

REVIEWS

Life and Other Contingencies, Vol. II. By P. F. HOOKER, F.I.A., A.S.A., and L. H. LONGLEY-COOK, M.A., F.I.A., F.C.A.S., A.S.A. [Pp. ix+256. Cambridge University Press. 1957. Price 20s.]

THIS is another in the series of text-books commissioned by the Institute of Actuaries and the Faculty of Actuaries for the use of students preparing for the actuarial examinations. Volume I, which has already been published, is confined to single decrement tables involving single lives. In Volume II the authors turn to multiple decrement tables and joint life tables. Together, these volumes cover a section of actuarial science for which SPURGEON has been the standard text-book for many years. The authors acknowledge their indebtedness to SPURGEON, but they have made very many changes to bring in more modern developments and methods.

One commendable change is the omission from the text of the treatment of numerous complicated cases found in SPURGEON. The new text-book covers the basic principles and the more common formulae. Once these have been grasped the student should have no difficulty in tackling the more complicated problems for himself, and the reduction in the text should help him to avoid many attacks of mental indigestion.

Certain sections of the book have been marked with an asterisk to indicate that they are thought to be outside the examination syllabus. As usual, it is possible to disagree with the placing of some of the asterisks. For example, the sections on contingent assurances when Gompertz's or Makeham's laws apply, although regarded now as being much less important than they were, are surely not outside the syllabus altogether?

The first two chapters deal with the subject of multiple decrement tables. In SPURGEON this subject was covered in the final chapter, but its position in the new text-book is more logical since the joint life mortality table may be regarded as an example of a multiple decrement table. This is a section where the changes in treatment are particularly noticeable. The theory of the subject was only just being developed when SPURGEON was published, and his treatment was unsatisfactory in many ways. The authors have drawn on a subsequent book, *Some Theoretical Aspects of Multiple Decrement Tables*, by Bailey and Haycocks, but have developed the subject in their own way. In particular, they have introduced an analogy between the model and actual experience which will probably help the student to grasp the subject.

The joint life mortality table is then introduced and the theory of the straightforward annuities and assurances involving more lives than one is developed smoothly and clearly. This is one of the places where much is gained by the elimination of some of the confusing detail in SPURGEON.

All the more pity that the flow of the development should have been interrupted by the insertion of a section on some standard deviations which appear to be of little importance.

There is an interesting chapter on some general theorems of life contingencies, such as the general case of the premium conversion table relationships. Some students may find this a little difficult to grasp, but it is well worth inclusion in the book for the background it will give to the student who is able to follow the reasoning.

The chapters on contingent assurances and reversionary annuities are well written, and here again the reduction in the number of cases covered helps to make these sections more readable.

The numerical evaluation of contingent assurances, reversionary annuities, and other functions of two or more lives is considered in two chapters which follow those in which the theory is developed. As many of the methods of evaluation apply to a number of different functions, this approach avoids a certain amount of repetition found in SPURGEON. The first of these chapters is concerned with commutation functions and approximate integration. The second deals with various transformations and in particular with the various laws of mortality which are treated in much less detail than in SPURGEON.

The last four chapters deal with pension, widows' and orphans' funds, and disability benefits, which were not covered in SPURGEON. The treatment is very lucid but the elimination of complicated cases from the text which was so noteworthy in the earlier chapters might with advantage have been extended to this later section. An introductory chapter explaining the nature of a pension fund and the benefits commonly provided would have been useful. These changes would have helped the majority of students who have no practical experience of pension fund work.

The book ends with a section on the international actuarial notation, which should prove very useful to students, and a small collection of tables for use in solving the examples.

The authors are to be congratulated on producing a fine new text-book which is certain to prove invaluable to students for many years to come.

S.J.Q.

The Elements of Probability Theory and some of its Applications. By HARALD CRAMÉR. [Pp. 281. New York: John Wiley and Sons; Stockholm: Almqvist and Wiksell. 1955. Price 56s.]

