ACCIDENT AND HEALTH INSURANCE FROM AN ACTUARIAL VIEWPOINT.

BY

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Certain losses, the incident of which are unforeseen, do or may, sooner or later, fall to the lot of the individuals comprising any group of men. The chief function of insurance is to distribute these losses among all the members of the group so that no great strain will be borne by any individual. Of late insurance has further increased its usefulness in an attempt to reduce the losses sustained by the group, as evidenced by the accident prevention work of the casualty companies, the life extension work of the life companies and the fire prevention work of the fire companies. Yet the chief function of insurance still lies in the proper distribution of the losses among the various members of a group as they occur.

There are two fundamental principles to be observed in the distribution of these losses. It is quite necessary

First, that in each case an actual financial loss be sustained.

Second, that the losses incurred be distributed among homogeneous groups.

Insurance, then, is *completely* fulfilling the obligations of its existence when it compensates *for each and every loss sustained,* provided only a financial loss has been incurred and, further, those losses have been distributed among homogeneous groups.

In life insurance the death of an individual constitutes the loss for which compensation is paid, and the rate at which these losses occur is known as the "rate of mortality." Upon the discovery that this "rate of mortality" followed certain well-defined laws and hence for all practical purposes could be measured in advance, rests the development of actuarial science. Previous to this discovery the losses incurred were distributed yearly among the various members of the groups insured, but after the development of actuarial science it was possible to determine the *present* value of the *future* death claims that would occur in a given group and hence to distribute these losses in advance. So that today, while

life insurance represents a distribution of losses, it represents a present distribution of future losses through the accumulation of a sinking fund. It is possible, therefore, to provide for these losses by a definitely known uniform rate and thus make the burden on the individual as light as possible.

Through the advent, then, of actuarial science, life insurance is provided to the public today in the best possible manner with the least disturbance to the normal run of everyday affairs. This change in distribution of losses, however—i. e., the change of distributing future losses at the present time instead of distributing present losses at the present time—makes one more simple rule necessary, namely—it is necessary to be sure that "the insurance carried be commensurable with the loss likely to be incurred." Whatever the form of insurance carried, then, all losses, provided they fall within these simple rules, should be compensated for and in such compensation we have the fundamental basis of insurance.

The benefits to life insurance from conducting the business along actuarial lines are many:

First, Indemnity is furnished for all losses incurred in the group. This is possible because the tables upon which the distribution of losses is based are compiled by taking into consideration all losses incurred in the group. In this manner life insurance is completely fulfilling the obligation of its existence.

Second, It is possible to spread the fluctuation in losses over a period of years and thus make a level charge and reduce the burden of caring for these losses to a minimum.

Third, The benefits paid are standardized and hence are not subject to fluctuation through competition. I do not mean by this that life insurance is not subject to competition. Of course it is. But it is not subject to competition through increase in benefits offered, but rather through competition in business efficiency and underwriting ability.

Fourth, Elimination of public dissatisfaction because if insurance is once procured, then, subject to certain conditions to be fulfilled by the insured, the indemnity is paid when the loss occurs.

Such are some of the benefits derived from applying actuarial science to life insurance. Is it not, then, a feasible inquiry to ascertain if this science is not applicable to other forms of insurance? The purpose of this paper is to inquire whether or not

actuarial science can be applied to accident and health insurance and if so, if we cannot expect the above-named benefits to result therefrom.

At the present time, while accident and health insurance is a current distribution of current losses, yet the charge is figured one year in advance. Rather the premium charged is fixed or determined upon in advance and such policies written, and as much coverage granted, as the underwriter in his opinion deems the company can grant and still have a profitable proposition. The statistics of the home office are so kept as to enable the underwriter to determine what cases he can take and what cases he must leave alone.

Such a viewpoint is quite contrary to what constitutes the true function of insurance as measured by the three rules previously enumerated—namely:

First, Has an actual financial loss been sustained?

Second, Have the losses incurred been distributed among homogeneous groups?

Third, Is the insurance carried commensurable with the loss likely to be incurred?

Measured from these standpoints, accident and health insurance should furnish indemnity for all actual financial losses incurred through reason of accident or sickness, provided only the protection is procured in advance and there is nothing about the individual risk to make it unduly hazardous. But how far short the present viewpoint falls below this ideal standard can be shown by a little review of the business.

