REVIEWS

Obstacles to the Liberalization of Trade in Insurance. BY R. L. CARTER & G. M. DICKINSON (Harvester Wheatsheaf, 1992) £14.95

This book, published by the Trade Policy Research Centre, is a result of a study carried out by the authors as part of the Centre's interest in restrictions on markets for services. Unfortunately, the major developments which have occurred in this market, particularly within the European Community, are almost certain to make such a publication out of date before it is widely read. Having said this, the book provides an interesting summary of the reasons barriers exist, the types of restrictions imposed on insurance trade and the effects that they have on the various economies.

It is perhaps unfortunate that the authors decided to start, in Chapter 1, with the recent developments in trade in insurance. This has the effect of immediately dating the book. Chapters 2- 5 form a very useful introduction to the nature of insurance business and the barriers which exist, as well as looking at the effects that these barriers have.

The rest of the book, Chapters 6, 7 and 8, looks at the ways forward. Particular reference is made to the European Community, OECD, and GATT. The appendices form an interesting reference library to the situation as at June 1991. It lists the various E.C. Directives in force, along with those adopted but not yet in force and those still in draft form. There is also a useful statistical analysis and a comprehensive list of references.

Whilst the book is certainly not one for the casual reader, those involved with the international insurance trade, particularly in Europe, may find the book a useful summary. Indeed, one would hope that a copy will find itself on the desk of all those involved in drafting regulations in this field.

JOHN REEVE

Medical Selection of Life Risks. BY R. D. C. BRACKENRIDGE & W. JOHN ELDER (Macmillan Publishers/Stockton Press) £95.00

For as long as I can remember, Dr Brackenridge has been the doyen of life assurance underwriting. He has held many posts, principally that of Chief Medical Officer of Mercantile and General Reinsurance. Even though he has retired, he maintains an active profile and many consider him irreplaceable.

Macmillan published Dr Brackenridge's *Medical Selection of Life Risks* in 1977. A new edition followed in 1985 and now comes a third, 200 pages longer than its predecessor and with the addition of a joint editor. W. John Elder is the Vice President and Medical Director of Transamerica Occidental Life Insurance Company, which is based in Los Angeles.

Whereas the previous editions were Dr Brackenridge's own work, this time there are 30 contributors, including both editors. This transitional period is crucial in determining the life and usefulness of a textbook; the unique vision of a book written by one man can be dissipated by the presence of many authors. Here, the transition is made smoothly, although there are hiccups.

The contributors are evenly divided between the United Kingdom and the North American continent. The fact that they have resorted to American spelling means that the book has lost its British flavour: 'oesophagus' is listed under 'esophagus' and there is no cross-reference. The U.K. term, Chief Medical Officer (CMO), has been largely supplanted by Medical Director (MD). However, the difference in currencies between the authors has not been rationalised. Logically, there is no need for an underwriting textbook to mention currency at all, as ratings can be given in percentage extra mortality or units per 1,000 units sum assured.

Having different authors spread over 2 continents can mean that a book is disjointed. I cannot tell the extent to which the editors have amended the text, but there are indications that many contributions have not been changed. Arthur DeTore opens his chapter on knowledge-based underwriting systems with the words, "A crucial skill for success in insurance risk management is

underwriting." Nothing wrong with that, except that you do not expect to find such a basic statement on the subject on page 117.

The 960-page book is aimed at life assurance underwriters and at doctors involved in insurance medicine. There are other guides—notably the bulky manuals produced by reassurers—but *Medical Selection Of Life Risks* offers clinical details as well as rating assessments. Bearing this in mind, I am sorry that the book does not contain photographs and is light on diagrams.

I have been looking, in particular, at the major changes in underwriting since the last edition. Last time, there were 4 paragraphs on AIDS: now there is a 14-page chapter written by an American physician, Robert K. Gleeson. It is up-to-date, but not up-to-date enough to do more than mention the advent of saliva testing. The U.K. insurance industry takes pains to ensure appropriate procedures for HIV testing are in place, and that positive results are only given out with full counselling. Reading that some American states "allow positive results to be sent directly to the proposed insured", the U.K.'s approach seems much more satisfactory, if admittedly more costly and time-consuming. Even though the bulk of AIDS victims in America are homosexual and bisexual men, it is not permitted to ask about sexual orientation. In the U.K. we do precisely this, and so we reach a much more realistic assessment of the proposal. The book makes no recommendations as to how one should underwrite a homosexual, an everyday occurrence for a U.K. underwriter.

Another new chapter, 'Drug Abuse, Alcohol And Tobacco', has again been written from an American standpoint, and because drug abuse is so widespread in the U.S.A., scientific tests may be undertaken to discover if the applicant has traces of illicit substances in his system. We are told, "Underwriting policies of some companies simply preclude the provision of insurance to users since they are engaging in inherently criminal behaviour, regardless of the unique aspects of the particular substance or its usage by an applicant under consideration." Does this imply that some companies are offering terms (normal rates?) to some applicants who take stimulants? It is unlikely that a U.K. office would be so generous, but when new business is hard to come by, rulings may be relaxed.

