

**DIGEST OF INFORMAL DISCUSSION**

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**ANNUITANT MORTALITY TRENDS**

- A. Is there a tendency for insurance companies to become more typically annuity companies in view of the large amount of income-paying business now on the books, the large proportion of claims which are going under settlement options, and the probable future development of pensions in the United States?
  - 1. What problems would confront actuaries in the determination of premiums and reserves as a consequence of this trend?
- B. What is the probable course of annuitant mortality?
  - 1. Will advances in science continue to increase longevity among the increasing number of persons surviving to the older ages?
  - 2. What effect will the survival of weaker lives to the older ages have on the average vitality of the aged?
  - 3. Is there any recent evidence in Canadian or United States population or other studies which throws light on the questions asked in (1) and (2)?
- C. What characteristics of the various group pension methods tend to solve the problem of improved mortality among annuitants?

MR. A. N. GUERTIN reported that the aggregate underwriting losses for individual annuities, including supplementary contracts involving life contingencies, amounted to more than \$400 million for the nine year period ending in 1947. The accuracy of this figure is dependent on the adequacy of the amounts set aside to strengthen reserves, such amounts having been included in the figures stated. Because of the change in reporting methods, comparable figures are not available for later years, but there is no doubt that experience has not been much more favorable.

The realistic annuity rates which have been in effect in recent years will help improve the picture in the future, but an increasing volume (currently 10% of policy proceeds) of supplementary contracts involving life contingencies arising from old policies will keep the problem with us for a long time. In addition, there is a substantial volume of group annuities, but the usual provision for adjustment of rates from time to time will no doubt help control losses in this area.

Some companies, particularly those heavily in the group annuity business, tend to become annuity companies. For all companies combined, annuity reserves amounted to 12.7% of total reserves in 1947, and this figure rose steadily to 18.1% in 1951. In a few companies the percentage is sub-

stantially higher. These figures do not include reserves on insurance policies which were taken out primarily to provide retirement incomes.

With annuity premiums constituting 1/7 of total premiums, the annuity business can no longer be regarded as a small incidental business carried on for the convenience of policyholders. Annuity business has come of age and is such a substantial portion of the total that this branch of the business is now an important factor in the solvency of the whole company. Management must now use conservative interest rates and make a serious attempt to forecast mortality trends in establishing annuity rates.

MR. J. W. RITCHIE quoted figures from the experience of the Sun Life of Canada indicating the increasing importance of annuities and settlement options relative to insurance business. From 1921 to 1951 annuities and settlement options as a percentage of the total increased from 5% to 25% with respect to business in force (taking a life income of \$100 annually as the equivalent of \$1,350 of insurance), from 15% to 34% with respect to reserves and from 7% to 35% with respect to income.

The increase in annuity and settlement option business has focused attention on at least some of the inherent problems and has brought with it reiteration of the axiom that each section of a company's business should be self-supporting. The development of the projection theory of annuitant mortality and the comprehensive discussions thereon have not provided solutions to all of the problems connected with annuity and settlement options business. Problems still requiring a great deal of thought and study include:

1. Mortality rates actually experienced are going to differ from projected rates and changes will be required in the starting point for annuitant mortality and projections thereof thus necessitating fairly frequent revision of rates and possibly reserve bases.

2. Should a company issue only participating business or only nonparticipating business or a combination thereof?

3. Because of the traditionally small margins in annuity and settlement option business, should the inflationary trend with respect to expenses be given more weight than for insurance business?

4. Is it convenient or desirable to use the interest rate to provide all or part of the margins needed in the other elements entering into rates and reserve calculations? In connection with the interest rate the form taken by permanent legislation on the Federal income tax may be very important.

5. Since purchasers of annuities are very conscious of the return they receive on their money, the life companies may, by the inclusion of the de-

sired margins, price themselves out of the annuity field with the void being filled by Government.

6. How are we to insure that annuity and settlement option business makes appropriate annual contributions to surplus and contingency reserves? Should relatively smaller contingency reserves and surplus funds be maintained for annuities and settlement options than for insurance business?

7. How detailed should fund accounting be made for annuity business?

8. How much is a company going to allow itself to be influenced by intercompany competition?

MR. W. G. BOWERMAN reviewed the 30 largest North American companies as of the end of 1950 and found that one had annuity reserves that were 30% larger than its insurance reserves. Two other companies had annuity reserves of about the same magnitude as insurance reserves, and two-thirds of them had annuity reserves at least one-third as large as insurance reserves. In these figures supplementary contracts are included with annuities.