Under the present conditions accident and health insurance performs many functions, most of which are of public benefit.

First, It insures against loss of life from accidental means.

Second, It insures against loss of sight or limb from accidental means.

Third, It insures against loss of time through disability on account of accident or sickness.

Fourth, It provides many special benefits which are limited only by the fertile imagination of the underwriter.

The benefits granted under classifications Nos. 2 and 3 are not covered by any other form of insurance and in furnishing these benefits and thus recompensing society for actual financial loss in-

curred, accident and health insurance is today fulfilling in a manner the chief obligation of its existence.

There is considerable dissatisfaction, however, at the present time in the manner in which this function is performed. It has been easy for competition to drive companies to add one feature after another to their policies, particularly since they had no real knowledge as to the cost of their various features, until a point has been reached requiring a very free use of the cancellation privilege and limitation of liability privilege granted in the contracts. The result of this has been to restrict the legitimate field of accident and health insurance to offering special privileges to the so-to-speak super-standard cases, and in doing this accident and health insurance is failing to fulfill its legitimate field in insurance.

Previous attempts to adjust these troubles have failed chiefly because the companies have not recognized the fact that accident and health insurance must ultimately indemnify for all legitimate losses and that to do this, they must have a recognized standard table to measure these losses by. The statistical committee of the Association of Accident and Health Underwriters is working at the present time, preparing tables showing the cost of the special features in the contracts. This is a good thing, but in the writer's opinion does not go far enough. If they succeed in eliminating these special features, they will be no further advanced as far as fulfilling the true function of accident and health insurance is concerned than they were before competition made the companies add these special features to their policies. What the business really needs is a table by which the losses can be accurately measured and the future operations of the companies based thereon.

The theoretically true function of accident and health insurance today, as it seems to me, is to distribute at an annual level premium, or its equivalent, the future losses, which will occur during the working period of a man's life, arising from loss of sight or limb or hearing, and loss of time through disability resulting from accident or disease. This can be done only through the application of actuarial science to accident and health insurance and the question involved then is: "Is it possible to apply actuarial science to the problem at hand?"

Our ability to apply actuarial science to this problem depends solely upon our ability to deduct adequate tables from material possessed. We need tables giving:

Rate of disability from accidental causes,
Rate of disability from disease,
Rate of loss of sight,
Rate of loss of hearing,
Rate of loss of limb.

For convenience we will consider only the "Rate of Disability from Disease." By this we mean the number of days' sickness from disease to each year of exposure, it being necessary only that the disease be incurred during the year of exposure. The principles involved in discussing the formation of this table would be applicable to the formation of all the tables above indicated.

One would find two difficulties in trying to formulate such a table at the present time:

1. Most of the statistics kept by the companies in the past have been on the basis of premiums received and losses paid. This measure shows only whether the companies are conducting their business at a profit or not and in no way gives an accurate measure of the probable rate at which the losses will be incurred. It is not impossible, however, to obtain an adequate measure—i. e., the ratio of the days of sickness to years of exposure from the statistics in possession of the various companies.

2. All companies have made a free use of the cancellation clause, which fact probably has affected the statistics more than any one thing.

The results obtained, then, would be rate of disability from disease in cases subject to cancellation at option of the company.

With these exceptions, then, it would be quite possible to formulate adequate tables from the data at hand and with the companies conducting their business on such a table for some time, with the view of ultimately eliminating the cancellation privilege, it seems to the writer that it will be possibe to bring the accident and health business in the end to the point where it will perform its full legitimate functions. For

First, subject only to the cancellation clause, there would be available a true measure of the future losses and the companies can begin to distribute future losses, as in life insurance, among present policyholders at a nominal level premium through sinking funds or reserves.

Second, with the policyholder acquiring an increasing interest

in his policy each year, through the accumulation of the sinking fund, there will be every reason for him to continue his contract in force from year to year, resulting in less lapsing and twisting of the business.

Third, with the contract a continuing one rather than a renewable term policy, it would be quite possible to reduce the acquisition expense and thus reduce the total expense to the insured.

