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REVIEWS

Actuarial Practice of Life Assurance. By H. F. Fisher and J. Young.
[Pp. viii+450. Cambridge University Press, 1965. 50*s*.]

The training of students in the actuarial aspects of life office practice is of the first importance to the profession because many more actuaries are engaged in this field than in any other. In producing an up-to-date text-book to replace the book by Coe and Ogborn which has served students so well, the authors have undertaken a responsible and difficult task.

The book forms almost the whole of the prescribed reading for the Institute Fellowship Subject (2) examination which is at the less advanced level. Its importance in practice is, however, probably more as the foundation for the wide course of reading for Fellowship Subject (3) at the more advanced level because most students choose to be examined in life office work at this level. Thus the book should be judged on whether it covers Fellowship Subject (2) adequately and, more important than this, on whether it facilitates an understanding of basic principles which will enable the student to appreciate the Fellowship Subject (3) course of reading.

As regards the coverage for Fellowship Subject (2), nothing is included in the book on approximate valuation and, contrary to what the authors say in the preface, the official text-book on this subject by Bizley and Lacey is not included in the course of reading. It is not easy to understand why the book does not deal with alterations of policies; this omission makes it necessary to retain in the course of reading the paper on this subject by Whitehead. The depth at which the book is presented seems entirely appropriate to the Fellowship Subject (2) examination.

The book is presented in five sections. An introductory section covers historical developments and there follows a section entitled 'Mortality and Financial Background' which covers, for all types of business, mortality, underwriting and the financial aspects of premiums and valuation. The three final sections deal respectively with ordinary life assurance, industrial life assurance and group pensions schemes and annuities. It is very desirable that principles should be explained before the student considers their application to particular sections of the business and this is achieved by this form of presentation. It does, however, make it difficult for the student to collect together all that is relevant to a particular problem. For example, valuation principles are discussed in Chapter 2 in relation to their historical development, in Chapter 3 in relation to modern conditions, in Chapter 8 which deals with the financial background of life offices and in Chapter 10 which deals with the financial aspects of actuarial investigations. The division of the subject in this way may have created difficulties for the authors. Two fundamental points—the choice of the rate of interest for a net premium valuation and the choice of the rate of future bonuses for a bonus reserve valuation—are not discussed as adequately as would seem desirable.

Another important point on which clearer guidance could be desired is the level of bonus to be provided by the bonus loading in with-profit premiums. On page 225 it seems to be suggested that the loading should provide for the level of bonus likely to be declared but if, as would be expected in current conditions, the interest rate used in the premium basis is lower than the current earned rate this will mean that premium rates will be increased. Similarly, the bonus reserve valuation of the existing business described on page 226 would, unless the estate was eliminated, produce a future bonus rate higher than current premium rates would support—which would again point to an increase in premiums. In the valuable discussion of the distribution of surplus from equity investments on page 310 the authors mention the possibility of declaring a larger bonus for existing policyholders and increasing the premium rates for new entrants so that the same rate can be allowed to them. It might be thought that the authors were advocating the maintenance of the current rate of reversionary bonus almost regardless of the consequences on premium rates—but on page 308 we read that the problems of equity are more easily handled when the bulk of the assurances are on the same premium scale.

The description of U.K. legislation is also scattered over several chapters. Discussing the legislative steps taken to ensure the financial stability of an office, mention is made on page 78 of the requirements as to the minimum paid-up share capital of a proprietary office and the deposit for a mutual office and of the returns required under the Insurance Companies Act, 1958. It is not until page 160 that it is stated that a certificate as to the value of the assets is required when a valuation is made; it does not, however, appear to be recorded that the Balance Sheet must state how the value of the Stock Exchange securities is arrived at. The power of the Board of Trade to investigate the affairs of a company whose solvency is in doubt is not mentioned until page 195.

The importance of regarding assets and liabilities together is very well brought out. The theory of immunization and its implications are very fully and clearly described in Chapter 8. It is quite properly stated that immunization is a theoretical concept and in view of this it possibly receives too much attention. There are several examples of a discussion of a situation on the assumption that the office is immunized perhaps at the expense of a discussion on the assumption, more likely in practice, that it is not.

The treatment of industrial life assurance and of group pensions schemes and annuities should be very valuable, particularly to those who are not familiar with these types of business in practice. The clear description of the various funding methods under group pensions schemes and the distinction between the rate of funding and the rates of premium charged by the office should leave students in no doubt on this important matter.

The discussion in Section 4.2 on equity to policyholders is excellent but there is little discussion in Chapter 15 comparing the extent to which equity is achieved in changing conditions by the various systems of distributing surplus.

