$$\zeta = r\,(\epsilon\, a + b) \tag{11}$$

Substituting for ϵ and ζ expressions (9) and 10), we have

$$\frac{E}{1 - \lambda} = r\left(\frac{E\,a}{r\,(1 - L)} + b\right) \tag{12}$$

Solving (12) for λ we obtain:

$$\lambda = 1 - \frac{E\,(1 - L)}{E\,a + r\,b\,(1 - L)} \tag{13}$$

Since in the present rates $1 - L = .598$ the expense loading percentage for excess rates is:

$$\lambda = 1 - \frac{.598\,E}{.9873\,E + .598\,r\,.0123}$$

$$\text{or } \lambda = 1 - \frac{.598\,E}{.9873\,E + .0073554\,r} \tag{14}$$

and the loading factor in excess rates

$$\frac{1}{1-\lambda} = \frac{.9873\,E + .0073554\,r}{.598\,E} \tag{15}$$

The equations (14) and (15) permit us to analyze the expense loading provision in excess rates. It is apparent that the loading is a function of two variables, namely, the excess pure premium, or cost, and the manual rates. For a fixed rate, λ will decrease as E increases and increase as E decreases, or, in other words, the loading percentage is smaller for higher excess cost and greater for lower excess costs. For a fixed excess cost, λ will increase or decrease as the rate increases or decreases.

In a given hazard group it is very likely that two classifications with the same rate have a different serious pure premium. The classification with the lower serious cost and therefore lower excess cost will have a higher expense loading percentage than the classification with the higher excess cost. This is neither easy to justify to the Self-Insurer or supervisory authorities nor is it desirable from the point of view of the carrier.

VI

In this last chapter of my discussion, I would like to sketch a few suggestions relative to the matter of expense loading and underwriting of excess insurance in general.

The argument may be advanced that the expense loading percentage for excess coverage must be higher than that for standard coverage because of certain elements which will cost the same amount of money regardless of whether full or excess coverage is granted. As long as no definite information is available just what is the cost of these elements and judgment has to be employed, it may be necessary to fix for the time being the permissible loss ratio at say 55%.

If this method were to be employed, we would have

$$\epsilon \cdot k \cdot r = \frac{E}{1-\lambda} \tag{16}$$

where k is the factor to be determined.
From (16), and since by (8)

$$E = \epsilon \cdot r\,(1-L)$$

we have

$$\epsilon \cdot k \cdot r = \frac{\epsilon r\,(1-L)}{1-\lambda}$$

and finally

$$k = \frac{1-L}{1-\lambda} \tag{17}$$

Thus if λ is taken at 45% the loading factor $\frac{1}{1-\lambda}$ becomes 1.818 and the formula for calculation of excess rates:

$$\zeta = \text{Manual Rate} \times \left(\frac{\text{Serious P.P.}}{\text{Total P.P.}} \times \frac{\text{Excess Cost}}{\text{Serious Cost}}\right) \times 1.087 \tag{18}$$

Another approach might be the use of the formula:

$$\text{Excess Premium} = \text{Payroll} \times \text{Excess Rate} + \text{Policy Fee} \tag{19}$$

where the excess rate would be obtained from

$$\text{Excess Rate} = \frac{\text{Serious P.P.}}{\text{Total P.P.}} \times \frac{\text{Excess Cost}}{\text{Serious Cost}} \times .9873 \times \text{Manual Rate} \tag{20}$$

Please note that formula (20) is equivalent to formula (6) where the constant b is assigned the value 0.

The policy fee would vary within the limits in accordance with the premium (or payroll) volume and possibly also by industrial groups.

The last method would be equivalent to the formula

$$P = \alpha p + \beta \tag{21}$$

prevalent in life insurance and although not publicized used quite effectively in connection with Self-Insurers' release policies in a somewhat modified form. This suggestion seems also to sound like an echo of some remarks in Mr. Perryman's last presidential address.*

* In this connection it may be also well to refer to a paper by Joseph Woodward, "Provision for Expenses in Workmen's Compensation Premium," *Proceedings*, Vol. III, pp. 140.

It would undoubtedly require careful study and analysis to determine the values of β so that the results of their application are both adequate and reasonable.

While excess premiums calculated under either of the above suggestions would be somewhat less than those produced by the revised advisory rates (depending, of course, on the selection of the permissible loss ratio or the determination of the values for β), there will still exist a wide gap between the actual experience on excess policies and the premium charges.

There are several possibilities which may account for this situation. In the first place the excess costs determined by the study are based on the entire body of the insured experience. Still Self-Insurers are more analogous to the group of large risks, say those with an annual premium of $5,000 or over.