Fourth, with a definite measure for the cost of each provision granted in the policies, all competition extending the coverage of policy contracts would be eliminated and a healthy competition based, as in life insurance, upon economy of management, underwriting ability and financial ability established.

In fact if the business was conducted along actuarial lines, based upon tables as above described, it would be quite possible to eliminate most of the present objections to the business and the manner in which it is fulfilling its obligations, with the possible exception of the cancellation clause, and furthermore it would furnish the only feasible basis for the ultimate elimination of this clause.

Since so many benefits are to be derived from treating accident and health insurance from an actuarial viewpoint, the question arises: "Why has it not been tried before?" I have not been able to answer this question to my own satisfaction.

We find from the early history of accident and health insurance that it was started without any knowledge of the proper rates necessary for the safe conduct of the business, and hence the underwriters had to feel their way along, giving a little more coverage for a definite premium as experience and competition dictated. This naturally led to the habit of viewing the business from the standpoint of measuring the dollars paid out against the premiums received, and as competition has become more and more keen, this experience as above indicated has been analyzed from the standpoint of policy forms, agencies and territory, and the results of a free use of the cancellation clause investigated. As one would naturally expect, each one of these elements has been shown to have its effect upon the total experience, and, therefore, underwriters have assumed that it would be impossible to construct a table from data subject to such a wide variation.

Few people acquainted with actuarial science, which requires a peculiar training itself, have worked compiling accident and health statistics.

And finally the effect of the variation in the experience has been given its greatest possible prominence in considering the accident and health contract as a one-year term contract. To illustrate the results of this, take an increase of 50 per cent. mortality in life insurance. Such an increase in mortality would increase the net premium at age twenty of a one-year term policy about 50 per cent., of an ordinary life policy about 30 per cent., and of a twenty-payment life policy about 25 per cent. In other words, the maximum effect in life insurance of such an increase in mortality is shown in the one year term contract and underwriters have always looked at the variation in disability in accident and health insurance from the standpoint of its effect upon a one-year term contract. If life insurance was written only on the one-year term plan and the underwriters realized that among apparently insurable risks occupation could cause a variation in mortality of 126 per cent., habitat of 78 per cent., physique of 180 per cent., personal history of 105 per cent. and family history of 194 per cent., one would not be surprised if that drew the conclusion that among such a heterogeneous conglomeration it would be impossible to deduce a mortality table which would in any way measure the future losses in life insurance. Yet such tables have been in use and have adequately performed their duties for many a year.

I am unable to find out from available data if the variations in accident and health experience, on account of cancellation clause, agents, territory and policy forms, are really as important as the many variations caused by similar reasons in life insurance. The variations in premiums charged by various companies for different classifications in accident insurance do not show an unmanageable variation. To illustrate:

Rate	Premium	Per Cent. Increase
Select and preferred	$ 5.00	.00
Extra preferred	6.00	.20
Ordinary	8.50	.70
Medium	11.00	1.20

Probably the greatest proportion of business has been written under the first three classifications showing a variation of less than 75 per cent. Again it has been a rule-of-thumb principle of various companies that of health premiums 50 per cent. was required for loading and 50 per cent. for net premium to cover losses; in

accident insurance 50 per cent. for loading and 30 per cent. to 35 per cent. for weekly indemnity losses and 15 per cent. to 20 per cent. for death and dismemberment losses.

Considering this and looking at the figures of premiums received and losses paid, reported to the state of Connecticut during the last five years, we find as follows:

ACCIDENT EXPERIENCE.

Year	Premiums	Claims	Per cent.
1910	$14,948,650	$5,891,231	39.4
1911	15,530,935	6,622,466	42.6
1912	16,776,190	7,567,837	45.1
1913	17,260,084	8,204,198	47.5
1914	17,006,774	7,552,955	44.4
	81,522,633	35,838,687	44.0

HEALTH EXPERIENCE.

1910	3,963,198	1,626,203	41.0
1911	4,301,489	1,855,321	43.1
1912	4,645,067	2,011,460	43.3
1913	5,212,274	2,289,862	43.9
1914	5,374,230	2,426,248	45.1
	23,496,258	10,209,094	43.4

During five years, then, taking the underwriting methods of all companies reporting to the state of Connecticut, with all their various policy forms, habitat of insured, methods of treating cancellation clause, etc., there were produced results where the greatest variance in accident experience was 4.6 per cent. from the average and in health insurance 2.4 per cent. from the average. Even though these figures are based on premiums received and claims paid, where the possibility of fluctuation is the greatest, yet the small variation in percentage of claims is remarkable and clearly indicates to the writer's mind the feasibility of basing the operations of accident and health insurance upon accurately constructed tables and according to actuarial methods.

