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REVIEWS

Equitable Assurances. By M. E. OGBORN, F.I.A., F.S.S.

[Pp. 271. London: George Allen and Unwin, Ltd. 1962. 42*s*.]

THIS attractive volume is produced, in every respect, in a style worthy of the occasion that it commemorates. It tells, as the sub-title indicates, 'the story of life assurance in the experience of the Equitable Life Assurance Society 1762–1962'. The original name chosen by the founders for their offspring was 'The Society for Equitable Assurances on Lives and Survivorships', from which the title of this history is aptly extracted.

Warm recognition by the Institute of the importance of this notable bi-centenary is accorded by Mr J. H. Gunlake's Presidential Foreword. In it he stresses the inner significance to all actuaries of the historic events which strew the successful path of this first experiment in scientific life assurance.

In 1862, when the Society attained its centenary, no commemorative record appears to have been prepared, an omission which renders all the greater our present gain. It was left to Cornelius Walford to pay, some years later, the appropriate tribute uniquely merited by the achievements of those early days. He wrote, as the author reminds us in the opening words of his Preface, that the history of the 'Equitable' was the history of life assurance in the United Kingdom, adding 'If that be not strictly true, it is yet much nearer the truth than the uninformed could imagine'. Walford would surely be gratified if he could know that, today, the uninformed, can he but beg borrow or afford a copy of this volume, need no longer imagine but may learn for himself how strictly true that tribute is.

Life assurance, we read, was born in the middle of the period 1740 to 1780—Johnson's England—and 'came when it did because the climate was favourable, England was prosperous; the mathematics of life contingencies was at hand; and there was an unsatisfied demand for the protection that life assurance can give'. It also came when it did because one man, James Dodson, F.R.S., was determined that it should. Largely responsible as he was for the availability of the necessary mathematics, he also realized fully the benefits that life assurance could confer. He conceived the vision of a mutual life assurance society conducted on scientific lines, and was, all in all, the ideal architect of the 'Equitable' to be.

The extent of his personal contribution was amazing. By the end of 1756 he had written his First Lecture on Insurances in which he laid down the principles, valid today, on which a mutual life assurance company should operate, including one all-important aspect then hardly understood at all, the part to be played by the life assurance fund. He had also computed a complete table of annual premiums for whole life policies and was engaged in getting together persons interested in obtaining a charter for the new Society.

It was indeed tragic that, although he lived to see the petition for a charter presented to the Privy Council in April 1757, he died only seven months later. But his labours were not in vain for it was his table of premiums that was used when the 'Equitable' was formed, premiums which proved to be well on the safe side.

One colourful individual who was brought into the project at the earliest stage

was Edward Rowe Mores, described by the author as possessing 'exceptional ability in academic studies, yet with a quarrelsome temper'. His task, in shouldering the main burden of affairs between the passing of Dodson and the arrival, as consultant adviser some eleven years later, of Richard Price, D.D., F.R.S., proved to be indeed a heavy one. His main problems were first the pre-natal struggle, protracted but unsuccessful, to obtain a charter and, next, the dispute, bitter at times, between the subscribers who put up the initial cash and the other members.

In telling the story of these eventful years, the author exhibits his ability to discharge the dual role of biographer and historian, if the two can be separated. In describing the men behind the Society he gives us not only their portraits but also their pedigrees, thus revealing his keen interest in genealogy without ever allowing the wood to be obscured by the trees.

By 1770, with the Society eight years old, the worst of its teething troubles appeared to be over. The subscribers then accepted a 'generous settlement' of their claims and, thereby, this troublesome and somewhat non-mutual bone of contention disappeared. From then on the chapter-headings themselves herald the dawn of a happier era—The New Regime (1769–1772); The Foundations of Prosperity (1773–1782); A Time for Building (1783–1800) and Flood-Tide (1801–1819). During much of this period the Society enjoyed the combination of a strong President, Sir Charles Gould; a wise consultant, Richard Price; and an outstanding actuary, William Morgan. Working harmoniously together they did much to raise the Society to a position of complete pre-eminence amongst its contemporaries.

