

## NOTES ON FOREIGN ACTUARIAL JOURNALS

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## AMERICA

*Transactions of the Society of Actuaries,*  
Vol. 11, Part 1, March 1950

- J. MUSER. *Actuarial aspects of the Railroad Retirement System*, pp. 1-48. A detailed description of the bases and methods of valuation of the Federal pension fund for railway employees. Some idea of the size of the figures involved is provided by the total present value of future benefits, viz. \$20,793,300,000.
- J. C. NOBACK. *Actuarial note: The valuation of self-insured retirement plans*, pp. 49-69. A useful compendium of formulae for the different types of benefit usual in pension funds.
- W. L. GRACE and C. J. NESBITT. *Actuarial note: On average age at death problems*, pp. 70-74. States, without proof, the theorem that if the number of deaths can be expressed as a linear function of  $l_x$ 's and  $T_x$ 's (with varying age suffixes) the average age at death is expressible as that linear function divided into the same linear function with  $xl_x + T_x$  replacing  $l_x$ , and  $xT_x + 2Y_x$  replacing  $T_x$ , throughout. Examples are given.

There are digests of informal discussions (pp. 75-132) on Surplus, Policy changes, Actuarial department organization, Underwriting, Expense limitation, Pension trusts, Sickness insurance, Average amounts of policies, Old age benefits.

## Vol. 11, Part 2, June 1950

- P. C. BASSETT. *Extra premiums based on the net amount at risk*, pp. 1-10. Effectively this paper is devoted to finding the value of the risk involved in holding normal reserves when the mortality is subject to a uniform addition at every age. The problems of covering the resulting decreasing risk by a level annual premium and of loading for expenses are also considered.
- W. A. POISSANT. *National Service Life Insurance*, pp. 11-29. Insurance under the U.S. government insurance schemes for veterans of World Wars I and II now approximates to 20% of the commercial insurance in that country.
- C. M. STERNHELL. *Calculation of approximate annuity values on a mortality basis that provides for future improvements in mortality*, pp. 30-75. Starting with  $q_x = q_x(1 - s_x)^k$  and assuming that second and higher powers of  $s_x$  can be ignored, then making a subsequent assumption that tends to counteract the error involved, the final approximation is developed and applied in great detail to various types of annuities—immediate, deferred, guaranteed, cash refund, etc. (cp. on method Wyss, see *J.I.A.* LXXII, 124). Numerical examples

and auxiliary tables are based on the Jenkins-Lew 1949 table with projection Scale B (see *J.I.A.* LXXVI, 168).

W. G. BOWERMAN. *Annuity mortality*, pp. 76-102. An extension to age zero of the Jenkins-Lew 1949 tables and modifications of these tables in the 80's lead to a discursive survey of sex differences in mortality, centenarians, Makeham *c*'s, etc.

There are digests of informal discussions (pp. 103-164) on Agents compensation, New mortality basis for annuities, Selection and policy issue, Staff selection and training, Decreasing term riders, Valuation, Group life insurances, etc.

In the *Journal of the American Statistical Association*, XLV, 225-237, there is an article by J. E. WALSH entitled *Large sample tests and confidence intervals for mortality rates*. This represents an attempt to meet the problem of estimating the variance of *q* derived from 'policies' or 'amounts' by subdividing the observations at each age into 10-15 roughly equal groups by means of the first letter of policyholders' names. The result is 10-15 estimates of *q* which form a distribution from which to estimate confidence limits for the median value, *q*. It would be interesting to see some numerical illustrations.

In the *Journal of Applied Psychology* XXXIV (1950) there is an article by S. R. WALLACE and A. G. WHITNEY entitled *The prediction of persistency in premium payment*. This contains a summary of the methods and statistics used in the preparation of the Life Agency Management Association's 'Persistency Rater' which is being widely applied by U.S. Life companies to predict the likely 'persistency' of individual proposers and thus to determine whether or not to accept their applications for insurance.

## CZECHOSLOVAKIA

### *Aktuárské Vědy*, Vol. VIII, Part 4

- A. KOTZIG. *The weights of the results of partial tests for determining the total result of the test*, pp. 129-137. The 'tests' of the title are mental or aptitude tests.
- J. SEITZ. *Note sur un problème fondamental de la théorie de l'équilibre économique*, pp. 137-144. A theorem on the non-negativeness of quadratic forms is proved and generalized.
- G. ARROBA. *El profesor Schoenbaum y el seguro social en Latino America*, pp. 145-146. A note praising the editor for his work on the initiation of social insurance schemes in Latin America.
- V. KALIVODA. *Social Insurance in Czechoslovakia*, pp. 147-151. Justification of an unconventional view of reserve funds necessary in a country in which 'the socialization of means of production is being accomplished with the parallel realization of the planned economy which diminishes to the minimum the rise of an economical (*sic*) crisis'. The actuary interested in a social insurance programme costing about 13% of national income should also read: E. ERBAN, *Czechoslovak National Insurance—A contribution to the pattern of social security*, Prague, 1948.