I know that this opinion will probably be challenged by the majority of the people in the accident and health business as theoretical and impractical. They all must admit, however, that the business today is suffering from a ruinous competition through the extension of coverage in the policy contracts; that there is public

dissatisfaction with the free use of the cancellation clause caused thereby and that there is a great demand for its elimination; and that there is bound to be a reaction against the use of the one-year term contract, where lapsing, twisting and large acquisition expense makes it possible for the company to return to the policyholder only 50 per cent. of the premiums paid in by him. They must not only recognize these facts but they must recognize a growing tendency on the part of legislatures to try to cure these evils through standard provisions, and unless something be done there is a great possibility that this agitation will develop standard benefits or even standard contracts.

If any way is possible—and I believe it is through the method outlined above—for the companies to effect a cure themselves, where the benefits will automatically be standardized, where it will be possible through the elimination of the one-year term contract to reduce the acquisition expense, and offer better inducements for the prevention of lapsing and twisting, and where the companies will have a safe foundation to establish a method which will ultimately eliminate the cancellation privilege granted to them at the present time, then I feel that such steps should be taken by the companies to bring these changes about before they bring upon themselves the restriction of legislative enactments.

ORAL DISCUSSION

MR. LAIRD: I agree with Mr. King in his statement that the logical form of accident and health insurance is a non-cancellable policy granting protection against disability during the working period of life. It seems to me, however, that a standard disability table based on the experience of American companies under the usual cancellable contract would be of little use in determining the premiums for benefits under a policy with no cancellation clause. A better guide would be found in some European experience, such as that of the Manchester Unity.

One company in Connecticut is already issuing a non-cancellable disability policy in connection with life insurance and a deferred life annuity. Unfortunately, however, when we calculate premiums on what are considered the most suitable tables now available, and make allowance for the different conditions under which the business will probably be conducted, we obtain rates which do not look particularly attractive to the man who does not recognize the value of the non-cancellable feature. With a few exceptions, the only prospects who appreciate the value of a non-cancellable policy are those who have had their accident or health insurance cancelled,

and as these persons are presumably impaired risks, they are not acceptable under the non-cancellable policy at the premiums charged for select risks.

According to the experience of the Manchester Unity, 1893 to 1897, with 3½ per cent. interest, the terminal reserves under a policy granting indemnity of $10 a month (payable during disability but terminating at a stipulated age—60, 65 or 70) are as follows:

1. PREMIUMS AND BENEFITS CEASING AT AGE 60.

End of Year	Age 20	Age 30	Age 40
5	$ 6.45	$ 8.89	$ 9.79
10	13.64	17.29	16.96
15	21.10	23.91	16.67
20	27.83	27.31	0
25	32.51	22.47	
30	33.61	0	
35	26.00		
40	0		

2. PREMIUMS AND BENEFITS CEASING AT AGE 65.

5	$ 8.88	$12.61	$15.87
10	18.99	25.48	30.46
15	29.95	37.84	39.81
20	40.95	48.37	36.25
25	51.18	52.99	0
30	59.24	43.72	
35	60.99	0	
40	48.25		
45	0		

3. PREMIUMS AND BENEFITS CEASING AT AGE 70.

5	$11.15	$16.28	$21.89
10	24.09	33.86	44.51
15	38.56	51.97	64.79
20	54.11	70.28	77.39
25	69.95	85.77	68.38
30	85.70	92.89	0
35	98.32	77.32	
40	102.17	0	
45	82.67		
50	0		

MR. MOWBRAY: This paper is interesting and important because it approaches the topic of personal health and accident insurance from a new point of view. Heretofore we have been accustomed to look upon this branch of insurance, more than most others, from the standpoint of private enterprise. Mr. King invites us to consider its problems from the social-service point of view. In the light of the trend of public opinion, traceable through the Arm-

strong legislation, the fire insurance rate regulation movement, and more lately the compensation movement, toward this point of view when insurance in any of its branches is under consideration the paper is most timely. The future of the health and accident business as conducted by private companies seems to depend, in the final analysis, on the reconciliation of these two points of view. I do not believe they are entirely irreconcilable, and Mr. King points out what seems to be a way of approach.