And now, who could be blamed for hoping that all was set fair for a future of expansion, prosperity and peace? With no shareholders to worry about, no agents to court, and no other institution with a comparable record, who or what could cause trouble? The answer is supplied by the history of the period 1816–93 and the years immediately preceding it, during which the Society suffered an almost incredibly long and painful series of attacks of growing pains.

The primary causes were twofold; the magnificent results disclosed by successive valuations and the lack of centralized control inherent in the un-incorporated nature of the Society's constitution. So surprisingly large were the earlier decennial surpluses, amounting as they did to 50 or even 60 % of the total assets, that the less enlightened and more vocal members could hardly be expected to look beyond the immediate prize to any longer-dated considerations of the future welfare of the Society. Moreover, the best-laid plans of the Actuary or Directors had perforce to be exposed to the hazard of submission to a meeting of the General Court of the members, where they incurred the risk of rejection or, even worse, of ill-considered amendment.

The classic example of this last-named danger was the Resolution of 1816, which drove a wedge between the interests of existing and future members, restricted growth almost to the point of jeopardizing survival, and rendered easier the expansion of less worthy institutions. It placed the Society in a strait-jacket, from which it did not feel morally free to seek escape until 1893, when it applied for and obtained registration under the Companies Acts, gaining, in the process, a completely 'new look' and, incidentally, assuming its present title. The author's account of this troubled period, enriched by frequent examples of the dignified language and clear foresight displayed by William Morgan in his series of addresses to the members, forms perhaps the most

absorbing part of this history and should prove of especial interest alike to present members of the Society and to all students of equity.

The date of incorporation divides this volume, in many respects, into two distinct parts. From then onwards, the story becomes one of comparative calm, growing maturity, prosperity and expansion, eventually resulting in the 'Equitable' as we know it today. By 1893, the storms were over and the crises past. Of the subsequent seventy years interest centres upon the last half century, a period of great expansion, inspired and dominated by Sir William Elderton. To him the author pays a tribute which may fittingly take its place among the many that have been, and will be, paid to his memory. Surely one of his greatest and most enduring monuments will be the 'Equitable' to which he gave so much.

No reader of this volume can fail to be impressed by the amount of research and scholarship devoted to its preparation. The author obviously approached and completed his work in a spirit of happy dedication. The result demonstrates, to the enjoyment of his readers, that dedication can be free from desiccation, and history from tears.

A. H. ROWELL

The London Stock Exchange. By F. A. A. MENZLER, C.B.E., B.Sc., F.I.A.

[Pp. viii+70, London: The Sunday Times. 1961. 3*s.* 6*d.*]

WRITTEN by a distinguished Past President of the Institute, this is one of the series of *Sunday Times* Careers Books. It is, however, much too good to be kept solely for the use of young people who are wondering whether to embark on a Stock Exchange career. Its analysis of how best to serve the needs of a client is so penetrating that it should be prescribed reading for all brokers (and jobbers too) and will be of interest to a much wider field.

With a foreword by the Chairman of the London Stock Exchange, the book deals with the crucial part, so often forgotten by its critics, played by the Stock Exchange in the commercial and industrial life of the community, and with its acceptance of vital responsibilities for the protection of the investing public. It graphically describes the workings of the 'House' and of Stock Exchange firms, and, in a section which will be particularly valuable to anyone contemplating a Stock Exchange career, holds the balance most effectively between the personal and academic qualities which go to make a good stockbroker.

The book serves actuaries well in its description of the work of the profession with its financial, statistical and investment training, and clearly underlines the actuary's particular qualifications to serve the Stock Exchange.

L. G. HALL

Measurement of Mortality. By HARRY GERSHENSON

[Pp. 340. Society of Actuaries. 1961. $7.50.]

THE measurement of mortality is a fundamental pillar of our actuarial science. Yet to the present-day student in this country it must appear that it has proved too great a task either to enunciate clearly and simply the theory of the subject, or to develop a satisfactory way of teaching it. For these reasons, particularly, a new textbook for students undertaking the examinations of the Society of

Actuaries is most welcome. For the same reasons it is unfortunate that one's hopes of an ideal treatment are not fulfilled.