The retrospective rating plan especially designed to appeal to self-insured risks recognizes a gradation of expenses by size of risk. Surely the type of coverage provided under an excess policy as well as the fact that most Self-Insurers present fairly large entities seem to warrant a reduction in certain elements of expense loading, particularly commissions since the "service" to policyholders would be negligible.

Another and perhaps more effective approach to this problem would be the introduction of experience rating for this type of coverage. A study would be necessary to evolve a sound experience rating plan and it would be desirable to re-examine the cost element in light of the experience of a substantial number of Self-Insurers. This, of course, might be fraught with insuperable difficulties.

There are, of course, other methods available to Self-Insurers who desire to reduce the cost of excess insurance but they lead to considerations which are entirely beyond the scope of this discussion.

AUTHOR'S REVIEW OF DISCUSSIONS

MR. JAMES M. CAHILL:

Two motives prompted me to write this paper: the first, to publish the latest available data on excess costs for the information of casualty insurance men generally; and the second, to give

the reinsurance companies and others who are interested in excess coverage for self-insurers under the New York Workmen's Compensation Law an opportunity to review and criticize the rate-making method evolved by the Actuarial Committee of the Compensation Insurance Rating Board. I had in mind that the entire situation with respect to this form of coverage has been so unsatisfactory in recent years that the Insurance Department might wish to approve the revised method, when filed, to be effective on a mandatory instead of an advisory basis. Under the circumstances, all parties in interest should be furnished with the full facts in order to enable them to develop the arguments for their viewpoint.

The discussions by Mr. H. G. Crane and Mr. Mark Kormes were written in a critical vein with respect to various elements of the rate-making method. This is what I asked for, so I should be happy about the whole thing. With several of their points I do not agree, however, and it is therefore necessary for me to add a further word on this subject.

Both Mr. Crane and Mr. Kormes made the observation that they consider the pure premiums developed for the excess coverage to be too high because they are based on the indications of the total experience for New York State. It is their thought that, since the larger risks develop more favorable pure premium experience than the small risks in the case of full coverage, the same condition should hold true with respect to excess coverage. Furthermore, it is not practicable to perform an experience rating calculation based on the self-insurer's statutory experience to determine the extent to which the manual rate for full coverage should be modified before proceeding with the computation of the excess coverage rate. I admit that there is some merit to these two points. I believe, however, that any tendency towards redundancy in the excess pure premiums resulting therefrom is more than offset by the following items:

(1) The excess pure premiums are actually low because the excess cost for cases involving life payments was determined using tables on a 3.5% interest basis whereas an interest rate of 2.5% would be more appropriate for today's investment conditions. In support of this statement, it may be said that the New York Workmen's Compensation Law provides for determining the present value of tabular cases on the equivalent of a 2.5% interest basis for claims

with date of accident on and after July 1 1941. Such a change in the interest rate used in evaluating tabular cases would have a very substantial effect upon the amount of the excess cost as computed in this study.

(2) In this analysis, claims incurred under ex-medical coverage were not built up to what the cost would have been on a statutory medical coverage basis because such information was not available. Since the excess coverage policy provides indemnification to the self-insurer for losses, including medical, in excess of his retention, it is apparent that this failure to adjust losses incurred under ex-medical coverage to the equivalent of statutory medical coverage has tended to depress the indicated excess cost somewhat.

(3) There was a very bad catastrophe which occurred during the experience period of this study but for which the excess losses could not be included because the liability of the carrier was not decided in the courts until after the fourth report under the Unit Statistical Plan had been submitted to the Board. This was the well known "Observation" disaster, where the question as to whether the claims came under the New York Compensation Law was not adjudicated until many years after the date of the accident. The courts held that the New York Compensation Law applied and the losses incurred by the carrier which had written the policy for the contractor amounted to more than $670,000.

(4) It is my impression that most of the very costly catastrophes occur on the larger risks.

(5) With regard to costly single cases, I am inclined to believe that the excess portion over $10,000 per case would run higher for the larger risks than for the total experience of the state. The cost of such cases is in fairly close relationship to the annual wages, which probably are higher in the larger establishments.

These five points certainly outweigh those made by Messrs. Crane and Kormes and vitiate their argument that the excess pure premiums proposed are probably redundant.

Considerable space was devoted in both discussions to the question of the proper expense loading. Unfortunately, this matter is largely one of judgment, since it is virtually impossible to prove one's point. It is the same type of problem as that which faces us with regard to full coverage where a graduation of the expense loading by size of policy has been introduced effective July 1,

1941, largely on a judgment basis. The Actuarial Committee established the expense loading which, in its judgment, would produce the expense provision necessary for the writing and servicing of excess coverage policies. I don't know just how reinsurance companies determine what they consider to be the proper expense loading, but it is undoubtedly a fact that they wouldn't contemplate making detailed payroll audits such as direct writing compensation carriers normally do, for example.