The discussion of expense loadings in office premiums in Section 9.6 is rather less complete than might be desired. The treatment, in the analysis, of expenses arising from premiums payable more frequently than annually is not described nor is the method of making a fixed charge per policy or per renewal to cover expenses which are constant per policy or per renewal explained (although there is a brief reference to it in Section 11.4).

Section 14.6 contains a numerical example of analysis of surplus on both a net premium and bonus reserve method of valuation and should be very valuable in giving students an insight not only into surplus analysis but into the financial operations of a life office.

In the discussion in Section 19.4 as to the equity of the legally prescribed minimum paid-up policy and surrender value bases under Industrial Branch policies it is demonstrated that the prescribed mortality basis is too heavy, but the effect of this on policy values is not brought out.

From the comments above it will be seen that the book provokes discussion and this is a very good thing. It usually says enough to enable a student to understand basic principles but leaves enough unsaid to encourage him to think for himself. This review may seem unbalanced because it yields to the temptation to respond to the provocation to discussion at the expense of devoting space to praising all the very good features of the book.

Because we do not cease to be students when we have passed our examinations, the authors have placed us all in their debt by doing a very difficult job very well indeed.

R. S. SKERMAN

Actuarial Aspects of Pension Security. By WILLIAM F. MARPLES.
[Pp. xix+210. Published in U.S.A. by R. D. Irwin Inc. Homewood, Illinois. $6]

THIS book is published for the Pension Research Council of the Wharton School of Finance and Commerce, University of Pennsylvania. The Council was created in 1952 in response to a feeling that there was an urgent need for a better understanding of the private pension movement. This book is the fifth and last of a series dealing with the Council's inquiry into the security of such arrangements. For each book a task-force (*sic*) was assembled and Marples was a member of the force for this particular section of the inquiry. As events turned out, he, in fact, wrote the book and to him must be given the major credit.

After dealing generally with the function of an Actuary in the first chapter, pointing out in passing the prime importance of the initial estimate of costs, since this directly governs the type and scale of benefits offered, and that an Actuary is concerned with valuing assets as well as liabilities, the author deals with the design of a Pension-Plan in Chapter 2, and in Chapter 3 with the types of benefits which are commonly provided. In Chapter 4 he considers extensively and in detail the various actuarial factors entering into the assessment of costs; apparently he favours using salary scales related to earnings levels at a valuation date without direct reference to likely increases in these levels in future, leaving any resulting liabilities to be dealt with as they arise, to the extent that they are not covered by extra interest earnings and releases of reserves from withdrawals, a method which in the U.K. (where more funds provide final salary pensions) has often become unsatisfactory. The author states that a growing practice is for an employer to ask for alternative figures on different assumptions.

Once costs have been established, the years in which these costs are to be met by payments from the employer have to be determined, and the various arrangements adopted are closely examined in Chapter 5; the question of the treatment of pension liabilities in an employer's accounts is also dealt with. Incidentally the author, after considering various circumstances and factors (economic and social) concludes that the only fund where contributions should be made on a pay-as-you-go basis is the O.A.S.D.I. (Federal National Insurance Scheme). In this chapter the author introduces a new terminology for classifying the various methods of funding which has been adopted by a technical council of Pennsylvania University; this new terminology is not used uniformly later in the book.

In Chapter 6 the author turns to consider investment income and asset valuation and makes some useful and telling comments on the importance of improving interest earnings. In Chapters 7 and 8 he considers respectively funds where no individual allocation of contributions is made and those where there is such, and deals usefully with problems of deposit administration plans and others of a similar nature offered by insurance companies.

Chapter 9 covers multi-employer plans which are so widespread in the U.S.A. and lightly hints at the pressures likely to be exerted on the Actuary in connexion with them.

Chapter 10 deals with the profession of Actuary, mentions that (in U.S.A.) all are not Actuaries who so term themselves, and refers to problems of professional conduct, especially areas of conflict of interest such as where insurance commission is paid or where advice is given regarding deposit administration.

The final chapter, 11, summarizes how security of pensions is affected by the work of Actuaries. The author returns to his point about conflicts of interest and the desirability that the lay public should appreciate the circumstances in which Actuaries employed by insurance companies or by insurance brokers give advice and the obvious limits to their actuarial spheres.

As might be expected from the author, this is a sound workmanlike book which is readable and reasonably concise. It gives a clear and interesting description of the American pension scene which will be of particular value to those advising the many subsidiaries of American companies in this country.

J. K. SCHOLEY

The Aged in the Welfare State. By PETER TOWNSEND and DOROTHY WEDDERBURN [Pp. 150. London: G. Bell & Sons Ltd. 1965. 21*s*.]

