CORRESPONDENCE

(*To the Editors of the* Journal of the Institute of Actuaries)

SIRS

Arising out of Mr Misra's paper on "Multiplicity of the Rate of Interest" [p. 71 *ante*] it has been suggested that multiplicity will only occur where the transaction is financially unsound. This suggestion brought to my mind a peculiar characteristic of one of the benefits included in a certain type of "Family Income" assurance. It has already been pointed out with regard to the type of assurance referred to that the premium necessary to provide the income benefit does not always increase as the rate of interest employed in its calculation decreases. The fact that it is possible to fit more than one rate of interest to a given premium securing a certain benefit has not however been stressed.

The benefit referred to above may best be described by giving the premium formula, which is

$$P = 100 \,.\, \frac{a_{\overline{n}|} - a_{x\overline{n}|}}{\text{a}_x}\,.$$

As an example of multiplicity, suppose that P is given as £4. 2*s*. 4*d*. when $x=40$ and $n=20$ and the mortality used is E.C.R.D. (males). It will be found that the rate of interest may be either $2\frac{3}{4}\%$ or $4\frac{1}{2}\%$ per annum.

Although Mr Misra excluded transactions involving a mortality factor from his considerations there is no difference in conception between the transaction corresponding to the formula given above and the series of erratic payments given in his article. The payments are not fixed beforehand in quite the same sense but the premium is of course calculated as though they were.

The question arises then as to whether the transaction is unsound. The parties, i.e. the office and the policy-holders, are certainly sometime creditor and sometime debtor. It should be noted however that surviving policy-holders are always debtor while deceased policy-holders, or rather their estates, are always, until the end of the income period, creditor.

It will have been noticed that the income benefit is only one of the benefits included in the contract and that such a benefit would not normally be issued as a separate assurance. The difficulty is to compel the policy-holder to pay premiums beyond the point at which it would be to his advantage to discontinue. A contract of this type could, theoretically, be made legally sound by a covenant on the part of the policy-holder to pay premiums throughout the duration of his life.

I am, Sirs, etc.

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