Mr. Crane criticized the proposed expense loading formula in that provisions for the Department of Labor assessment and for the Security Funds tax were incorporated. Justification for the former is found in the fact that the insurance carrier becomes directly liable to the claimants in the event of the insolvency or bankruptcy of the self-insurer. Under such circumstances, it appears that the insurance carrier would likewise be liable for the Department of Labor assessment on such compensation payments. With regard to the Security Funds tax, Mr. Crane is undoubtedly familiar with the fact that the question has not been definitely settled as to whether the premiums for this form of excess coverage are exempt from the Security Funds Tax. The Insurance Department is currently reviewing this problem from the legal standpoint, but its attitude to date has been that the tax is payable on the premiums for such excess coverage as well as on the premiums for full coverage policies.

Mr. Crane gave an explanation as to why we should consider the actual loss ratio for the business of reinsurance carriers to be 36.7% instead of 91.5%, this improvement being effected by eliminating the experience attributable to a single risk. My comment is that, by using this same device, underwriters can invariably demonstrate that what has been an unfavorable class of business in the past nevertheless appears to be satisfactory as respects future underwriting policy. The argument used is that the risks which proved to be undesirable have been eliminated through cancellation or otherwise. This is not sound reasoning, however, since it ignores the fact that other risks of comparable quality may have been added.

I had previously been much disturbed by the results computed in Exhibit 11 which indicated such a wide discrepancy between the actual premiums charged for this coverage and the premiums

determined by either the present or the proposed rates for excess coverage. It did not seem reasonable that there should be such wide differences. The second last paragraph of Mr. Crane's discussion gives the explanation for which I had been groping. The answer is that no conclusions can properly be drawn from the test given in Exhibit 11 because the method of determining and applying the actual excess coverage rates is not comparable with that contemplated with respect to either the present advisory or the proposed rates. In the actual writing of this business, the carriers have disregarded the proper breakdown of payroll by classification and also, on interstate risks, average rates for the risk as a whole have been applied, although it is perfectly obvious that the rates for New York coverage should be much higher than those for other states with less liberal compensation laws. The present advisory and the proposed rates used in the test contemplate an accurate assignment of payroll exposure by classification in accordance with the rules of the Manual and are designed to measure the excess cost under the liberal New York Compensation Law. If a breakdown of the actual payroll data by classification were available, and if a proper adjustment in the actual rates to eliminate the effect of interstate coverage were made, I have no doubt but what the wide differences between the actual and either the present or the proposed premiums would be substantially reduced.

Whereas reinsurance carriers are probably not geared to obtain accurate detailed payroll audits incorporating the proper assignment of payroll by classification, this does not hold true of carriers which also write full coverage policies. In order to avoid the possibility of unfair competition, it appears to be only proper to require that excess coverage policies in New York be written on a proper classification basis. There also appears to be no good reason why the proper rate should not be determined and applied by state instead of merely applying an overall average rate.

As mentioned before, the situation with respect to this type of coverage has been very unsatisfactory, particularly in recent years, and it appears inevitable that it will be subjected to closer regulation than has been the case in the past. The schedule of proposed rates determined by the ratemaking method evolved by the Actuarial Committee of the Board can at least serve as the

starting point for discussion in the event that the Insurance Department rules that tariff rates must be established.

EX-MEDICAL COVERAGE—WORKMEN'S COMPENSATION

STEFAN PETERS

VOLUME XXVII, PAGE 112

WRITTEN DISCUSSION

MR. SEYMOUR E. SMITH:

Mr. Peters has given a thorough and comprehensive presentation of ex-medical coverage for workmen's compensation risks. The historical and descriptive matter in the paper calls for no discussion—suffice it to say that it is complete.

