

the tables for ages below 15: at that age it is correct; from 15 to 52 an addition of half a year will rectify the result very nearly; and from 52 to 75 a deduction of a similar quantity will be sufficiently near. From 75 upwards the table is in excess of the formula by a rapidly increasing quantity, very nearly measured by $\frac{(a-72)^2}{90}$.

If the range of ages be divided into periods of fifteens, the following set of formulæ gives a closer approximation, for the Carlisle Table:—

	General Formula.	Correction.
For lives under 29 . . .	$(79-a)\frac{7}{10}$	$+\frac{29-a}{40}$
From 29 to 44 . . .	$(79-a)\frac{7}{10}$	$+\frac{a-29}{30}$
„ 44 to 59 . . .	$(79-a)\frac{7}{10}$	$+ \cdot 8$
„ 60 to 74 . . .	$(79-a)\frac{7}{10}$	$+\frac{a-55}{5}$

Or these four may be reduced to—

Under 29	$56\frac{1}{4} - \frac{3a}{4}$
From 29 to 44	$54\frac{1}{3} - \frac{2a}{3}$
„ 44 to 59	$56\cdot 1 - \frac{7a}{10}$
„ 59 to 74	$44\cdot 3 - \frac{a}{2}$

The formula for ages between 29 and 45, given just above, coincides with Mr. Willich's $\frac{2(81\frac{1}{2}-a)}{3}$, which, for want of correction in the early ages, differs by an amount increasing from $\cdot 3$ at the age of 28, to $1\cdot 24$ years at the age of 9 years; a difference twice as great as any which exists between the tabulated expectation and the expectation expressed by the formula $57 - \frac{5a}{6} + \frac{a^2}{450}$.

I am, Sir,
Your obedient servant,
WM. D. BIDEN.

9, Lansdowne Cottages, Lower Road, Islington,
March 12th, 1858.

ON THE METHOD OF TESTING THE SOLVENCY OF AN ASSURANCE COMPANY.

To the Editor of the Assurance Magazine.

SIR,—Mr. Younger and myself are so little likely to agree upon the first principles of the subject under discussion, that I feel some apology is due to you for resuming it. After the lengthened notice with which that gentleman has favoured me in your April Number, however, I must ask your indulgence for a brief reply to it.

Mr. Younger assumes that I do not understand his formula; but, by his admission of my correction of it, proves that I do. Divested of the imposing array of algebraic symbols by which he expresses his meaning, it amounts to this, that the balance at the credit of his premium account, reduced by the proportion that was originally added to the premiums for "loading," and increased by the interest accruing therefrom, when set off against the amount *paid* for claims, is a criterion "whether a Company is in a solvent state," and exhibits "the funds necessary to provide for the sums assured under existing policies." This argument, I submit, is exactly that of the dupe at the "*rouge et noir* table, who pricks on a card result (or sequence) of a few past throws, to enable him to 'make his game' for the next."

Had Mr. Younger proposed to subtract from his premiums the amount that *should have been* paid for claims (could it have been arrived at with sufficient certainty), I might understand his argument; as it is, I hold that his plan is quite ineffectual for the purpose in view, and will be glad to hear the grounds upon which his opinion is based, or be referred to the instances where he says his formula has frequently been stated in a different form, without any one disputing its accuracy. I confess to never having met with it before.

I have noted below* all the authorities at present within my reach, none of whom contemplate any other plan of valuation than the ordinary one having reference to the future duration of *existing* policies. Mr. Morgan and Farr both point to abridgments of the labour by grouping the policies; and the valuation of the "loading" of the premiums has been variously discussed in your own columns, but never, so far as I am aware, based on any other principle than that of their "annuity" value.

Mr. Younger now informs us, that his method is intended to apply only to the case of the purchasing Office paying the selling Office; and here I am willing to confess my own misapprehension of his meaning; for I would as soon think of attending the Auction Mart, and being paid for assuming the property of a policy, as expect to see a purchasing Office pay over money to a selling Office at valuation of the current risks of the latter. Mr. Younger has yet to inform us by what method he arrives at the conclusion that it is by the purchasing party the payment has to be made.

