

## REVIEWS

*The Analysis of Mortality and other Actuarial Statistics.* BY B. BENJAMIN and the late H. W. HAYCOCKS

[Pp. viii + 392. Cambridge University Press, 1970. £3.00]

THIS book was written as one of a series of text books for students preparing for the actuarial examinations but it is also intended to appeal to non-actuarial readers. The work was completed by B. Benjamin after the sad death of the co-author when only one-third of the book had been written.

The book starts with a discussion of the various measures of mortality. It covers the use of crude death rates and discusses in general terms the analysis of death by causes. The concept of senescence is introduced.

It continues with a detailed treatment of 'exposed to risk' formulae which are approached in a direct manner and the exposition is very clear. The difference between the rate-interval and the period of the investigation is explained and, although the approach is essentially practical throughout, occasion is taken to discourse philosophically upon more esoteric matters; for example, when discussing whether we should count the number of lives or the number of policies in the experience. The reader is taken gradually through the 'exposed to risk' theory and it is not until Chapter 5 that he is presented with the full analysis of mortality rates by age and duration.

The book goes on to consider multiple decrement tables in a very readable manner. We are first presented with an actual table, we are told how it was constructed, and finally the theoretical aspects, such as the forces of decrement, are covered. The book goes on to interpret the associated family of single decrement tables and the discursive style of the book is well illustrated by an extract from paragraph 6.35:

'Populations consist of individuals. They do not vary in number continuously, but by discrete amounts. The assumption of continuity is convenient and it is not necessary to indulge in a metaphysical enquiry as to whether forces really exist. It is sufficient that from them we can infer rates which do exist in that they can be measured in the real world.'

The use of multiple decrement tables is fully explained by means of worked examples in the pension fund field.

With Chapter 7 the book turns to the idea of a sickness rate. The essential difference between this rate and the mortality rates discussed earlier is clearly described. The practical problem of how to define sickness is discussed and various solutions to the problems arising from varying 'sick-pay periods' and the 'off periods' are set out.

From a discussion of marriage and fertility rates, the book naturally turns to methods of forecasting population size with particular reference to England and Wales. The logical sequence is then interrupted by a short but useful chapter on selection and heterogeneity of data, and the effect of these factors on mortality rates.

The next six chapters of the book deal with the methods of graduating the crude data obtained from the experience. Treatment therefore is very detailed but the presentation is improved by the inclusion, where possible, of examples taken from actual experiences. For example, T. B. Sprague's paper (1887) dealing with the Female Government Annuitants experience is used to illustrate the methods of graphical graduation.

Mortality tables currently in general use are discussed in Chapter 17. The emphasis

is on the practical methods which were used in their construction. This chapter concludes somewhat incongruously with a review of recent work in Britain and America on the survival prospects of people suffering from particular impairments.

After a survey of some social and economic factors known to affect mortality, the book ends with a brief chapter indicating the ways in which the 'exposed to risk' theory which has been developed in the book may be applied in non-life situations.

Whilst providing a complete survey of the field of study required by the actuarial examinations, the book may certainly be read by non-actuarial readers who will find their interest sustained by the vigour and style of the presentation. This is no mean feat when it is considered that the subject matter has always been at the centre of the mystique of actuarial science.

G. MITCHELL

*Compound Interest and Annuities Certain.* BY D. W. A. DONALD.

[Second Edition. Pp. viii + 312. Cambridge University Press, 1971. £1.40].

WHEN the first edition was published in 1953 it was, rightly, favourably compared with its predecessor 'Todhunter'. The author's approach to the subject by way of calculus, his breaking down into manageable 'bites' some of the involved processes met in this subject, and the many and very comprehensive examples given, led the reviewer to suggest that any student who conscientiously worked through all the examples and exercises should not trouble the examiners in this subject more than once. The present reviewer, with the advantage of hindsight, notes with regret that the rate of success in this subject in the Institute's examinations did not dramatically improve with the introduction of this book. As a tutor, he found many students experienced difficulty in understanding the early chapters. The pitfalls of an indiscriminate use of Makeham's formula for the valuation of redeemable securities did not appear to be sufficiently emphasized. The assumption normally made when calculating yields (that future interest payments may be invested at the same rate) was not given enough prominence.