In the conclusions which the author draws from his investigations there are several recommendations made calling for changes in the existing procedure. The first two are: (1) that the actual permissible loss ratio underlying the rates for a particular state be used in calculating ex-medical ratios rather than the average permissible loss ratio of 60%, and (2) that the 20% retention of the medical pure premium in the ex-medical rate be reduced to a 5% retention. The first point is well taken, and the only thing that can be said in favor of the present method is that it is simpler in calculation and the resultant error is very small. As for the second suggestion, while it is perfectly true that the experience of medical payments made by carriers on ex-medical risks will not support the 20% medical pure premium retention, it is the opinion of the writer that the 5% suggested is a bit too small, and that a retention of 10% would be more desirable. This 10% recommendation is not made for covering expected medical payments to be made by carriers, but to cover the contractual liability of the carrier to supply medical aid should the assured fail to do so. In a state such as New York, which provides unlimited medical benefits as well as a free choice of hospital and physician, it is quite possible for a serious claim to incur $1,000 or $2,000 medical expenses a year over a period of 30 years or more, and there is some doubt as to an assured being in business 10 or 20 years hence. Of course this is an extreme example, but it would require very few such losses to wipe out

a 10% medical pure premium retention on ex-medical risks accumulated over several years. There is also the additional hazard due to the fact that the carrier does not have control of a claim from the medical angle. It is of interest to note however that Mr. Peters' suggestions have born fruit, and that on April 3, 1941, the Actuarial Committee of the National Council on Compensation Insurance adopted the following resolution:

> "Resolved, that effective concurrently with the next general revision of rates in each state, the ex-medical rates be determined on the basis of a retention of 10% of the medical pure premiums with appropriate variations for the state permissible loss ratio."

Thus the new formula for calculating the ex-medical rate will be:

$$\text{ex-medical rate} = \text{Standard Rate} - \frac{.90 \text{ Med. Pure Prem.}}{1.0 - \text{Acq.} - \text{Taxes}}$$

and the formula for determining the ex-medical ratio will be:

$$\text{ex-medical ratio} = \frac{.90 \text{ Permissible L.R.}}{1.0 - \text{Acq.} - \text{Taxes}} \times \frac{\text{Med. Pure Prem.}}{\text{Total Pure Prem.}}$$

The third change in the present procedure proposed by Mr. Peters is that the saving in claim expense on ex-medical risks be reflected in the ex-medical rate, and that a reduction of about 10% in the full claim provision would be a proper estimate in view of the lack of detailed experience. This proposal seems quite reasonable, although it is the writer's opinion that the saving in claim expense would follow the loss saving and be proportional to the ex-medical ratio, and that a reduction in the rate of 3% or 3½% of the ex-medical ratio would be preferable to the flat 10% reduction in the claim provision for all ex-medical risks.

As an addition to the section in Mr. Peters' paper covering the treatment of ex-medical risks under the experience rating plan it is of interest to note the method of handling these risks under the socalled Multi-Split plan. In this latter plan experience developed on an ex-medical coverage basis is treated in the same manner as for full coverage risks, with the following exceptions:

1. The primary expected losses are the product of the undiscounted expected losses and the ex-medical D ratio.

2. The undiscounted expected losses are converted to an ex-medical basis by applying to such losses the ex-medical multiplier

equal to 1.0 — (1.33 × the ex-medical ratio). This factor of 1.33 will of course be changed to $\frac{1.0 - \text{Acq.} - \text{Taxes}}{\text{Permissible Loss Ratio}}$ due to the recent action of the National Council Actuarial Committee.

3. The ex-medical excess expected losses will be the difference between the converted undiscounted expected losses and the primary expected losses.

4. The undiscounted expected losses on a statutory medical basis will be used to determine the B and W values.

Referring to Mr. Smick's paper on the Multi-Split Experience Rating Plan it is to be noted that the ex-medical D ratios are calculated as follows:

$$\text{D serious} = \frac{\text{Serious Indemnity Discounted}}{\text{Serious Indemnity}}$$

$$\text{D non-serious} = \frac{\text{Non-Serious Indemnity Discounted}}{\text{Non-Serious Indemnity}}$$

$$\text{D medical} = .20$$

Under the new procedure however the medical D ratio will be .10.

Under the Retrospective Rating Plan the recent action of the National Council Actuarial Committee will require a change in the calculation of the Loss Conversion Factor for ex-medical risks. The present factor applied to the expense portion of the Loss Conversion Factor (excluding taxes) is $\frac{.60}{.60 - \text{Ex-Medical Ratio.}}$ This will now become

$$\frac{\text{Permissible Loss Ratio}}{\text{Permissible Loss Ratio} - \text{Ex-Medical Ratio}\ \frac{1.0 - \text{Acq.} - \text{Taxes}}{.90}}$$

In the final section of his paper, Mr. Peters discusses, in regard to the Retrospective Rating Plan, the variance in the insurance charge in the basic premium between risks written on a full medical basis and risks written on the ex-medical basis. Since excess pure premium ratios have not been calculated on the basis of indemnity losses only, the author was forced to make certain maximum and minimum assumptions and then assume that the true results lie somewhere between these extremes. His investi-

gations indicate that the insurance charges for ex-medical risks are slightly deficient, but the writer agrees with Mr. Peters that the contingency margins are adequate to absorb this small amount.

