

CORRESPONDENCE.

AMERICAN TEN YEAR NON-FORFEITURE POLICIES.

To the Editor of the Assurance Magazine.

SIR,—The investigations of Mr. Younger on this class of assurance leave little to be said, but it may be worth while to look at the subject from another point of view.

An assurance for life of 1 is to be effected by annual payments during 10 years, with the option of at any time discontinuing the payments and receiving in exchange a paid-up policy of as many tenths as the number of payments made. Required the payments.

I leave out for the present the restriction usually made, that the discontinuance is not to take place till after the first two years.

The first payment is plainly the single payment which will secure an assurance of $\frac{1}{10}$ for life and a temporary assurance of $\frac{9}{10}$ for one year, and is therefore

$$\frac{1}{10} \cdot \frac{M_x}{D_x} + \frac{9}{10} \cdot \frac{M_x - M_{x+1}}{D_x}$$

or

$$(1) \quad = \frac{1}{10} \cdot \frac{M_x}{D_x} - \frac{9}{10} \cdot \frac{M_{x+1}}{D_x}.$$

Similarly, the second payment is the single payment which will secure another $\frac{1}{10}$ for life and a temporary assurance of $\frac{8}{10}$ during that year, and we have

$$(2) \quad = \frac{9}{10} \cdot \frac{M_{x+1}}{D_{x+1}} - \frac{8}{10} \cdot \frac{M_{x+2}}{D_{x+1}}.$$

In the same way,

$$(3) \quad = \frac{8}{10} \cdot \frac{M_{x+2}}{D_{x+2}} - \frac{7}{10} \cdot \frac{M_{x+3}}{D_{x+2}}$$

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$$(9) \quad = \frac{2}{10} \cdot \frac{M_{x+8}}{D_{x+8}} - \frac{1}{10} \cdot \frac{M_{x+9}}{D_{x+8}}$$

$$(10) \quad = \frac{1}{10} \cdot \frac{M_{x+9}}{D_{x+9}},$$

these values being the same as those obtained by Mr. Younger.

In order to get the *uniform* annual premium which is equivalent to them, we require to know the probabilities of surrender, and as we are ignorant of these, the problem is insoluble, but in practice the Offices can have no difficulty in selecting a rate which shall err on the side of safety.

I subjoin the different payments, commencing at the ages 30, 40, 50, calculated on the New Experience Tables at $4\frac{1}{2}$ percent interest, for an assurance of 1,000.

Age.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
30	34.32	34.27	34.27	34.25	34.24	34.24	34.20	34.10	33.95	33.78
40	43.73	43.76	43.87	43.99	44.11	44.16	44.11	43.94	43.65	43.26
50	58.32	58.46	58.58	58.59	58.46	58.13	57.60	56.86	55.86	54.53

There appears to be only one maximum in each set, the differences becoming large only in the three last payments; so that it may be sufficient to give merely the first, last, and maximum payments for the intermediate years, as follows:—

Age.	25	26	27	28	29	30	31
First payment	30.42	31.19	31.98	32.77	33.56	34.32	35.07
Last "	29.98	30.70	31.44	32.20	32.98	33.78	34.62
Maximum payment	30.54	31.28	32.03	32.79	33.56	34.32	35.13
No. of maximum payment	4	3	3	2	1	1	5
Age.	32	33	34	35	36	37	38
First payment	35.90	36.74	37.65	38.67	39.71	40.73	41.72
Last "	35.50	36.40	37.33	38.28	39.24	40.22	41.21
Maximum payment	36.03	36.95	37.89	38.84	39.78	40.75	41.73
No. of maximum payment	5	4	4	3	2	2	2
Age.	39	40	41	42	43	44	45
First payment	42.73	43.73	44.80	46.00	47.32	48.77	50.31
Last "	42.22	43.26	44.32	45.41	46.52	47.63	48.76
Maximum payment	42.73	44.16	45.41	46.71	48.02	49.38	50.78
No. of maximum payment	1	6	6	5	5	4	4
Age.	46	47	48	49	50		
First payment	51.89	53.46	55.06	56.63	58.32		
Last "	49.90	51.05	52.21	53.37	54.53		
Maximum payment	52.21	53.66	55.21	56.85	58.59		
No. of maximum payment	3	3	3	4	4		

As the American Offices (with very few exceptions) employ the Carlisle, or Old Experience, at 4 or $4\frac{1}{2}$ percent, their premiums should be higher than the above, and a comparison will confirm Mr. Younger's conclusion with reference to them.

The restriction as to the non-discontinuance of payments till after two years seems merely intended to allow the effect of selection to recoup the Offices for loss on the first payment by commission and preliminary expenses, and need hardly be considered.

There can be no doubt that this form of assurance is becoming a favourite on this continent, its great recommendation being probably its definiteness as regards the surrender values.

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ON THE EQUITABLE APPORTIONMENT OF A FUND BETWEEN THE LIFE TENANT AND THE REVERSIONER.

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

SIR,—the words “rough justice” quoted by Mr. Baden at page 284 from my remark at page 280, were used by me with reference, not to the “rateable division” of the fund, but to the division which Mr. Baden advocates. Considerations dissimilar from those which he advanced had led me to feel a decided preference for the latter method, without however my being able to satisfy myself that its applicability could be fully demonstrated.

I cannot regard it as surprising that, in treating upon this subject, so many persons consider the market values of the separate interests to be the point from which to start; but it remains in the next place to be decided upon what principle the life tenant and the reversioner shall share that dormant value or surplus which is only to be realised upon the completion of an arrangement between them for cancelling the existing tenure. An apportionment in the proportion of the market values of the two interests is the only method which I have known to be proposed for dividing such surplus; but I venture to submit that there are two other methods which are just as plausible. It might be alleged that as the consents of the two parties are equally necessary to the contemplated arrangement, the surplus realised by it should be divided equally between them. Or it might, I think, be argued that in addition to the market value of his interest, each party should be credited with the difference between the market value of the interest of the other party and the value of it when computed as a part of the perpetuity; for this is the difference of which each deprives the other until both consent to effect the arrangement.

In illustration of these several methods of dividing the surplus, I subjoin three examples in which the age of the life-tenant is assumed to be respectively 20, 45, and 70; and in each case the net income chosen is £30, assumed to be of the capital value of £850. For estimating the market values, the formulas selected from those illustrated by Mr. Porter are as regards the reversions A 6 per cent Carlisle, and as regards the life-