Since the first edition which appeared almost 20 years ago, the emphasis on some parts of this subject has decreased—for example, cumulative sinking funds now hardly justify the extensive treatment they are given—and on others increased—the use of computers in this subject is not mentioned. The reviewer is therefore disappointed that the second edition follows the first edition almost word for word except that sterling values are expressed in decimal currency and that the chapter on taxation has been developed to deal with capital gains tax.

The treatment of the taxation of capital gains is by way of an adjustment to Makeham's formula. The reviewer would have preferred a more general approach, first calculating the value of an investment ignoring the effect of capital gains tax but making due allowance for tax on interest, giving a value  $A'$ , say.

If the actual price is  $A$ , the capital gain is  $(C - A)$  and the tax thereon, say  $t(C - A)$ . The value of the gross capital repayments  $K$  will have been found in the first part of the calculation, so that the value of  $t(C - A)$  is  $t(C - A)K/C$ . Whence

$$A = A' - t(C - A)K/C.$$

What further development is necessary?

The 'writing up' of redeemable securities making allowance for capital gains tax is fully analysed but does this exercise warrant the extensive treatment it is given, particularly in view of the inherent weakness of the underlying assumption as to constant future interest rates?

This is still a good text book. The reviewer only regrets that the opportunity has not been fully taken to make it even better.

D. J. BOND

*The Art of Investment.* BY A. G. ELLINGER.

[Pp. 293. Bowes and Bowes, London, 1971. £5.00.]

THIS is the third and revised edition of a book first published in 1955. The author, who is well known in the investment world, is the founder of a company providing advice to investors which is based largely, but by no means entirely, on the study of charts of share prices and other market data. The activity of studying such charts is now known as technical analysis, a not very suitable name unless it is realized that what is analysed is the market. Their opposite numbers in the investment field who study the industrial, commercial and economic forces bearing on individual companies are known by an equally unsatisfactory name, fundamental analysis, which smacks of the bible belt.

The book is divided into three parts. The first has the heading *The General Theory of Stock Exchange Fluctuation*, the second *Practical Applications of the General Theory* and the third, which occupies more than half of the book, is called *The Theory and Practice of Security Charts*. It is not specifically stated to whom the book is addressed but from internal evidence it would appear that Mr Ellinger is writing mainly for the private investor with modest funds and who lacks the resources available in the research department of a large stockbroking firm. To such an investor Mr Ellinger offers a do-it-yourself kit.

Scattered throughout the book is much general comment and advice which all investors would find useful. In particular, Chapter 1, *The Market*, could well be read by students coming new to the subject of investment. Nevertheless these nuggets of precious metal are embedded in strata made out of the author's basic philosophy that the present movement of share prices will help us to foretell their future movements. Those seeking to use this book as a practical guide should turn very early to the last chapter where the basic tools and basic rules are listed. As far as the tools are concerned these are:

- (i) a share index,
- (ii) a fixed interest indicator,
- (iii) a chart of price-earnings ratios,
- (iv) the confidence indicator,
- (v) the advance and decline line, and
- (vi) the *Financial Times* industrial activity index.

These are all defined and discussed in the text and Part Three of the book consists mainly of examples of these methods in use. The author plays very fair and describes failures as well as successes. Oddly enough, in this part of the book he often drifts into explanations that plainly owe more to fundamental than to technical analysis.

It is easy to assume that such methods as the author describes will have little appeal to those with an actuarial background but it is a fact that many institutional investors maintain or subscribe for charts of prices of individual shares or of whole markets. It cannot be assumed from this that they accept the author's methods but it is likely that they believe that such charts at least help in the timing of the purchases and sales of shares. To the fundamental analyst chartism looks completely subjective. Patterns and trend lines on completed charts may appear wholly convincing but it is no doubt far from obvious in the build-up stage. Indeed, the author himself states that the chartist's best friend is the india-rubber.

In the last few years all those giving investment advice have had to contend with the random walkers who claim that the sequence of prices produced by the stock exchange is random and if it can be sustained this theory calls into question a large proportion of the methodology of technical analysis. Now the giving of investment advice, on whatever method it is based, involves the forecasting of the future and this is a field in which the level of success cannot be very high. To prove that they have something of value both technical and fundamental analysts must publish their results and the methods by which they have been achieved. The present book does not give figures for the performance of any portfolios managed on the principles of technical analysis.