MR. RUSSELL P. GODDARD:

If a layman were to stump the experts in a quiz contest, and win as a prize a set of twenty-five volumes of the *Proceedings* of the Casualty Actuarial Society, he might be interested enough to read all the papers presented by the worthy members, comparing the several methods of approach. He would find all kinds of papers, of course, but he would be most impressed by two main types which may be called, for want of better names, the literary and the scientific. The literary paper is full of classical allusions, Latin phrases, and quotations from poets and philosophers, both American and Chinese. The scientific paper, on the other hand, resembles a mathematical textbook, and in addition to its imposing collection of formulas, it literally overflows with charts, graphs and tables of closely packed statistics which have to be folded in double in order to get into the book at all.

Our layman would also notice, as he reached the back pages of each volume, that it is customary for each type of paper to be reviewed in its own vein. A literary paper gets a literary response. Shakespeare answers Milton, Childe Roland's slug-horn becomes impaled on Don Quixote's lance, and Christopher Morley is confounded by Confucius. A scientific paper, on the other hand, is discussed scientifically or not at all. Our members have shown a commendable reluctance to argue about the multiplication table.

All this is merely by way of saying that Mr. Peters has produced a very stimulating paper, definitely in the scientific tradition. After a thorough review of legal and underwriting restrictions, he outlines certain assumptions underlying ex-medical coverage and shows clearly what a consistent treatment of these assumptions would mean in the experience and retrospective rating plans as well as in manual rate-making.

The first part of the paper is, to a certain extent, an excursion into actuarial psychology, since Mr. Peters is interested, quite properly, not only in discovering the "true" formulas, but also in discerning the trend of actuarial thought on November 5, 1926.

Here the literary technique might have been used more effectively. It is not always possible to tell what an actuary is thinking about from his formulas, for

"Things are seldom what they seem
Skim-milk masquerades as cream."

This does not imply necessarily that actuarial technique is a mass of chicanery and subterfuge; it often happens, however, that a simple formula embraces more than appears on the face of it at first blush.

The old formula for ex-medical rates in its standard form was as follows:

$$\text{Ex-medical rate} = \frac{\text{Indemnity P.P.} + .20\ \text{Medical P.P.}}{.60}$$

The present formula, in use in all states except California, is

$$\text{Ex-medical rate} = \frac{\text{Indemnity P.P.} + .40\ \text{Medical P.P.}}{.60}$$

Neither of these formulas show, on their face, that any special assumptions have been made with regard to the expense loading. Mr. Peters demonstrates, however, that the second formula is equivalent to

$$\text{Ex-Med. rate} = \frac{\text{Ind. P.P.} + \text{Med. P.P.}}{.60} - \frac{.80\ \text{Med. P.P.}}{.80}$$

In other words a sizeable amount of expense, equal to 20% of the medical pure premium, is masquerading as medical in the 40% of medical pure premium retained in the rate.

Similarly, the old formula might be construed to be

$$\text{Ex-Med. rate} = \frac{\text{Ind. P.P.} + \text{Med. P.P.}}{.60} - \frac{1.067\ \text{Med. P.P.}}{.80}$$

If the ex-medical rate were expressed in this way, it would mean that the entire medical losses and a portion of medical claim expense had been deducted as well as the medical portion of acquisition and taxes. Actually, it appears that this interpretation was not used, since in the experience rating plan the expected ex-medical losses were taken as 60% of the final ex-medical rate.

Mr. Peters recommends a formula about half-way between the present formula and the old formula, since he would use .95 instead of .80 or 1.067 in the part to be deducted. The differences

may appear more clearly if an actual example is given, assuming a 60% loss ratio with medical losses equal to half the indemnity.

EX-MEDICAL RATE

	Old Formula	Present Formula	Proposed
Indemnity Losses	.400	.400	.400
Medical Losses	..	.040	.010
Claim Expense	.067	.080	.080
Administration	.075	.075	.075
Inspection & Bureau	.025	.025	.025
Payroll Audit	.020	.020	.020
Acquisition & Taxes	.146	.160	.153
	.733	.800	.763

It will be seen that the proposed formula would be very similar to the old formula except in the provision for medical losses and loss expense. The old formula, however, was found to be unsatisfactory because it did not "meet the needs" and before reverting to it, or part way to it, it would be desirable to determine as closely as possible in what respects it was deficient.