THIS booklet is No. 14 in a series of Occasional Papers on Social Administration, begun in 1960 by an Editorial Committee under the Chairmanship of Professor Titmuss and intended as a medium for studies that are suitable neither for a short article nor for a full-length book. The present work is, however, in the nature of an interim report on a survey the general theme of which 'will be explored more fully in later publications', and appears 'because it seems important to publish as soon as possible the information which is particularly relevant for immediate policy decisions'.

The list of Social Surveys of Old People in Britain during the past twenty years, given in Appendix I, shows a long series of investigations mostly based on quite small samples. With one (official) exception all the work described in this list is less extensive than the current survey, relating as it does to over 4,000 people chosen on a sound and nation-wide sampling design, and forming part of a plan involving parallel studies in Denmark and the United States of America. The response rate was about 85%. It is not at present possible to comment on the suitability of the questions asked, the quality and consistency of the interviews or the steps taken to verify the representativeness of the sample, as such matters are either not mentioned or only very barely touched upon.

The general conclusions drawn by the authors are concisely summarized on pages 15 and 16. They find little evidence to suggest that family responsibility for the old has been undermined by the welfare state, and in their view the issue is essentially one between the community services and those without relatives. They argue that, partly because the services have not been adapted to changing social conditions, they do not always reach everyone who needs them, especially the housebound. In particular, national assistance is not drawn by all who are qualified to receive it.

This last finding comprises the outcome of earlier surveys, following which Parliamentary Questions have stimulated the inception of an official inquiry on a larger scale, the results of which are—at the time of writing—awaited. Pending the publication of these results, and of a fuller account of the technical bases of the unofficial investigation described in this booklet, it would seem well to suspend critical judgment. In the meanwhile, it may be said that the present work presents its case clearly and in a persuasive style.

P. R. COX

Mathematical Theory of Probability and Statistics. By R. VON MISES, edited by HILDA GEIRINGER.

[Pp xiv+694. London and New York: Academic Press, 1964. £7 17*s*. 6*d*.]

THIS is an unusual form of book, written posthumously and using as a basis sets of notes for lectures that Richard von Mises gave at Harvard, Rome and Zurich in the late 1940s and early 1950s. Von Mises had intended to put the notes together himself to form a comprehensive work on probability and statistics, that would provide a successor to his 1928 work on probability entitled *Probability, Statistics and Truth.* With his death, the various notes have been edited by Hilda Geiringer to form a coherent whole.

It is a long book of some 700 pages, broken into just twelve chapters. The first two chapters deal with fundamentals of probability presented, as is to be expected, from the frequency theory approach. Set and measure theory is used extensively, the argument being extremely mathematical, but rigid. Chapters 3 to 6 present the concepts of random variables, characteristic functions and derivations of the standard distributions met with in statistical theory. Further distributions are studied in Chapter 8. Chapter 7 is a crucial one dealing with inference from the Bayes point of view, and the subject being taken up again and considerably broadened in Chapter 10. The latter chapter devotes considerable space to the Neyman-Pearson approach to the testing of hypotheses and the concept of confidence limits, as well as giving a good account of the principles of maximum likelihood. Chapters 9 and 11 are concerned with the analysis of statistical data, in the former chapter through many of the standard statistical tests (although the Smirnov and Kolnogorov-Smirnov tests get a rather larger share of the limelight than is usual in an English language text-book), whilst the latter describes correlation analysis. The final chapter discusses a generalized theory of statistical functions.

This is not a book for the reader seeking to learn about detailed applications of statistical theory, particularly as many recent developments in the statistical field are, not surprisingly, left uncovered; it is for the university graduate mathematician who is primarily interested in the application of modern mathematics to probability and some of its ramifications. Nevertheless, this limitation should not conceal the fact that some sections are exceptionally well written from a statistician's point of view, for example the sections on the w^2 test of von Mises and on the problems of 'runs'. There are numerous references throughout the book, and the mathematician should find the approach a stimulating experience if he is prepared to follow up the various references. Many of the proofs and demonstrations have the elegance that has come to be expected from the writings of von Mises. This work must serve as his memorial. Like his earlier book, it is based on lecture notes and has the same pigeon-holing drawbacks that seem to go hand in hand with the attempt to turn lectures directly into a book—chapters can be flexible in length, lectures cannot. But the present book demonstrates vividly the wide grasp of his far-ranging and powerful mind. It is a book to stimulate as well as to educate, but not one for the general practitioner to dip into at the end of a long day.

P. G. MOORE

ERRATA

In *J.I.A.* Vol. 91, p. 72, in line 27:
for 1956 *read* 1965.

In *J.I.A.* Vol. 91, p. 328, in lines 27 and 28, the three percentages should be 5, 0·8 and 0·6 respectively.