However, your reviewer feels somewhat precluded from insisting too strongly on results. The author, who writes gracefully in a field that has not attracted much literary talent, has called his book *The Art of Investment*. The practice of an art is its own reward and this is also true of investment. Many investors derive much pleasure from managing a portfolio of ordinary shares. If the Random Walk theory calls into question the basis on which they are advised it also means that, as well as having fun, they will in the long run achieve an average result. With the help of the author's more general investment advice they may even from time to time make real gains.

D. WEAVER

*Fundamental Mathematics of Life Insurance.* BY FLOYD S. HARPER and LEWIS C. WORKMAN.

[Pp. xiii + 394. Richard D. Irwin, Illinois, 1970. \$10.]

IF there are any students who wish to acquire an understanding of the basic concepts of life insurance mathematics, but whose mathematical knowledge is so scanty that they do not know how to add together  $2/3$  and  $1/6$ , or to find an expression for  $S$  given that  $S - C = P$ , this is an ideal book for them. One is bound to admire the painstaking manner in which the authors conduct the reader step by step through the most elementary problems in arithmetic and algebra followed by compound interest, mortality tables, life annuities, net and office premiums, reserves, non-forfeiture values, etc. At the same time one wonders whether the student who needs to have everything explained so meticulously will only succeed in acquiring that 'little learning' which is dangerous rather than useful.

One excellent feature of the book is the frequent use which is made of 'line diagrams'. It seems a pity that the authors did not use this method for deriving such relationships as

$$a_x^{(4)} = a_x + \frac{3}{8}$$

instead of dismissing the problems as 'beyond the scope of this book'.

The authors are to be commended for including the following practical warning: 'It pays to estimate the answer in advance and to assure oneself that the answer, when obtained, is reasonable'. It would have been better still if they had pointed out that this useful piece of advice is applicable to any problem requiring an arithmetical result and not merely, as they imply, to a multiplication or division.

P. F. HOOKER

*Vesting and Termination Provisions in Private Pension Plans.* BY CARL H. FISCHER.

[Pp. iv + 39. American Enterprise Institute for Public Policy Research, Washington, 1970. \$2.00.]

THE author is Professor of Insurance and Actuarial Mathematics at the University of

Michigan and this study sets out the results of an enquiry into vested benefits awarded on withdrawal from occupational pension plans, with particular reference to the security for such benefits in the event of termination of the plans. It appears that in the U.S.A., as in the U.K., scant attention is given to the dissolution provisions when a pension plan is instituted. Even when anomalies are noted by those responsible for the administration of the plan, the contingency of dissolution may seem so remote that a revision of the dissolution clause may be regarded as a matter of low priority. If a pension plan is to honour its obligations in respect of Vested Benefits (denoting benefits in course of payment to pensioners, deferred benefits already awarded to ex-employees and the deferred benefits which would be provided for serving employees if they withdrew from service), it is necessary that the total assets of the pension plan cover the discounted values of the Vested Benefits. As the author points out, this is a necessary condition but it is not a sufficient condition. It is also necessary that the assets allocated for each individual in the event of the winding up of the pension plan cover that individual's Vested Benefits. On the evidence adduced by the author, this point has often been overlooked in U.S. practice.

Perhaps a review of U.K. practice would be opportune in view of the possibility of the introduction of legislation on Preservation of Pension Rights. It is common practice in U.K. pension plans to give priority to provision for continuance of pensions in course of payment at the discontinuance of the plan but this protection does not usually extend to frozen pensions for ex-employees and to the withdrawal benefits of serving members. Thus, in general, after making provision for present pensioners, the remaining assets are applied to satisfy accrued liabilities, both Vested and non-Vested, without priority. There could thus arise a situation in which assets exceeded the value of the Vested Benefits but fell short of the combined value of Vested and non-Vested Benefits; some of the ex-employees and serving members might then receive less than their Vested Benefits. There may be difficulties in altering existing Trust Deeds to create priority on dissolution for Vested Benefits in the wide sense of the definition above, but if preservation of pension rights is to be fully effective some such protection seems to be required.

The paper offers useful reading for administrators of pension plans and for potential legislators. The clear and straightforward presentation of the material makes it suitable for a wide readership.

P. BASTEN

*The Truth about Life Assurance.* By MARGOT NAYLOR.

[Pp. 186. G. Allen and Unwin, London, 1971. £2.50.]