To begin with, ex-medical coverage is a form of partial coverage which has not always received the approval of state legislatures and is not always acceptable to the carriers. With any type of partial coverage there is the possibility of "selection against the carriers" which in the case of ex-medical coverage may mean that it will be selected by insureds who feel that their indemnity costs are high and their medical costs low. The fact that their medical costs may be lower than average is of no particular moment, as Mr. Peters points out. On the other hand, the possibility of high indemnity losses is something which should be guarded against. Furthermore, there is the possibility that an assured with a normal distribution of indemnity and medical losses under full coverage may find his indemnity costs rising if ex-medical coverage is adopted. If the insurance company pays both medical and indemnity losses it will not hesitate to authorize extensive medical treatment in the hope that indemnity payments may thereby be reduced. If the insured is responsible for medical treatment, however, the financial incentive to attempt to reduce indemnity payments by increasing medical is largely lost.

Under these circumstances it is not illogical to assume that a

certain amount of indemnity is masquerading as medical in the 40% of medical pure premium retained in the present ex-medical rate. Obviously the proportion of indemnity retained would vary from class to class, depending on the relationship of indemnity and medical pure premiums. The net result is that the final formula is extremely simple, but is not based on hard and fast assumptions with regard to the exact amount of safety margin which it is designed to produce. With a rough and ready formula such as this, there has been a natural reluctance to introduce variations by state to conform to varying expense provisions and permissible loss ratios.

The ex-medical manual rate, therefore, provides for full expenses and a small portion, equal to 20% of the medical pure premium, remains to cover a possible increase in indemnity losses and such medical losses as may be incurred, including those resulting from the insured's bankruptcy. In the manual rate it makes no difference whether this portion is called expected losses, safety margin, or contingency factor. In the experience rating plan, however, as Mr. Peters points out, "the expected losses must be determined in such a manner as to exclude all or almost all expected medical losses." To revert to the numerical example previously given, a risk with 100% credibility with indemnity losses equal to .400 and no medical losses would receive an experience credit of 9.1% if expected losses were taken at .440. This would mean, under the present formula, an adjusted rate of .727 which would be lower than the adjusted rate obtained under Mr. Peters' proposed formula. It would also be lower than the adjusted rate obtained under the old formula if expected losses were taken at .400 instead of .440. It becomes imperative, therefore, to decide whether the "expected medical losses" included in the manual rate should be treated as ratable or non-ratable in experience rating. This decision will be influenced by the fact that some of these expected losses have been included to cover the uncollectible losses resulting from the insured's bankruptcy. Obviously it would be almost impossible to collect such losses through the medium of experience rating.

In retrospective rating the assumption is made that there have been no medical losses incurred and that the amount collected for company expenses must be the same as would be collected for a

statutory medical risk. In retrospective rating, of course, the *fait* has all been *accompli,* so it would be possible to use one factor for indemnity losses and another factor for any medical losses which might have been incurred. The factor applicable to medical losses would have to be very small in order to be consistent with the assumptions made in calculating the regular loss conversion factor.

Mr. Peters has shown that the amount of actual medical losses incurred under ex-medical policies is very small. There exists, however, the possibility that such losses may be incurred as well as the possibility that indemnity losses may be larger under an ex-medical policy than otherwise. These losses will probably not be evenly distributed among all risks and it will consequently not be possible for the carriers on the risks to collect sufficient premium for them through the operation of the manual rate-making procedure or the experience rating plan. If this is true, some method should be devised to insure the collection of sufficient premium to cover this rather fortuitous type of loss.

Another suggestion made by Mr. Peters is that an investigation be made to determine if claim expenses are reduced because of the exclusion of medical payments. The usual assumption is that claim expenses are 8% of the premium if losses are 60%, and that this same relationship holds when the permissible loss ratio is altered. Claim expenses therefore are usually treated as approximately 13.3% of losses regardless of the fact that the proportion of large and small losses, or the proportion of indemnity and medical losses, varies between states and industry groups. In view of the fact that the total volume of ex-medical business is comparatively small, it would be difficult to make a study which would show conclusively that any variations from the normal claim expense ratio were due entirely to the elimination of medical payments.

Similar objections might be raised to the proposal that the insurance charge for ex-medical risks be different from that for other risks on the assumption that the insurance charge is affected by the proportion of medical losses. It would be difficult to justify such a departure without first making sure that other departures should not be made for differences between states and industry groups. In any event, as Mr. Peters foresees, a change

such as this in the insurance charge would probably not alter the basic premium ratio but would only affect the contingency margin.