Mr. King points to an increasing equity in the non-cancellable policy, as a safeguard against twisting. How far this will be so is not apparent on the face of things. It is well known to those who have studied the life insurance side of our profession, that the size of reserves depends on rate of *increase* in mortality, rather than merely the rate of mortality. Does the rate of morbidity increase with sufficient rapidity to produce substantial reserves?

While we cannot wholly ignore the apparent showing of the successive investigations into the experience of the Manchester Unity, that the extent of morbidity as a whole is increasing, there may be factors present affecting that experience which would not be present in personal accident and health insurance of the professional and middle classes. These factors are a growing tendency to make claims on the part of the insured and the stress and pressure of modern industrial life.

It may be that the failure to find an increasing rate of morbidity with age in the studies of American experience heretofore made, is due to the exercise of the cancellation clause or its equivalent the refusal to renew. If this is so it casts doubt upon the value of experience based upon one year term policies as the basis of rates and reserves for non-cancellable contracts. But Mr. King's proposals at least call for careful consideration from those in charge of this branch of the business.

MR. JAMES D. CRAIG: I agree with Mr. Mowbray in his statement that health policies issued for the working period of a man's life, assuming this to be up to age 60 or 65, would not produce such large reserves as are carried by life insurance policies under whole life contracts, unless some provision were included for an old age annuity commencing at the expiration of the health insurance.

I think the principal reason why actuaries have limited health policies to the one-year-term plan and included the cancellation clause is that they were afraid of an increasing rate of morbidity. While it is perfectly true, as Mr. King says, that no health tables have been prepared in this country, nevertheless standard tables have been prepared from the experience in England and each table has shown a higher rate of sickness than the previous tables, with the latest the Manchester Unity 1893–1897 showing the highest of all. The increases may have been due to the general increase in the sickness of the country at large or it might have been due to a larger proportion of lives insured in more hazardous occupations or

in less healthy conditions. The last Manchester Unity Table was the only one that attempted to go into the question of occupation by preparing four different rates to cover different industries. The increase may also be partly due to the insured's increased desire for participation in benefits, reflecting itself in recent years in application for sick pay on account of accidents or sickness, whereas in earlier times such incapacity would not have prompted any demand.

Whatever the cause, it is very probable that actuaries now realize more than ever before that the business of health insurance is more of a managerial proposition than an actuarial calculation and that when policies are issued on the one-year term plan with the cancellation clause, the power rests with the companies to change the basis of calculation whenever different conditions make a change desirable and prevent companies from being bound for long periods by contracts which become unprofitable when hazard increases beyond that upon which the premiums were predicated.

If long term contracts were to be issued without the cancellation clause, the actuary would not feel secure in his quotation unless he either provided an ample loading or else based his premiums upon select tables which in themselves provide for an increasing rate of sickness.

MR. FLYNN: Discussing the question as to whether the rate of sickness is decreasing or increasing from year to year, I would say that a study of the experience for the past ten years of The Travelers Insurance Company upon its personal health business shows no increase and, in fact, a very slight decrease. Examining the experience by three groups of ages, the younger ages (under 30 years of age), the middle ages (ages 30 to 50 inclusive) and the old ages (age 51 and over), we find no marked divergence from the slight decrease in the rate shown for all ages combined. This experience is based upon one year renewable term contracts which cover all diseases and which contain the privilege of cancellation or declination of renewal by the company. It is impossible for us to say to what extent the exercise of the last two privileges of the company has operated to modify the rate of sickness. Then again, the rate may have been affected largely by improvement in selection of business; that is, by selection from the more healthful localities, the more healthful age groups, and so on. The only conclusion which can be drawn is that, while the experience of American insurance companies writing health insurance upon the usual one-year renewable term plan may be of great value to the companies as a guide in the selection of business, it cannot throw much light upon the general question of the increase or decrease from year to year in the rate of sickness of the whole population—or of the preferred classes of the whole population.