A good textbook must satisfy two criteria: it must present a sound treatise on its subject and must be a vehicle for instruction of students.

The fundamentals of mortality measurement are very simple to state: the first step is the determination of an interval over which the rate is to be measured (for example the year of age between the 45th and 46th birthdays). The second step is to evaluate the number of deaths within that interval from the population under investigation and the number of corresponding lives (due allowance being made for lives not under observation for the full interval). The final stage is to interpret the resulting ratio. Surrounding the basic concept are practical problems: compiling the data and computation of the 'fractional exposure'.

The fundamentals are so very simple that any textbook should be mainly devoted to easing the difficulties of students. These arise not from the basic concept but from the form of the data. The ideal textbook should explain in simple terms what the problem is; it should pass, if necessary in stages, to the theoretical treatment and should end with instructional matter including examples.

Mr Gershenson's book does not present a coherent theoretical statement of the subject but devotes the vast majority of its 340 pages to teaching the student how to deal with problems. The method chosen is to use the analogy of a toll road with cars joining and leaving the road first at regularly spaced toll booths only, but later at other points as well.

The analogy is very helpful in many ways although it can be argued that it is not flexible enough. The mistake lies in using the toll road to formulate methods—not merely to illustrate them. On page 2 the author says 'the toll road analysis will remain throughout the text, a useful device for developing or for checking the formulas used in the measurement of human mortality'.

After a brief statement of the impracticability of the 'cradle to the grave' method in the study of human mortality chapter I is devoted to explaining the convention of the toll road, its relation to compound interest and life table identities. The idea of the car mile, i.e. one car travelling one mile, leads in chapter II to fractional exposure if a group of cars joins the road partway between toll booths spaced at mile intervals. Such a group is split into two, one subgroup being treated as entering at each of the booths; the proportion in each subgroup is determined solely by the point of entry.

Chapters III and IV use the same technique to deal with data obtained from individual records and data obtained from valuation or other grouped records. The methods are built up in sequence with elaborate development of symbols. No attempt is made to show the student how to deal with a problem without having recourse to the analogy. This quotation is revealing: 'the routine indicates that the exposure formula is built up around the deaths'. It suggests an automatic standard procedure and although the author stresses later that the student should be able to deal with a problem from first principles the teaching method does not encourage this.

The adaptation of the toll road to problems in which the age definition of the group is given by reference to calendar year of birth or valuation age is perfectly valid. It is a slight defect that it concentrates attention on age, albeit 'calendar' or 'policy' age, whereas the rate interval may be the calendar year or the policy year.

The fifth chapter on practical aspects of mortality studies includes much valuable material although not all would be applicable to students in this country. The final chapter seems out of place in a book which is so nearly a teaching manual. It analyses mathematically a number of mortality assumptions.

While the general plan of the book is disappointing, it contains a number of admirable features. On page 160 the student is reminded that a subdivision into policy year, calendar year or life year formerly emphasized the trivial differences instead of the basic similarities; a more formal approach could have demonstrated this more clearly. Another is the stress laid on the need to state assumptions completely but concisely, and there are many others. A particularly interesting section is that putting forward the arguments for a non-continuous exposed to risk formula.

The book is a long one but largely because the text is interspersed with an abundance of examples. The introduction of examples is essential but such extreme fragmentation of the theory is undesirable. It must moreover be remembered that only one aspect of the study of mortality is covered. It is quite possible that this book will be of great assistance to students who need a new approach to the subject. It is doubtful, however, whether it will solve the difficulties of the student approaching it for the first time. Nevertheless, the author deserves our thanks for his attempt to create a method of teaching this difficult subject.

E. B. O. SHERLOCK

Business Economics and Statistics. By A. J. MERRETT and G. BANNOCK

[Pp. 271. London: Hutchinson & Co., Ltd. 1962. 42*s*.]

THE book is divided into three parts as follows:

Part 1. Some Methods and Problems of Applied Micro-Economics
Part 2. Forecasting
Part 3. Statistical Methods and their Application to Market Research.