THIS book is written 'by a financial journalist whose primary interest is family finance and the savings and investment that go with it'. The author prefaces this remark by saying that it is not written 'by an expert in life assurance' but that is too modest an assessment. Someone who can cover not only the salient features of ordinary life assurance and the more specialized type of contract but also the intricacies of Estate Duty and the complexities of the rules for qualifying policies introduced in the Finance Act, 1968, has certainly 'done her homework' and cannot claim to be a non-expert in the life assurance field.

The book is written in a most readable fashion and its somewhat chatty style—life assurance is a 'long term thing'—makes a refreshing change and takes this book out of the purely text book class without losing any of its value as a work of reference. It is written primarily to enable the layman to be more fully informed regarding the 'Truth about life assurance' and concentrates particularly on the position of a married couple,

although there are chapters also on life assurance for single people and for minors. Thus it starts with the various methods of financing house purchase and continues with a number of ways of investing through life assurance, comparing these with other forms of investment. This in turn leads on to means of providing for retirement and also for covering estate duty. The whole is admirably illustrated with many numerical examples and so benefits the 'numerate' as well as the 'literate'.

The book is also of some historic interest because it is written at a time when many specialized forms of contract have been developing, e.g. the ten-year plus, the equity based, the building society linked, etc. and, whereas conventional text books tend to concentrate on the traditional forms of contract, it is very useful to have a book with the more recent variations so fully illustrated and discussed. A disadvantage of this, topical, approach is that it could soon become overtaken by events not only in the stock market but also by changes in taxation and legislation. However the book contains ample signposts to guide one in the choice of contracts in varying conditions and, for good measure, an entire chapter is devoted to 'How to get advice'.

The book has several aspects of interest to actuaries, and also seeks to define them, in the extensive 'Glossary of Terms', as a 'Mathematical expert who is qualified to solve monetary problems that depend on interest rates and probability and to compile mortality tables'. This does, however, place rather more emphasis on actuaries' mathematical qualities than on their wider ranging qualifications.

Of particular interest to actuaries in the life office field is the Appendix on the 'Technical and Moral Problems that Confront Life Offices'. It deals with selling methods, investment problems and a life office's influence on share values and in fact raises so many interesting issues that one could have wished it elevated to a chapter rather than an Appendix.

To sum up: it is always helpful to actuaries to know how the layman views the problems they are called upon to resolve and this essentially practical books should be useful to them in this field.

MONICA C. ALLANACH

*Theory and Practice of Investment.* By T. G. GOFF.

[Pp. xii+220. Heinemann, London, 1971. £2.50.]

MR GOFF is a trust officer at a bank and has a Scottish background, so that it is no surprise to find that his book is both meticulous and workmanlike. It is a description of the factors, mainly technical, administrative and legal, which a trustee must understand and take into account when dealing with investments. No pretence is made to discuss the economic considerations which influence the choice of a particular investment at a given moment, nor the finer points concerning the interpretation of company accounts, the analysis of financial performance and such like matters which tend towards the artistic rather than the scientific side of the practice of investment.

The book describes the different types of investment media from National Savings to real property; it deals with the various categories of stocks and shares, with company organization and the operation of the Stock Exchange and with Stock Exchange procedure, including the transfer of title and new issues. Portfolio planning is tackled from such points of view as tax, redemption yield, spread of risk and the investment powers of trustees. There is one chapter on share analysis and one on chartist theory, and there are descriptions of the Take-over Code, the operation of the dollar pool, the law on prevention of fraud and chapters on income and corporation tax and capital gains tax. These are wide ranging and individually complex subjects to cover in a book of just over 200

pages, and much of the treatment is therefore very brief and concise. Each chapter has specimen examination questions and suggested answers, which serve both to illustrate and amplify the text.

I would say that this kind of book is too serious for the armchair investor, and yet lacks the detail required by the whole-time professional. Falling between these extremes it is an excellent introduction to the subject and will meet the need of examination candidates (specifically for the Institute of Bankers and the Chartered Institute of Secretaries) and people in other related professions, who require a sound background knowledge of investment matters. The advantage and the danger of its concise presentation is that it is like a concentrated food capsule: it is convenient and contains all the necessary ingredients for health, but it does not give the consumer any opportunity to appreciate the flavour of the contents. Also the brevity may make it easy to find the answer to a question in the text, but the apparent completeness and finality of that answer can be misleading for, in practice, there is almost always an unfamiliar quirk, a fact which may surprise Mr Goff's readers. But for its purpose it is an admirable book.

G. J. TITFORD