Because large scale issuance of life annuities in America dates from 1931, it can be definitely stated that there is a tendency for insurance companies to become more typically annuity companies. The chief annuity problems arise from improving mortality, and insurance companies are actually contributing to their own problem by the good work they are doing through their contributions to the Life Insurance Medical Research Fund.

MR. E. F. ESTES observed that although a company may regard life insurance as its primary business, nevertheless it will build up a fair volume of annuities through settlements. This is encouraged by modern sales techniques, which strongly emphasize income settlements. The use of most stringent annuity tables in future policy issues might be a discouraging factor.

While annuities, under which income payments are now being made, offer a valuation problem, it becomes aggravated in connection with annual premium retirement income policies currently in force, because many of them have maturity values which now appear to be inadequate. It is possible to estimate on an amortized basis the portion of surplus which may ultimately have to be allocated toward a revaluation of these policies as annuity benefits become payable; and this estimate should be made periodically.

He observed the contribution of improved medical and surgical practices in increasing the longevity of the older people. He indicated that it

might be well to look at some of the individual cases where medical science has met with outstanding success in prolonging the lives of individuals of advanced ages. These cases may serve as indicators of what can be expected in the future. He believes that the mortality improvement factors developed by Jenkins and Lew are none too conservative.

MR. W. M. ANDERSON feels that companies have not been giving annuity business enough emphasis in their annual reports. This branch of the business is becoming more important and should be given more publicity. If the public was more aware of the extent to which the life insurance industry is engaged in annuity business, there would be less demand for the Government getting into this field. He suggested that annuities might be translated into a figure which would be comparable with the amounts of insurance and be included in published statements of the amount of business in force. This has been done in recent years by a number of Canadian companies.

MR. MORTIMER SPIEGELMAN believed that an examination of the trend of general population mortality for people over age 65 would

TABLE 1

DEATH RATES PER 1,000 FOR WHITE MALES AND WHITE FEMALES AT AGES 65-74 AND 75-84 YEARS; GENERAL POPULATION OF THE UNITED STATES AND INDUSTRIAL POLICYHOLDERS OF THE METROPOLITAN LIFE INSURANCE COMPANY FROM 1900 TO 1949

YEAR	WHITE MALES			WHITE FEMALES		
	Ages 65-74		75-84	Ages 65-74		75-84
	M.L.I. Co.	General Population	General Population	M.L.I. Co.	General Population	General Population
1900 . . . . .	n.a.*	59.1	128.2	n.a.	53.4	118.9
1910 . . . . .	85.3†	58.6	127.6	71.2†	52.2	117.8
1920 . . . . .	68.6	54.2	122.5	61.0	49.9	116.4
1930 . . . . .	66.9	55.1	119.2	53.9	46.0	107.6
1940 . . . . .	62.9	54.0	122.2	49.7	41.5	105.6
1945 . . . . .	56.9	51.3	110.7	40.8	37.2	93.6
1949 . . . . .	52.5	51.0	107.9	36.6	34.7	86.0

\*"n.a." = not available.

† Figure relates to 1911.

contribute toward an understanding of the course of annuitant mortality. This trend is shown in Table 1, which also includes for comparison the industrial experience of the Metropolitan Life Insurance Company. The

convergence of general population and industrial mortality rates indicates that the rate of mortality improvement is greater for the urban wage-earning element of the population than for the general population. However, mortality rates for the industrial segment of our population are still high and there is room for considerable improvement. This is pointed up by a comparison of population mortality rates in five industrial states of

