

NOTES ON OTHER ACTUARIAL JOURNALS

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GERMANY

Blätter der Deutschen Gesellschaft für Versicherungsmathematik,
Vol. 1, Part 5, 1953

- TOSBERG, A. *Über ein neues versicherungsmathematisches Verfahren als Ergebnis neuerer Morbiditätsuntersuchungen*, pp. 3-84. A simplified approach to the calculation of age-dependent premiums for hospital-expense insurance. The data relate to more than 90,000 lives insured with the Deutsche Krankenversicherungs-A.-G. Berlin (D.K.V.), and the resulting basic tables are calculated at $3\frac{1}{2}\%$.

HOLLAND

Het Verzeekerings-Archief (Actuarieel Bijvoegsel), Vol. 30, 1953

- HOEK, U. H. VAN DER. *A practical method for the calculation of a_x at various rates of interest; with numerical data based on the Dutch mortality table G.B.M. 1947-49 (Makeham graduation)*, pp. 65-75. In 1918 Steffensen suggested the approximation

$$a_{x(i)} \approx a_{x(h)} \quad \text{where} \quad n = a_{x(i)} - h\alpha_x + h^2\beta_x \quad \text{and} \quad h = i' - i.$$

The author tabulates α_x , α_{xx} , β_x and β_{xx} at 3% and shows how accurate the results are even when h is as large as 0.15 provided x is then greater than about 30.

- JAGER, J. DE. *Stochastical investigations on mortality tables*, pp. 76-92. The Redington-Michaelson r_x test (*Trans. 12th Int. Congr. Actuar.*) is developed and applied to the male death rates in the Netherlands in 1947, 1948 and 1949 (separately and aggregated). An analogous test based on the transformation $2 \arcsin \sqrt{q_x}$ is applied to the female rates in 1949.

PORTUGAL

Boletim do Instituto dos Actuários Portugueses, Vol. 7, 1952

- LAH, I. *Noch einige Interpolationsformeln des Zinsfussproblems für steigende Renten*, pp. 7-16. Deduces two sets of interpolation formulae for $v(Ia)_x$ at rate i . Each of the six formulae in the first set is a linear combination of two means (arithmetic, harmonic, geometric or antiharmonic) of $v(Ia)_x$ at rates i_0 and i_1 , the coefficients being simple functions of the generalized Poukka function $S_{x+1}^{(3)} S_{x+1} / \{S_{x+1}^{(2)}\}^2$, which must lie between 0.75 and 1 and is insensitive to age and interest-rate changes. The single numerical illustration indicates good accuracy.

- NOVA, A. C. *Nota sobre o método dos mínimos quadrados*, pp. 17-21. Proposes the minimization of

$$\sum_j y_j^2 (\log y_j - \log \hat{y}_j)^2 \quad \text{instead of} \quad \sum_j (\log y_j - \log \hat{y}_j)^2,$$

where y_j are the observed and $\hat{y}_j$ the theoretical values.

ALEXANDRE, A. *Os métodos de capitalização na previdência social*, pp. 23-38. Argues that social insurance can be financed on a funded basis if the assets are invested in public works yielding an income rising and falling with the cost of living. An example quoted in detail is the building and operation of a bridge over the Tagus at Lisbon.

COSTA, M. A. F. *The calculation of marriage and maternity rates; their graduation by frequency curves*, pp. 39-65. Extends a previous study of exposed to risk formula (see *J.I.A.* 79, 102) to marriage and maternity rates (separately), and applies the results to Portuguese data. The graduations of the resulting rates are effected by means of truncated Pearsonian, and related, curves. A useful contribution.

NOVA, A. C. *Os efeitos das variações de vencimento nas instituições de previdência*, pp. 67-98. Studies the effect of a single, and sudden, change in salary levels on the liabilities of a pension scheme based on career-average salaries. A uniform salary scale is assumed in the numerical illustrations.

LEÃO, A. *Regime financeiro do seguro social*, pp. 99-114. In Portugal, the number of children under 14 is over 50% of the number of adults between 20 and 70; in England and Wales the percentage is about half this. It is argued that, for the present, a social security system based on annual assessments is the only one practicable.

This number also contains a review of the proceedings of the thirteenth International Congress of Actuaries.

SCANDINAVIA

Skandinavisk Aktuarietidskrift, Vol. 36, 1953, Parts 1 and 2

ARFVEDSON, G. *Research in collective risk theory. The case of equal risk sums*, pp. 1-15. Finds the probability of 'ruin' before the net risk premium received totals x given that the initial risk reserve is n (an integer). The sums at risk are supposed to be distributed uniformly.

QUENSEL, C.-E. *The distribution of the partial correlation coefficient in samples from multivariate universes in a special case of non-normally distributed random variables*, pp. 16-23. The special case is where the first r variables are distributed arbitrarily and are related to the remaining $p-r$ by the relations

$$x_i = \sum_{j=1}^r a_{ij}x_j + y_i \quad (i=r+1, r+2, \dots, p),$$

where the y 's are normal variates uncorrelated with the x 's.

BARTON, D. E. *On Neyman's smooth test of goodness of fit and its power with respect to a particular system of alternatives*, pp. 24-63. This test—developed in Vol. 20 (see *J.I.A.* 69, 185)—takes account of a particular ('smooth') type of departure from a specified statistical hypothesis. The author makes a thorough study of 'first-order' departures of the type mentioned.

SVERDRUP, E. *Similarity, unbiasedness, minimaxibility and admissibility of statistical test procedures*, pp. 64-86. An important theoretical paper.