AUTHOR'S REVIEW OF DISCUSSIONS

MR. STEFAN PETERS:

The constructive criticisms expressed in the discussions of Messrs. Seymour E. Smith and Russell P. Goddard will certainly contribute to the clarification of thought and improvement of methods dealing with ex-medical coverage in Workmen's Compensation Insurance.

The main objection raised in both discussions against the modification of the formula for the ex-medical manual rate which was proposed by the author is based on the assumption that for ex-medical risks there exists an anti-selection against the carriers with respect to compensation losses; that is, both reviewers believe that it is likely that indemnity losses of ex-medical risks may be relatively higher than those of comparable risks insured on a statutory medical basis. The theory underlying this assumption is that in those cases where the carrier insures both indemnity and medical payments it may sometimes feel induced to spend an extra amount for medical care in order to reduce the duration of compensation payments, while in those cases where medical payments are borne by employers no incentive exists for the latter to reduce the duration of the compensation payments by increasing the amounts made available for medical care.

I agree that, on its face, this argument has some probability of being true. I wanted, however, to check against the actual experience, within the limits permitted by not too extensive a study, whether this assumption is proven by facts. In order to obtain a fair comparison between ex-medical and statutory medical indemnity costs, indemnity losses incurred under the same classifications and for risks of approximately the same size must be compared. This was done in the following manner: Certain classifications which produced a substantial volume of payroll exposure under ex-medical coverage in New York in policy year 1938 were selected. The selection was further made in such a manner as to

lead to a fair proportion of ex-medical coverage for each industry group. The selected classes are shown below:

1164	3081	3634	6251	8742
1439	3082	4150	6252	8810
1605	3179	4304	6254	8833
2021	3241	4875	6872	9015
2402	3548	5057	7309	9040
2581	3612	5213	7380	9052
3002	3632	6217	8039	

For each of these classifications the indicated indemnity pure premiums for statutory medical coverage were computed and then the ex-medical payrolls were extended at these indemnity pure premiums. The resulting theoretical indemnity losses for statutory medical coverage were compared with the indemnity losses incurred under ex-medical coverage.

In order to eliminate, as far as possible, differences in the distribution by size of risk between statutory medical and ex-medical experience, only the experience of risks with annual premium size over $5,000 was taken into consideration because, below this size, practically no ex-medical coverage exists. The experience of each classification was further subdivided into two risk size groups, namely $5,000—$9,999 and $10,000 and over. The indicated indemnity pure premiums for statutory medical coverage mentioned above were determined separately for each of these size groups and then multiplied by the corresponding ex-medical payrolls, so that for each classification and each risk size group separately theoretical indemnity losses for statutory medical coverage could be compared with the corresponding indemnity losses for ex-medical coverage. Since, however, the experience for the individual classes and size groups was not of sufficient volume to be considered separately, the theoretical indemnity losses for statutory medical coverage and the indemnity losses for ex-medical coverage were totaled for both size groups and all classifications and thus the figures in line (*a*) of the following table were obtained. The figures in line (*d*) were derived by totaling the figures for both size groups and only those classifications belonging to the contracting industry group. The determination of the figures in lines (*b*), (*c*), (*e*) and (*f*) is self-explanatory.

WORKMEN'S COMPENSATION — NEW YORK

Comparison of Indemnity Losses for Statutory Medical and Ex-Medical Coverages
Policy Year 1938 — 1st Report

Item	Ex-Medical Payrolls	Ex-Medical Payrolls Extended at Indicated Stat. Med. Indemnity P. P.'s	Actual Incurred Indemnity Losses for Ex-Medical Coverage	Ratio (4) ÷ (3)
(1)	(2)	(3)	(4)	(5)
(a) All Classifications.....	$63,304,938	$586,552	$616,324	1.051
(b) Code No. 6251—Tunneling.	3,045,598	156,544	212,576	1.358
(c) All Classifications excluding Code No. 6251 — Tunneling (a) — (b)	60,259,340	430,008	403,748	.939
(d) Contracting Classifications.	6,776,263	301,562	360,815	1.196
(e) Contracting Classifications excl. Code No. 6251 — Tunneling (d) — (b)	3,730,665	145,018	148,239	1.022
(f) All Classifications excluding Contracting Classes (a) — (d)	56,528,675	284,990	255,509	.897

It is seen from this table that, while in the aggregate the indemnity losses for ex-medical risks are about 5% higher than those for statutory medical coverage risks, this result is entirely due to the inclusion of one classification—Code No. 6251 "Tunneling"—which enters into the experience with a disproportionately large amount of losses. If this class is excluded, the indemnity losses of ex-medical risks are 6% lower than those for statutory medical coverage risks. The exposure under Code No. 6251 was incurred primarily in one operation, namely the construction of the Delaware Aqueduct Project for the City of New York. The experience incurred in this project differs materially in many respects from the average compensation experience in New York State and it is therefore felt that the exclusion of this classification from the study would be justified.