TABLE 2  
DEATH RATES PER 1,000 AT THE HIGHER AGES BY SEX  
IN SELECTED COUNTRIES FOR SPECIFIED PERIODS

	PERIOD	MALES				FEMALES			
		65-69	70-74	75-79	80-84	65-69	70-74	75-79	80-84
United States White.....	1949	43.0	62.6	92.9	138.7	27.5	44.4	70.1	117.8
Canada.....	1949	37.0	56.4	80.8	126.0	26.2	45.0	70.9	110.2
England and Wales.....	1949	43.0	66.7	103.3	159.7	26.5	46.9	79.0	127.8
Australia.....	1947	41.6	61.4	97.2	140.6	26.2	43.1	73.0	122.8
New Zealand...	1948	36.7	56.3	n.a.*	n.a.	25.2	40.3	n.a.	n.a.
South Africa...	1948	43.2	62.0	91.5	134.6	27.4	44.8	68.7	116.8
Scotland.....	1950	44.3	72.3	101.9	158.5	32.1	55.9	87.4	133.4
Ireland.....	1946	42.5	65.7	n.a.	n.a.	34.3	56.2	n.a.	n.a.
Northern Ire- land.....	1950	37.4	68.7	124.9	204.6	28.8	60.2	96.1	186.0
Sweden.....	1948	30.8	48.7	81.1	136.3	25.9	44.5	74.4	129.5
Norway.....	1949	24.8	43.2	72.7	123.2	20.8	37.5	65.0	115.2
Denmark.....	1949	31.0	50.0	80.1	n.a.	25.8	45.4	76.4	n.a.
Netherlands...	1950	28.5	47.2	79.0	134.5	25.0	43.4	76.2	125.5
Switzerland....	1949	39.4	65.3	104.8	n.a.	29.2	49.7	86.8	n.a.
France.....	1950	38.9	61.3	96.9	157.3	24.2	40.9	70.4	116.5
Belgium.....	1950	40.6	61.1	98.8	157.4	28.0	47.9	80.5	134.0
Finland.....	1949	48.2	69.4	106.8	133.5	34.1	58.6	94.4	151.5
Portugal.....	1949	43.7	74.4	122.9	204.2	28.3	52.0	86.7	182.9

\*"n.a." = not available.

Source: "Vital Statistics—Special Reports," vol. 36, No. 14, and the Demographic Yearbook, 1951, United Nations.

the northeast with those of five essentially rural states of the midwest. For ages 65 to 74 mortality rates in the industrial states averaged almost 30% above those in the rural states, and for ages 75 to 84 the excess was 8% for males and 14% for females.

Further indication of the room for improvement in mortality at the higher ages in this country is contained in Table 2, which compares U.S. population mortality with that of other countries. Further reasons for ex-

pecting general reductions in mortality in the U.S. are the concern that is being taken for the health of individuals, the high economic level which makes it possible to improve the level of medical care, the considerable contributions which are being made toward medical research, and the emphasis on public health education.

MR. W. A. JENKINS discussed the commonly heard theory that improving medical care at the younger ages will enable more and more weaker lives to survive to older ages, thereby increasing death rates at these older ages. He believed that the survival of weaker lives would contribute toward an increase in the death rates at the higher ages, but that this is only part of the picture. Improving medical care also improves the vitality of the vast majority of the younger people who would have survived to the older ages without such care. Whether or not this will outweigh the effect of the survival of weaker lives can be determined only from mortality statistics. He referred to Arthur Pedoe's excellent paper, "The Survival of the Unfit and Its Influence on Mortality," which destroyed the theory that a decrease in mortality at the younger ages results in a corresponding increase at the older ages.

MR. L. E. COWARD submitted a study of the improvement of Canadian population mortality between 1941 and 1950. This indicated an improvement of 35% for men and 45% for women under age 35, and an improvement of 7% for men and 20% for women around age 50. For ages 60 to 70 there was no improvement for men and a 15% improvement for women.

We hope we have now made considerable advances in the art of anticipating pension costs, but the real problem is that of controlling costs. He believed that the solution may lie in flexible retirement ages. He suggested that if the health of the people improved to such an extent that they can live another five years, then perhaps they should be able to work another five years. Thus retirement costs might be controlled by adjusting the retirement age so that the life expectancy at retirement would remain roughly constant. In his view, it is wasteful, illogical and expensive to retire any man who is able and willing to work.

MR. B. F. BLAIR expressed the opinion that progress in medical science would result in increased longevity among the persons surviving to the advanced ages. Four-fifths of all deaths at ages which are important when considering annuitant mortality result from cancer and cardiovascular-renal diseases. Medical science is making steady advance in its attack upon cancer. Although the chances of any spectacular advance seem more remote in the cardiovascular-renal field, we cannot overlook the fact

that life insurance companies are spending some 3/4 of a million dollars a year in research in this field, and anything that is done to improve the mortality of the insured lives will also improve the mortality of annuitants.

Mortality rates at the older ages are higher in the United States than in many other countries. One explanation advanced for this fact is the prevalence of overweights in this country. Much is being done to educate people against dietary excesses and we may hope this will bring some improvement. He considered the possible effects of the survival of the weaker on mortality rates at the higher ages, and agreed generally with Mr. Jenkins' conclusion.