## FRANCE

*Bulletin Trimestriel de L'Institut des Actuaire Français,*  
No. 191, June 1950

- R. RISSER. *Calcul des constantes de certaines surfaces de distribution*, pp. 141-232. Gives a large number of surfaces of Pearson type, and of such types as

$$z = z_0 \left[ 1 - \frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{2\gamma xy}{ab} \right]^h$$

with derivations of moments, etc. There are no numerical examples. It would be of interest to see how nearly such types would compare arithmetically with those discussed by S. J. Pretorius, *Biometrika* XXII, 109 etc.

No. 192, September 1950

- H. JECKLIN. *Du champ d'application de la formule d'approximation de Lidstone*, pp. 261-272. The formula is the one for  $P_{\overline{xy}|n}$ . This continues the author's investigation. See, for instance, *J.I.A.* LXXVI, 253.
- A. THÉPAUT. *Le Traité d'excédent du coût moyen relatif* (ECOMOR), pp. 273-343. Develops the theoretical and practical aspects of the following new method of reinsurance which has, so far, been applied only to risks of partial loss (e.g. fire and accident) insurance: The reinsurer agrees to pay the excess of every claim above a variable limit which is fixed in any year by the value of the claim ranking (say) twentieth in order from the highest of the ceding office's claims, subject, however, to a ceiling of (say) 10 times this limit and to a premium of (say) 24 times the limit. An interesting application of statistical methods.

## GERMANY

*Blätter der Deutschen Gesellschaft für Versicherungsmathematik*  
Vol. 1, Part 1, April 1950

We welcome the reappearance of the *Blätter* albeit with a slightly different title. Our pleasure is, however, marred by the news of the premature death of Prof. Dr Paul Riebesell, the first President of the newly founded Society and a familiar figure to many of our members. We deeply sympathize with our German actuarial friends in their great loss.

- S. VAJDA. *Der Beruf des Versicherungsmathematikers*, pp. 7-12. The author answers the question: Should actuaries be interested in mathematics?
- E. ZWINGGL. *Anwendung neuerer statistischer Verfahren in der Versicherungsmathematik*, pp. 13-23. Applies statistical theory to the comparison of mortality rates and sampling methods of reserve calculation.
- W. SACHS. *Bemerkungen über die Nachkriegssterblichkeit*, pp. 25-27. Population data of the American and British zones in 1946-47 do not confirm the feared increase in mortality rates over those registered pre-war but should not be used without reservation by insurance companies, because of the unusual circumstances ruling at the time.

- H. MÜNZNER. *Statistische Testmethoden in der Versicherung*, pp. 29-37. A short introduction to testing statistical hypotheses.
- W. LOREY. *Die Bedeutung von Pierre Simon Laplace und Felix Klein für die Versicherungsmathematik*, pp. 39-50.
- W. PÖTTKER. *Methoden zur summarischen Berechnung der Prämienreserve ohne Gruppierung des Versicherungsbestandes*, pp. 51-62. A well-argued attempt to express the reserves at duration  $t$  in terms of reserves at four fixed points of time so that, the summations being extended to all the policies of a portfolio the total reserve can be expressed by

$$\sum V(t) \doteq A_1(t) \sum V(t_1) + A_2(t) \sum V(t_2) + A_3(t) \sum V(t_3) + A_4(t) \sum V(t_4).$$

The numerical results of application to endowment, *terme fixe*, and limited payment whole life assurances are satisfactory.

## SCANDINAVIA

*Skandinavisk Aktuarietidskrift*, 1950, Parts 1 and 2

- G. ARFWEDSON. *Some problems in the collective theory of risk*, pp. 1-38. Considers the probability of ruin before certain specified points of time. Positive sums at risk are assumed (cp. Saxen's 1948 paper, *J.I.A.* LXXV, 110, where negative sums are treated) and their distribution is supposed exponential.
- E. KIVIKOSKI. *Ein vernachlässigtes Interpolationsverfahren*, pp. 39-87. The formula

$$u_x = u_a + \frac{x^{-1} - a^{-1}}{b^{-1} - a^{-1}} (u_b - u_a)$$

often furnishes an improvement over ordinary linear interpolation. A detailed investigation of the advantage of this formula in connexion with compound interest functions is made. It is proved *inter alia* that, if repayment of a loan is made by means of a series of payments forming an arithmetic or a geometric progression, the calculation of the yield by interpolation between two interest rates is not only improved but that the true value lies between the result obtained by simple linear interpolation and the improved method.