The figures for the Contracting Industry Group show further that in this group the indemnity losses may actually be slightly higher for ex-medical risks than for statutory medical coverage risks whereas no such tendency can be discovered in the other industry groups.

It is not claimed that these results give a final and conclusive answer to the question whether ex-medical risks incur higher indemnity costs than statutory medical coverage risks because the volume of the experience employed in the study is not sufficient. I believe that, as far as this investigation goes, the answer would be negative, however.

The reference of Mr. Smith to the estimate of the reduction in claim adjustment expenses for ex-medical risks does not take account of the fact that in the paper it was estimated that the claim adjustment expense would be reduced by about 10% of the claim adjustment expense relating to medical losses and not of that relating to total losses. This would mean a reduction of the claim adjustment expense provision in the manual rate by about 1% times the ex-medical ratio and would be almost negligible. Besides, the proportion of 10% of the claim adjustment expense for medical losses is a very rough estimate and I agree with Mr. Goddard that it would be very difficult to obtain any reliable justification for it on the basis of actual experience.

Mr. Goddard remarks that experience modifications computed by the method in use heretofore will tend to develop larger credits for ex-medical risks than will be the case under the proposed method because the expected losses under the old system include 20% of the expected medical losses while under the proposed system a smaller proportion of expected medical losses is included. I believe that this is quite proper because, if it is thought that the ex-medical pure premium should include a certain proportion of the medical pure premium the same should be true with respect to experience rating and the actual losses should properly be compared with those expected losses which are obtained by multiplying the exposure by the ex-medical pure premium.

In his introductory remarks, Mr. Goddard makes a brilliant analysis of the two main styles—the literary and the scientific—in which papers can be written. I think that everybody who has read his discussion will agree that he is equally master of both styles, the first being ably illustrated in the introduction and the second being exemplified by his critical remarks. I should like to follow Mr. Goddard's suggestion to use the literary style where it

is indicated but I am afraid that my lack of talent in this field induces me to stay in the comparatively safe realm of scientific language.

RECENT DEVELOPMENTS IN NEW YORK COMPENSATION RATE MAKING

ROGER A. JOHNSON, JR.

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WRITTEN DISCUSSION

MR. N. M. VALERIUS:

Mr. Johnson's paper gives a brief and accurate report of the latest refinements in compensation rate making for the great industrial empire of New York. As this state expends for compensation insurance one-fourth, more or less, of the entire expenditure in the United States for such protection, inevitably it is in a position of leadership in compensation rate making.

The first development discussed in the paper, namely, keying of rate levels to the results of the most recent completed twelve months of issue or "policy month" experience seems at this time to have brought us almost to the ideal in respect to this item. Of course, it is not implied that twelve months experience would be ideal in a lesser state.

The treatment of the general occupational disease portion of the experience and of the rates seemed very fair in view of the current status of statistics and knowledge of this item, as it must be remembered that only a part of the experience is on the basis of the all-inclusive law.

With respect to the catastrophe provision until and unless further study indicates a proper departure from the present, it is better for all concerned that error therein, if any, be in favor of the carriers' surpluses.

The second and third developments mentioned by Mr. Johnson relate to the determination of loss constants and their offsetting adjustments. A proper refinement seems to have been made in introducing the "k" factor in the formulas and, on the other hand, it was demonstrated that no material error arises from the appli-

cation of loss constants by "risk's governing classification" and application of the offsets by classification.

The next and last section of Mr. Johnson's remarks, "New York Expense Loading," with a brief history thereof, is valuable for reference, and was included because the loading had been under scrutiny and continues so to be although there had been no very recent adopted change.

Temporary or variable items it has not been deemed permissible or expedient to take into the expense loading in quite a parallel place with items of long standing and this tends to confusion. The lines between what should be provided for by a law amendment factor, a special factor, or a change in expense loading are hazy. Hence exhibits have appeared on occasion in which some items of expense have had to be found in a contingency provision, if any, or been unprovided for altogether. Also, in the experience rating plan the permissible loss ratio of .605 was ostensibly retained similarly because of the temporary or variable character of the variation therefrom when .598 say was the accepted value with the result that for some time past in explaining the rating factors the situation has been something like a conversation in code in which we agree to call certain things things they are not with resultant difficulties of thought adjustment.

These remarks on the expense loading are not meant to be in criticism of present methods but merely by way of thanks to Mr. Johnson for setting out the matter clearly in a readily available place.