Mr. Younger repeats his assertion, that Companies have been thriving for half a century treating the premiums of lapsed policies as "entire profit," by the adoption of the ordinary method of valuation. He would see the fallacy of this, if he would but reflect that the claims arising over this period were a fair percentage on the number of policies then existing, and that a proportion of the (whole life) premiums on these policies was required to meet the claims. Even if no surrender value was given for the policies subsequently dropped, I am utterly at a loss to know upon what principle Mr. Younger can maintain his assertion that the amount of these premiums is entire profit. †

* Baily, § 432, vol. ii., p. 97 (French Edition). Milne, p. 283, vol. i. Jones, vol. i., p. 192. De Morgan (*Lardner's Cyc.*), pp. 218 and 276. Farr, in *Reg. Genls. Twelfth Report*, p. 29 (8vo. Edition), with relative Table xix. *Assurance Magazine*, vol. iii., p. 185. Griffith Davies, Table xlv.

† Mr. Younger does not say so; on the contrary, he expresses his full concurrence (see p. 296) in the opinion "that only so much of them is profit as remains after deducting the value of the risk actually borne."—ED. A. M.

Mr. Younger expresses himself in strong terms, because having initiated a system at variance with all our previous knowledge of his subject, he is called upon to maintain it. Now Sir, I certainly do not hesitate to characterize his method as empirical, and, until he can defend it on sounder grounds than in his last communication to you, he must bear to be told so.

I remain, Sir,

Your most obedient Servant,

Aberdeen, 28th April, 1858.

H. A. S.

ON THE PRINCIPLES WHICH SHOULD GOVERN ASSURANCE COMPANIES IN AMALGAMATING.

To the Editor of the Assurance Magazine.

SIR,—I shall feel obliged if you will insert, in the next Number of the *Assurance Magazine*, the following remarks on Mr. Jellicoe's valuable paper on the subject of the amalgamation of Assurance Companies. That paper contains the complete and satisfactory solution of a problem of considerable practical interest, especially at the present time. The conclusions there arrived at may be summed up as follows:—If it is proposed to amalgamate two Companies, denoted by (A) and (B), let the liabilities of each be estimated by the same data, credit being taken for the gross premiums on the policies of assurance, and let S and S' be the surpluses thus found to exist in the two Companies; then, if these are proportional to the respective requirements of the Companies for expenses and future bonuses, the Companies may at once unite on equal terms; but if one of them, as S' , is larger in proportion than S , a portion of it, S_1 , is to be reserved, proportional to S , and the remainder, $S' - S_1$, is to be at once divided between the assured and the shareholders of (B). The only question that remains is this—to what elements are S and S_1 to be proportional? In Mr. Jellicoe's way of treating the subject, S and S_1 are taken proportional to the values of the net premiums on the various policies; and the consequence then follows, as he points out, that the bonuses should be thenceforward declared in both Companies upon the same principle, and independently of any difference in the loadings of the rates of premium charged. Such a method would be the very common one of giving an addition to each policy at a uniform rate per cent *per annum*. In effect, if the participating premiums in the two Companies are unequally loaded, the net premiums in (B) having a larger addition made to them than those of (A), the assured in (B) are, in equity, entitled to have larger bonuses added to their policies than those in (A), and the process indicated by Mr. Jellicoe gives them the benefit equivalent to their higher rates of premium *at once*; so that, thenceforward, they will only be entitled to the same amount of bonus as the assured in (A).

But now let us suppose that the method of division of profits pursued in the Company, after the amalgamation, is one which does not neglect the inequality in the loadings—as examples of such, we may instance those methods which give a cash bonus proportional to the premiums paid, or to the loadings of those premiums—then it is at once obvious that the plan hitherto pursued, of reserving a surplus in proportion to the net premiums, will not be consistent with strict justice.