It is unusual to find all three topics dealt with in the same book. The authors say that the conception derives from their experience, over a number of years, in applying economics to the problems of the firm and observing how these economic problems are commonly tackled. In their view the optimum allocation of assets and resources of a firm requires systematic and rational evaluation of the cost and revenues arising from their alternative uses and the basis of these evaluations should be the allied disciplines of statistics and accounting.

The first two chapters are concerned with the assessment of capital projects and the valuation of assets. Ordinary accounting methods are considered useless for this purpose. The methods suggested are based on the possibility of estimating the net revenue from an asset and discounting this stream of payments at a rate of interest which is not necessarily equal to but is related to the firm's cost of borrowing. Uncertainty is taken into account by asking the body responsible for the estimates to state the percentage degree of confidence with which they expect the estimates to be achieved or exceeded. It is agreed that these confidence levels are not subject to the usual probability calculus, but the authors believe that reasonable estimates and confidence levels can be arrived at provided there is thoughtful and systematic 'ex post' analysis of the actual outcome compared with the estimates. Thus the book does not pretend

to provide a set of mechanical tools which can be used by any economist or statistician to solve the problems of the firm. Decision problems can be solved only by those with insight, experience and flair. Statistical and accounting methods can only present the data in the most systematic way and in this manner give the maximum help in arriving at a decision.

This attitude of mind, that simple statistical methods combined with sound judgment and flair are often highly successful, is apparent throughout the book and is illustrated by numerous practical examples. It is particularly noticeable in the chapters on 'forecasting' where the authors also discuss the more sophisticated econometric methods. The treatment of the difficulties of interpretation in using these methods is very well done. The reviewer, however, did not feel so happy about the presentation of some of the examples. They are taken from other publications and the accounts are sometimes so brief that it is difficult for the uninitiated to understand them; this was particularly the case with Stone's 'Analysis of Consumer Durable Demand'. However, all the sources are given and any interested reader can refer to them.

Part 3 of the book gives a fairly comprehensive account of the statistical theory of sampling and deals in some detail with Multi-stage Sampling. The final two chapters give several practical examples of the use of these techniques. Again the authors are careful to point out the difficulties of interpreting data in which several factors are at work, some of which may not be allowed for adequately in the method of analysis used.

Altogether the book is interesting and can be recommended to any young actuary who contemplates taking up work involving decision problems outside the usual field of actuarial work.

H. W. HAYCOCKS

Guide to Tables in Mathematical Statistics. By J. ARTHUR GREENWOOD and H. O. HARTLEY

[Pp. lxii + 1014. Princeton, N. J.: Princeton University Press. London: Oxford University Press. 1962. 55*s*.]

NUMERICAL tables appear as by-products of a considerable proportion of research in mathematical statistics. As increasing numbers of workers find it profitable to turn their attention to this field there has naturally been an associated increase in the volume of output of 'statistical tables'. Most of these tables are, in fact, tables of mathematical functions rather than of (collected) statistics in the more popular understanding of the phrase. However, since the essential interest of many of these tables resides in the way in which they are to be applied rather than in the intrinsic nature of the mathematical function, they are either treated inadequately (from a statistical standpoint) or ignored in standard works on *mathematical* tables.

The present impressive work of Greenwood and Hartley is therefore particularly welcome as a guide to the very large accumulation of tables available for statistical use. It is evident that there is no great virtue in large areas of tabulated functions purely on account of their size, or even variety. They are useless without the necessary information to make possible an accurate and rapid choice of the particular table(s) appropriate to a given problem. The volume under review can supply this, given a modicum of serious study.

However competent may be the user, he will find his knowledge of available published material constantly increasing.

A valuable feature is the inclusion of abstracts of many papers; this makes the work more informative and also more interesting to read. Another useful feature is that existing *collections* of tables are described in detail. A perusal of these lists of contents throws light on historical lines of development, and also on the occasional tendency (on the part of compilers) to equate the importance of a collection to the number of tables in it.

As would be expected, there is a rather long list of references. Among these there appears a rather unusual name (in this connexion)—in a reference to a paper by W. A. Mozart (1793) on application of harmonic analysis to musical composition.

There are many other features of interest in this book. The price is exceptionally low. For anyone interested in statistical tables it is a real bargain.

N. L. JOHNSON