REVIEWS

Modern Actuarial Theory and Practice. By P. M. BOOTH, R. G. CHADBURN, D. R. COOPER, S. HABERMAN AND D. E. JAMES (Chapman & Hall, 1999)

This book attempts to describe the traditional areas of actuarial activity in a way that highlights the fundamental principals as well as the links between different areas.

There are five parts:
— investment;
— life insurance;
— general insurance;
— pensions; and
— actuarial models.

The first four of these correspond to the subject divisions in the latter part of the United Kingdom actuarial examinations.

Part One, on investment, is mainly concerned with portfolio and asset selection, and covers the analysis of individual investments only to the extent necessary for the main themes. The initial section on intermediation gives an important overview of the economic role of pension funds and insurance companies, where most actuaries are still employed. It would have been nice to see this topic treated at somewhat greater length, because it is just this type of contextual background which can easily be skipped over in an education process concentrating on factual detail.

The remainder of Part One is a good, readable treatment of the type of material required for the non-specialist actuarial investment examinations. However, readers expecting to find a mathematical approach to modern finance will be disappointed. The level of mathematics has not kept pace with the recent changes to the U.K. actuarial syllabus. There is nothing on financial calculus or the mathematics of derivatives.

Life insurance is covered in Part Two. Again, this section is well written, and provides a useful background for students not working in the area. It would also be valuable to readers outside of the industry who need a guide to the financial management of a long-term insurance business and the role of actuaries in it. Such a treatment is particularly valuable because, unlike investment, there is little similar material accessible to such readers. The same could be said about the treatment of general insurance in Part Three.

Some overseas readers might be surprised at the lack of mathematics in Part Three, particularly if they have been exposed to the papers in the *ASTIN Bulletin* or the *Scandinavian Actuarial Journal*. Although this might be consistent with the traditional teaching of the subject in the U.K. profession and in the institution where most of the authors work, they could surely have done the U.K. profession a service by gently leading readers to an appreciation of the utility (or otherwise!) of some of the methods studied elsewhere. Researchers would, undoubtedly, have found a more mathematical approach, even if confined to appendices, useful.

I work in a pensions consultancy, so my views on Part Four might be coloured by this, but I felt that this part could offer very little insight to anyone beyond the level of the non-specialist U.K. examination. Recent demographic, economic, and political trends have strained the pensions industry's traditional thinking of the last 20 years or so. Pension benefits are increasingly being seen in the context of an individual's total wealth, and this is reflected in more flexible benefit designs and funding methods. The great problem with text books on pensions is that they become out of date so rapidly. This section already feels slightly stale, even for the principal audience. Researchers and others outside the actuarial profession would get very little idea of the important recent developments and factors driving them, few of which are U.K. specific.

Part Five deals with the topic of actuarial modelling by presenting examples in four different areas: non-life insurance; life contingencies; pension fund investment; and long-term disability

247

insurance. There is also a short introduction to the principles of modelling. It is useful to see the process of modelling discussed separately from the chapters on application areas, and, given the limitations of space, the authors have done well to indicate the pervasive influence of actuarial models. A full course on modelling techniques would require much more than one part of a single text book, and it is an area that can only be satisfactorily taught by giving students a chance to build (or at least adapt) and apply their own models. Some extra material, possibly in the form of case studies, encouraging readers to do this would, therefore, have been a valuable addition to the book. Many text books now come with a CD-ROM, and there is, perhaps, a missed opportunity here.

The authors state that the book is aimed at university students and students studying for the professional examinations of a number of professional bodies. They also suggest that practising actuaries might find the book a useful guide to current methodologies and models. How well, then, are the needs of these different audiences met?

Let us consider university students first. I would imagine that this would be a useful general textbook for final year undergraduates on U.K. actuarial courses. It will also provide a helpful overview and introduction for research students, although they will need more detail than is provided here in their specialist areas. Of crucial importance for research is, of course, the number and quality of the references provided. Each chapter does end with a good number of references. However, these are overwhelmingly U.K. biased, and I worry that, in some cases, they may reflect the authors' own interests and areas of specialism too closely to give a fully balanced picture.

For overseas students, I think that the U.K. bias of the book will prove to be off-putting. The majority of the underlying problems considered are of universal interest, but most of the examples and many of the references are U.K. based. In theory, a student anywhere in the world could develop an understanding of principles from U.K. examples, and then apply these principles to different circumstances, but, in practice, I expect that those unfamiliar with the U.K. environment would find this difficult.