- E. ZWINGGI. *A study of the dependence of the premium on the rate of interest*, pp. 88-97. An ingenious and accurate method of calculating the net premium of an endowment (or temporary) assurance at any rate of interest from commutation functions at one standard interest rate. With interest changes of up to  $\pm 1\%$  the error in the derived premium seldom exceeds 1 per mille and is usually only a fraction of this. The method applies also to office premiums and income disability premiums.
- E. MICHALUP. *On inverse linear interpolation*, pp. 98-100. A development of a procedure described in Steffensen's 1933 paper on iteration (see *J.I.A.* LXIV, 516).
- H. V. MUHSAM. *An attempt to classify life tables*, pp. 101-122. The classification is by means of the various types of Makeham representation of the  $l_x$  curve.

*Nordisk Försäkringstidskrift*

Vol. xxx, No. 2, April 1950, contains an article by Professor P. KASTARI on 'Nationalization of insurance companies and the protection of private property offered by the constitution of Finland'. Legislation cannot change the rights of protection by a mere majority in Parliament—only by a two-thirds (or four-fifths) majority can these rights be rescinded. The rights of the companies as regards funds and reserves are protected. The constitution allows legislation to expropriate property 'for the common need and against full compensation' and the legal profession holds that a nationalization on political ideological bases cannot be covered by this phrase. Reference is made to the proposal in Switzerland by the canton of Geneva to nationalize fire insurance, which was rejected in view *inter alia* of the legal opinion that state monopoly cannot be considered 'a common need' (*utilité publique*).

Vol. xxx, No. 4, October 1950, contains a complete index of articles etc. that have appeared in 1921-50 with an introduction, a dictionary of terms etc. and explanations and definitions.

## SWITZERLAND

*Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker*,  
Vol. I, Part 2, 1950

- E. MICHALUP. *Über unterjährig zahlbare Zeitrenten*, pp. 173-177. Develops formulae involving powers of  $i$  up to the second which express  $s_{\overline{t}|i}$  and  $a_{\overline{t}|i}$  with an error of a unit or less in the eighth decimal place.
- H. JECKLIN and H. ZIMMERMANN. *Reserveberechnung hyperbolischer Interpolation*, pp. 179-196. Jecklin's hyperbolic interpolation formula (see *J.I.A.* LXXV, 114) is very successful when applied to policy values ranged according to duration. Hence if two constants,  $\alpha_x$  and  $\beta_x$ , are recorded on each valuation card the simple relation

$$\sum_x S_x \cdot t V_x \doteq \frac{t \left( \sum_x \alpha_x \right)^2}{\sum_x \alpha_x - t \sum_x \beta_x}$$

produces the approximate total of reserves on policies of duration  $t$ , all the usual types of limited-period assurances (endowment assurances, pure endowments, children's endowments, joint endowments, etc.) and various valuation bases being aggregated. From the numerical examples given the total error in a portfolio thus valued might be a few units per mille. By changing the valuation constants after each ten durations the authors show numerically that the accuracy is improved more than ten-fold.

- H. RUCH. *Über ein Schätzungsverfahren für die Berechnung des Bilanzdeckungs-kapitals*, pp. 197-214. Estimates the valuation reserves from a knowledge of (i) the sums assured and net premiums at that and the previous valuation, (ii) the reserves at the previous and some earlier valuations, and (iii) the reserves released by exits during the inter-valuation period.

- E. ALBRECHT. *Neue Beobachtungen der schweizerischen Unfallversicherungsanstalt über den Verlauf der Invaliden- und Hinterlassenenrenten*, pp. 215-228. A point of interest in this review of the experience of the Swiss accident insurance institution is the 'revision rate' of annuity benefits as total disability is replaced by partial disability and eventually by full activity.
- O. W. SPRING. *Kleine Bemerkung zu einer Klasse versicherungstechnischer Approximation*, pp. 229-238. One of Jecklin's examples (see *J.I.A.* LXXVI, 282) is investigated analytically and a generalization developed.
- H. NAGLER. *Über ein versicherungsmathematisches Problem mit zwei charakteristischen Dauern*, pp. 239-248. The author continues his investigation on 'critical duration' in *J.S.S.* ix, 199, by considering a deferred cash-return annuity in which two such durations arise. He proves that if the annuity payment exceeds a given multiple of the immediate death benefit both critical durations are uniquely determined and provides a simple method of computational procedure.
- E. KAISER. *La distribution des revenus dans la technique mathématique de la sécurité sociale*, pp. 249-335. If the ratios of mean incomes at successive ages (salary scale) are invariant with time and if the corresponding distributions of incomes are identical except for changes of scale, the problem of the future distribution of incomes in the population is theoretically solved. It is shown how this approach allows the application of Pareto's law to the low income groups usually considered to be beyond the range of this law. The development is extended to the evaluation of future social security benefits and payments. There are no numerical examples.