CORRESPONDENCE.

FRIENDLY SOCIETY RESERVES AND MARGINS OF SURPLUS.

To the Editor of the Journal of the Institute of Actuaries.

Sir,—It has already become evident and the point will be particularly appreciated by those who have had the advantage of hearing the last of Mr. A. W. Watson's Lectures on Friendly Societies that the National Health Insurance Scheme will give rise to a new class of problem as to the relative reserves for sickness benefits on different bases, and as to the surplus margins which will be available.

It may therefore be of interest to point out that two existing and very general investigations, ostensibly applying only to insurance benefits, may be applied with little or no modification to the case of sickness benefits, or even to a combination of sickness, insurance and other benefits.

1. In appendix B to a paper "On the Distribution of the Divisible Surplus of a Life Assurance Company" (*J.I.A.*, xxxii, p. 105) I gave a general expression for the present value of the future profit or loss from mortality and interest.

2. In a paper on "Changes in Pure Premium Policy-Values consequent upon variations in the rate of interest or the rate of mortality, or upon the introduction of the rate of discontinuance" (*J.I.A.*, xxxix, p. 209), I discussed a series of problems which are sufficiently indicated by the title of the paper, and arrived at some very general results.

Both these investigations extended to the case where the sum assured varied from year to year, and both provided for p and q being entirely independent, these quantities being defined as follows :

> p_n = probability that if the status be in existence at the beginning of the nth year, it will survive to the end of the year.
>
> q_n = probability that if the status be in existence at the beginning of the nth year, the sum assured, S_n, will become payable at the end of the year.

Thus $(q_n S_n)$ is the expected amount of claim during the year, and it will be found that it always enters into the investigations as one quantity, which might have been represented by a single symbol, say β_n, defined as the expected claim at the end of the nth year for each status in force at the beginning of the year. If, therefore, β represents the expected cost of sickness, or the expected cost of sickness plus death benefit plus any other benefit, the whole of the above general investigations will still apply, practically without alteration, except that for "mortality profit" we must substitute "combined profit from mortality, sickness and other benefits."

It is possible that this extension of results, which were already very general, may be of some use in future investigations.

I am, Sir,

Your obedient servant,

G. J. LIDSTONE.

Mansion House Street, E.C.
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