MR. R. A. HOHAUS pointed out that the United States Social Security plan does not freeze the retirement age at 65 but that the average retirement age thereunder has been about 69. For those who retire at age 65 the mortality rates are high for a few years and then level off. This does not support the common statement that retirement causes death but merely illustrates the fact that poor health causes retirement. He expressed the belief that we still have a great improvement in mortality coming after age 45 and that we may expect that in the future our own people over age 65 will live as long as they do in other countries with presently better longevity records.

DR. H. B. BROWN reviewed the factors which would affect the health conditions of those who buy annuities. Little seems to be accomplished in reducing the accident toll. Living conditions will continue to improve, but annuitants being a favored group will probably be less affected than the general population. While the scope of chemotherapy and antibiotics is increasing, we have already felt the greatest impact of the miracle drugs.

Future developments in the knowledge of cancer and cardiovascular disease are of greater importance. It can be expected that these factors will allow a slight betterment of annuitant mortality, but some basic discovery as to the nature of cancer or the cause of atherosclerosis would greatly change annuitant mortality. An offset to improvements in the treatment of cardiovascular disease is its increasing incidence, particularly among males in the industrial areas. The combination of over-eating and tension, which seem to be related, constitutes a problem among business men. Although we may influence a man to reduce, it will be harder to keep him relaxed.

One may speculate that the survival of increased numbers of impaired lives may decrease annuitant longevity. However, it must be borne in

mind that these people can refuse to take an annuity settlement. In addition, many who would have previously survived crippled through older methods of treatment are now cured without any weakening of vitality.

One cannot think of the amount of time and effort being expended in research on cancer and cardiovascular disease without speculating on the results. The earliest successes may be increases in knowledge of the basic causes of cancer or atherosclerosis. This might allow effective prophylaxis permitting a gradual mortality betterment as those afflicted are reduced in numbers. This Dr. Brown expects. The next possibility is that this knowledge will sponsor new methods of dealing with cancer cells to save most of those afflicted. This may come in time. Most effective, as to immediate mortality, would be the discovery of a method to cure atherosclerosis; to renew the damaged vascular system. This is the least probable achievement, but the present century seems to laugh at long-term discounts. Such a discovery would require the transfer of insurance mortality savings to the annuity account.

MR. ARTHUR PEDOE stated that the insurance industry could not possibly take over the pension liability of a nation on the severe competitive basis which is now current. A new method is needed to handle the vast annuity business in a way that will not hazard the future of the insurance companies. Future annuity mortality cannot be forecast. It is known that mortality will go down but it is necessary to know how much and when. He had studied the subject of mortality trends extensively but would hesitate to give an opinion on the possible extent of mortality trends in the future.

He pointed out that the Prudential of England was issuing group annuities with a reversionary bonus of a yearly addition to the annuity, the current yearly addition being  $1\frac{1}{4}\%$ . He felt that this was a good idea as it was necessary to charge adequate premiums and hold sufficient reserves. If the annuity forecast table does not provide for sufficient improvement, then the bonus would be decreased and vice versa. This idea of charging more than sufficient and returning the excess as a dividend had developed great insurance companies in the past and with it, it should be possible to build up great annuity companies in the future.

MR. LOUIS LEVINSON cited the Deposit Administration plan as one group pension method effective in counteracting the cost of improved mortality among employees to be pensioned. He pointed out that the method had been adapted to pension trust plans implemented by individual policies and that an advantageous consequence to insurance companies of the arrangement was that the burden of high rates of survival to retirement was largely borne by the trustee or employer. He then ex-

plained that, under the individual policy Deposit Administration method, policies on the life plan are used in lieu of the usual Retirement Income policies. Each life policy so issued provides that at the date income is to begin the insurer will change the policy to a life income contract on receipt of the difference between the purchase price of the life income and the reserve under the life policy, the charge ordinarily being subject to a small loading for taxes and expenses of handling.

He pointed out that the difference required to provide the full income was, in effect, a pure endowment and if the mortality prior to retirement were lower than the tabular rate that the margin between the Retirement Income premium and the life premium would be insufficient to accumulate to the reserve difference. The assumption by the purchaser of the responsibility for accumulating the reserve difference therefore safeguards the insurer against the loss which the insurer might otherwise sustain under the pure endowment portion of the Retirement Income policy by reason of improvement in mortality.