The final group of students to consider is those studying for professional examinations. My comments about overseas undergraduates also apply to professional students studying for the examinations of an overseas actuarial body; but what about students, home and abroad, of the Faculty and Institute?

In terms of content and level, *Modern Actuarial Theory and Practice* seems to be pitched fairly and squarely at students studying for the 300 and 400 Series examinations of the Faculty and Institute of Actuaries. 400 Series students will certainly require some more U.K. detail, but that is easily obtained. Will they get the insight and understanding that they require for the final Fellowship examination? It is always good to get a second opinion, and I think that an actuarial education system where students are expected to develop skills of analysis and judgement through reading one set of notes by a single author is one of the current weaknesses of the U.K. profession. For this reason alone, I would like to be able to recommend that students read the appropriate section of this book. The trouble is that I am not sure that there is enough extra to be gained by someone who has gone through an ActEd course to justify the time and effort. Yes, there are some interesting insights, and yes, there is some material not covered by the Faculty and Institute's Core Reading and ActEd; but, in the final analysis, I think that the authors should have been braver, and produced a book that did not have one eye on the current U.K. education system.

P. KING

Actuarial Models for Disability Insurance. By S. HABERMANN AND E. PITACCO (Chapman & Hall/CRC, 1999)

Habermann and Pitacco, professors of insurance at City University in London and at the University of Trieste, respectively, have picked an adequate title for their nearly encyclopedic

book. It renders a comprehensive account of existing forms of disability insurance and of what practising actuaries are actually doing with them in terms of model-based analysis. The enterprise is convincingly motivated in the preface, which explains why disability and related forms of insurance are becoming increasingly important in economically developed societies. The introduction outlines important features of the history behind contemporary actuarial methods for life contingencies.

The first two chapters present the traditional multiple state models and associated techniques for determining premiums and reserves. This is done in a time-continuous, as well as in a time-discrete, set-up, not only under the traditional Markov assumption, but also in semi-Markov models apt to describe the duration dependence that is notoriously present in vital rates of disabled persons. Those readers who have difficulties with the mathematics in certain places should not despair; just leave the dark spots and proceed to sort out the solid, plain things that are needed for the rest.

Chapter 3 gives an overview of various types of disability and related forms of insurance, and points out special problems arising either from the underlying phenomena or from particulars of the products themselves. The show is live, featuring insurance schemes and technical bases from a number of countries.

Chapter 4, dealing with graduation of intensities, is less global in its outlook, as focus is placed on generalised linear models (GLIM). No mention is made of modern life history analysis based on counting processes, which many insurance statisticians would proclaim the uncontested panacea for treating problems related to censoring, covariates, heterogeneity, and other complicating circumstances that are omnipresent in disability data. However, this is certainly a deliberate choice on the part of the authors, and conforms well with their purpose; the model and its associated methods are their vehicle, not their goal, and they must choose one that can last the distance. The GLIM approach is advocated as comprehensive, coherent, and versatile. While this can be approved of in general, it ought to be said that the approach builds on aggregate data, and rests on distributional approximations that are problematic when data are sparse (recoveries and deaths of disabled may be rare).

The remaining Chapters 5-8 treat critical illness cover, long-term care insurance, actuarial models for AIDS, and indexing benefits in insurance packages (no financial stochastics are involved). There is a wealth of material here, amply supported by tables and figures. Again, the epistemological emphasis is on what we can learn about disability, and not so much on how we can learn it.

Given the practical outlook of the book, its treatment of computational aspects leaves something to be desired. The reader should bear in mind that the ordinary differential equations for transition probabilities and reserves in the Markov case can be solved numerically by standard finite difference methods, regardless of the pattern of the transition matrix. Problems arise only when there is dependence on the past (notably duration dependent intensities), in which case partial differential equations will arise. There are, however, safe numerical recipes also for those. So there is no reason to share the worries expressed by the authors.

Actuaries who are working with disability insurance and related topics in practice should keep the book handy as a source of information on existing insurance schemes and actuarial practice. It is also recommended to teachers of life insurance mathematics as a source of background knowledge and examples, many of which would go far beyond the stylised textbook facts, and might inspire interesting theoretical problems. The book requires a certain maturity on the part of the reader, however, and this reviewer would not recommend exposing unsuspecting students to it without supplementing rigorous and up-to-date accounts on the probabilistic, statistical and computational issues involved.

R. Norberg