Professor Cramér's *Mathematical Methods of Statistics* is well established as a standard text-book. The present book is written in the same style as the larger treatise, but at a considerably less advanced level. It is divided into three parts: 'Foundations', 'Random Variables and Probability Distributions' and 'Applications', respectively. There is also a concise set of statistical tables (Normal, χ^2 , t and F) at the end of the book.

There are a number of exercises distributed rather unevenly over the book. The third part of the book has relatively few exercises. This may well arise from the greater ease of construction of problems on probability theory as opposed to statistical applications. More problems on applications would, however, be of considerable help to the student.

The author has effected a noteworthy economy of space in the first part of the book. In the course of fifty-six pages he introduces the basic ideas and theorems in probability which are needed for the statistical superstructure of the second part.

The contents of the book are comparable with those of 'JOHNSON AND TETLEY', though the mathematical treatment of the subject is, perhaps, slightly more sophisticated. The mathematically inclined student might well find Professor Cramér's book stimulating ancillary reading for the statistical sections of the Institute's examinations.

The format is the same as that used in *Mathematical Methods* and is clear to read, once the unusual features of the notation have been mastered. In a sample of some thirty pages the only misprint found was (possibly) 'cholorimetric' for 'colorimetric' on p. 260.

N.L.J.

Demographic Yearbook 1956, by the Statistical Office of the United Nations. [Pp. vii + 744. U.N. Publication Sales No. 1956. XIII, 3; paper-bound 50s., cloth-bound 60s.]

The 1956 *Demographic Yearbook* is the eighth in this series published by the Statistical Office of the United Nations. Year by year these volumes present a summary of the latest available population and vital statistics for most countries of the world and, in addition, each volume makes a special study of some particular aspect of demography.

The information published every year and continuously brought up to date relates to total population, area and density, population subdivided by age and sex, number of live births and crude birth rates, births and birth rates specific for age of mother, stillbirths, deaths and crude death rates, death rates specific for age and sex, infant deaths and infant mortality rates, numbers of marriages and divorces and crude rates, and expectation of life at specified ages for each sex. To have all this data brought together in one volume and kept up to date is a great boon to those interested in studying world population trends.

The special matter contained in the 1956 volume can be divided into two distinct parts. The first of these is a chapter entitled 'The World Demographic Situation' which discusses at some length trends since the war in the crude rates of birth, death and natural increase in different areas of the world, together with the numbers in the population and the distribution by age. It is hardly possible to summarize the chapter in the space of this review, but it is worth mentioning briefly that the data examined therein indicate that, almost without exception, the death rates in 1950-54 were

lower than in 1945-49 and that countries with higher mortality experienced a greater reduction in their death rates than countries which had already achieved lower mortality by 1945-49. The reduction in mortality is stated to be the most significant demographic event during the last decade, and the accelerated population growth, which is greatest among countries with high rates of population increase, may be explained by the stabilization of birth rates and the fall of the death rates.

The second special feature is the population analysis, which completes the presentation of results of population censuses carried out between 1945 and 1955. This was begun in the 1955 *Demographic Yearbook* with voluminous tabulations of the population in regional, national, sub-national, city, urban and rural groups, and distributed according to size of locality, marital status, literacy, fertility, and size of household. An important section contained subdivisions by sex and by individual years of age. The 1956 volume completes the picture with tabulations according to religion, language, race, country of birth, country of citizenship, level of education, school attendance and sub-tabulations according to age, sex, industry, occupation and status of the economically active population.

[It is probably worth mentioning here for ease of reference that the 1955 *Yearbook* ends with a useful list of all the tables published in *Demographic Yearbooks* up to and including 1955.]

In the Foreword, it is emphasized that the *Demographic Yearbook* should not be considered as an isolated volume adequate for all purposes. Attention is drawn in addition to the publications of the World Health Organization, in particular to its series 'Annual Epidemiological and Vital Statistics', containing compilations of deaths by cause of death, age and sex; special compilations for selected causes of death; detailed data on cases and deaths for notifiable diseases; and other data of medical interest. Nevertheless, the *Demographic Yearbook* is the central source of international demographic data, and its usefulness is becoming more apparent with the growing interest in world population problems.

C.M.S.