JENSEN, A. *Markoff chains as an aid in the study of Markoff processes*, pp. 87-91. A neat approximation whereby the points of 'no change' in a Markoff process are filled-in in such a way that the distribution of consecutive differences is uniform.

- DALENIUS, T. *The multi-variate sampling problem*, pp. 92-102. The choice of a stratified sampling design optimum for a specified variable may mean that other interesting variables are badly estimated. The loss may be defined by the ratio $[\text{var}_o(y) - \text{var}_c(y)]/\text{var}_o(y)$, where o and c denote, respectively, that the variances have been calculated on singly optimum or compromise bases. The author suggests that the number sampled from stratum j be found by minimizing the sum of the losses in the different variables subject to a total sample size n .

Vol. 36, 1953, Supplement

- WEIBULL, M. *The distribution of t- and F-statistics and of correlation and regression coefficients in stratified samples from normal populations with different means*, pp. 1-106. A detailed presentation (without numerical illustrations) of the theory sketched in Vols. 33 and 34 (see *J.I.A.* 77, 304 and 78, 137).

SWITZERLAND

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker
Vol. 53, Part 2, 1953

- JECKLIN, H. and LEIMBACHER, W. *Über ein Sterbengesetz, welches eine exakte Darstellung der Leibrenten durch Zeitrentenwerte erlaubt*, pp. 129-39. If the relation $\ddot{a}_{x:\overline{n}|} = A_n + q_x B_n$ is to be satisfied, we must have

$$l_x = l_0 \frac{\sin z(\omega - z)}{\sin z\omega} k^x \rightarrow l_0 \left(1 - \frac{x}{\omega}\right) k^x \quad (z \rightarrow 0).$$

Sections of a standard table comprising 30 or 40 ages may be re-graduated by this formula. Lidstone's Z method (q_x as the 'weight') then applies 'exactly'.

- ZWINGGI, E. *Ergänzende Note zu 'Prämien und Deckungskapitalien in der Todesfallversicherung, wenn die Beiträge nur bis zum Todestag geschuldet sind'*, pp. 141-44. Expresses without approximation the continuous premium $\bar{P}(\bar{A}_{x:\overline{n}|})$ in terms of assurances payable at the end of the year.

- FRANCKX, E. *La génération d'une chaîne de Markoff*, pp. 145-51. Shows how to construct Markoff chains of order r from (irreducible) 'elementary' chains consisting of zeros, units and a single set of $k < r$ real numbers which add up to unity.

- HANSEN, CHR. *Über einen Satz der Mathematik der Lebensversicherung auf ein Leben*, pp. 152-54. Every variable assurance on one life subject to a variable premium can be decomposed into a constant assurance with a variable premium plus a capital redemption assurance.

- LAH, I. *Das Zinsfussproblem der Anwartschaften*, pp. 155-65. Extends his previous results for life annuities (see *J.I.A.* 79, 104) to annuities commencing on disability.

- RUFENER, E. *Renten und Todesfallversicherungen höherer Ordnung*, pp. 166-88. Introduces operators J and S which generate the successive orders of continuous and discrete annuities and assurances. There is also an elegant derivation of relations connecting such functions.

- WENK, A. *Über eine Aufspaltung verschiedener Versicherungsformen nach Risiko und Sparfunktion*, pp. 189-203. Shows how all the usual assurances can be analysed into two parts, one independent of mortality and one (with good approximation) independent of interest. The results are applied to simplify the routine calculations of each year's sum for reinsurance under a risk premium contract.
- ROBERT, J.-P. *Bases techniques des assurances en cas d'hospitalisation*, pp. 205-71. A small text-book on the principles and practice of hospital-expense insurance including a set of net single and annual premiums at $2\frac{1}{2}\%$.

UNITED STATES

Transactions of the Society of Actuaries
Vol. 5, 1953, No. 3

- PHILLIPS, J. T. *The Korean war hazard*, pp. 1-29. 'Based on our analysis of combat and aviation accident death rates under policies issued since the start of Korean hostilities we (New York Life) are now able to so underwrite our military business that more than half of it is issued without a war clause.'
- MYERS, R. J. *The 1952 amendments to the Social Security Act*, pp. 30-44. These amendments are estimated to increase the 1953 benefit payments of social security from \$2.3 billion to \$2.7 billion. By the year 2000 these payments will amount to about \$13 billion a year.

This number also contains digests of (1) informal discussions on ordinary insurance, annuities and settlement options, group insurance, pension trusts, and the actuarial profession, and (2) a forum on economic trends and life insurance.

Vol. 5, 1953, No. 4

- BOWERMAN, W. G. *The dip in mortality in the twenties of age*, pp. 117-24. '...the dip and trough, either in death-rates or in their first differences, is a characteristic of all mortality tables, ancient and modern.'
- DOUGHERTY, E. A. *Ordinary life insurance limits*, pp. 125-34. Distinguishes between the limit of retention established to avoid chance fluctuations in annual surplus, and the limit beyond which it is unwise to issue insurance on a single life.
- SEAL, H. L. *The mathematical risk of lump-sum death benefits in a trustee pension plan*, pp. 135-42. Shows that, for a given level contribution rate, the introduction of a lump-sum death benefit, in lieu of a part of the pension otherwise payable, can result in a reduction of the risk of chance deviations. A numerical example is provided resulting in an optimum death benefit of about eight times the annual pension.
- DELANEY, A. *Valuation of policy deposits at an interest rate lower than the guaranteed rate*, pp. 143-44. The valuation uses the rate at which deposits are withdrawn during the n th contract year.

This number also contains digests of (1) informal discussions on Agency, General matters, Individual accident and sickness, Social security, and New recording means and computing devices, and (2) a smaller company forum.