CORRESPONDENCE

RE: Comments on 'Some Results on the Gompertz and Heligman and Pollard Laws of Mortality'. *J.I.A.* **119,** 107.

Dr Renshaw (1992), in his comments on my paper on the Gompertz and Heligman and Pollard laws of mortality (Thatcher, 1990), uses a phrase which may give a misleading impression. No doubt this was unintentional, but I should like to set the record straight.

The bulk of my paper was concerned with some mathematical properties of the two 'laws'. I then tried to see how close the two laws come to reality by fitting them to English Life Table No. 14 at ages 50–90. Dr Renshaw describes what I did as 're-graduating' the life table, which carries the implication that I was dissatisfied with E.L.T. No. 14 at ages 50–90. In fact, I was assuming that E.L.T. No. 14 is correct at these ages.

Dr Renshaw proposes that better results can be obtained by graduating $\log(\mu_x)$ by a natural cubic spline function with three fixed knots, at ages 60, 70 and 80. However, the uppermost segment of a natural cubic spline function is linear. (If we insert $n = 3$, $j = 1$, $x_1 = 60$, $x_2 = 70$, $x_3 = 80$ in Dr Renshaw's function $\psi_j(x)$, we find that for $x \geqslant 80$ the coefficients of x^3 and x^2 reduce to zero.) Thus the natural cubic spline may be a good method for graduating ages 50–90, but if extrapolated to higher ages it simply expresses $\log(\mu_x)$ as a linear function of x, which is Gompertz's law.

I agree with Dr Renshaw's finding that the Heligman and Pollard law does not always give a satisfactory fit, but nor does Gompertz. At very high ages, there is still an outstanding problem. Extrapolating the curve of mortality beyond the available data is inevitably risky. At the present time there are several competing models, in addition to Gompertz and Heligman and Pollard. However, proper comparisons between the alternatives requires more data at very high ages than can be obtained from a single country. It is to be hoped that the massive collection of data on old age mortality in 27 countries, which is now being assembled at the University of Odense, may soon enable such comparisons to be made.

<div align="right">A. R. THATCHER</div>

REFERENCES

RENSHAW, A. E. (1992). Comments on 'Some results on the Gompertz and Heligman and Pollard laws of mortality'. *J.I.A.*, **119,** 107.
THATCHER, A. R. (1990). Some results on the Gompertz and Heligman and Pollard laws of mortality. *J.I.A.*, **117,** 135.