Because deaths from heart disease are the most prevalent, those at risk need to be identified, and proposers with heart disorders have to be underwritten correctly. In comparing the 2nd and 3rd editions, there has been a noticeable shift in underwriting recommendations. Previously an applicant who had had a myocardial infarction might be rated + 100% extra mortality throughout together with 10 per 1,000 sum assured p.a. for the balance of 5 years since the attack. The logic for this rating is because the risk of death is at its most acute in the months and years immediately following a heart attack. Dr Gordon Cumming changes this approach and writes, "The underwriting system proposed does not follow current industry standards. When a disease is chronic, usually with a downward course, either gradually or in steps that are often catastrophic, it makes no medical sense to have a very high initial premium and then a low premium, so the practice of applying a flat temporary extra has not been followed." He continues by saying how inappropriate this is for coronary artery bypass grafts and for angina, and he appears to have developed an approach, if I have read him right, which encompasses all heart diseases. The intention is to place the applicant in 1 of 5 classes (ranging from 'mild' to 'very severe'), and then apply an extra mortality loading according to age. The criteria for these 5 classes are multi-factorial and, as some applicants are bound to fall partly in one class and partly in another, the situation is not as clearcut as the author might wish. He acknowledges that all the relevant information may not be to hand, but "This should be regarded as a business decision and not as sound medical underwriting". That reads like a cop-out to me.

Maurice Lipsedge, a consultant physician at Guy's Hospital in London, has written a well-balanced account of psychiatric disorders, and, in particular, he links alcoholism with mental illness. Life offices want to identify those most at risk from suicide. We are told, "Suicide rarely occurs in the absence of psychiatric illness; even then, only a minority of psychiatric patients will commit suicide." Strangely enough, none of the 54 deaths from suicide amongst my own company's policyholders in 1991 were from applicants who had been rated for mental disorders, and the most favoured method is now car exhaust fumes and not overdoses. The recession may be a contributory factor, and statistics may be understated because a death certificate can disguise a suicide to avoid embarrassment to relatives, or because it cannot be determined as to whether a death was an accident or suicide. Dr Lipsedge does not say if his various statistics include 'open verdicts', and what difference they might have made to the results.

It is surprising, in view of the vast amount of publicity, that the book does not deal with myalgic encephalitis (ME), or post-viral syndrome, in any depth, and indeed many, much rarer conditions are covered in the book. Offices are sometimes asked to consider life proposals from applicants who are still troubled by ME, and I would have welcomed views on the potential suicide risks involved.

Because of Dr Brackenridge's employment with a leading reassurer, he has always wanted to quote competitive terms and thereby accept applicants passed to his company from direct offices, wherever possible. Some direct offices may, therefore, feel that his approach to underwriting is generous, and would exhibit caution in following some suggestions. A good example is in relation to cancer, where my own office has only recently started quoting terms for those with a history of cancer, in addition to the less bothersome kinds such as carcinoma *in situ*. By and large, the loadings for cancerous growths in the 3rd edition are 20% more generous than in the 2nd edition, and many applicants with recent growths can have their proposals accepted rather than deferred.

There is a cautionary tale for U.K. offices in the U.S. experience of smoker/non-smoker differentials: "In order to escape the relatively high premiums charged to smokers, some applicants misrepresent their habit in their declaration (most companies define a non-smoker as one who has not smoked cigarettes for 1 year or longer). The rate of misrepresentation in the U.S.A. has been found to be as high as 37% in some samples." Hence, the growing use of urine tests for evidence of smoking, although this does not necessarily resolve the problem. What if the applicant says, "Yes, my test may be positive, but all I smoke is a pipe."?

The chapter on structured settlements is also written from an American standpoint, and the authors should have stated that they have not yet reached the U.K. in any significant way. If and when they do, offices should heed the warning that the cases are shopped between many offices to find the most competitive terms, and "some placed cases represent the occasional errors in the underwriting process". The underwriting of structured settlements is intricate, and requires a knowledge of the mortality of vegetative patients. The book should have devoted more space to this aspect; it is all very well to refer to learned papers, but most readers will not have the perseverance or the inclination to seek them out.

Everyone in employment has feelings of excitement and fear about the future. To what extent will computers make manual work redundant? U.K. underwriters, therefore, view the knowledge-based systems of U.S.A. and Japan with trepidation. The chapter on 'Life Underwriting with Knowledge-Based Systems' summarises what can be done, although it does not say how widespread the systems currently are. Many routine decisions have been computerised, and we are told that "This gives the underwriters time to deal with the more complex and time-consuming cases." Is that true? Does any manager tell his staff that they can now spend longer on each piece of work? Expert systems could be used to underwrite over 95% of the proposals received, but the costs may mitigate against such developments.

The book also contains much useful information on the history of life assurance. However, the Institute of Actuaries was not given much credit here, and, indeed, there are only 2 references to the Institute in the whole book.

I have no doubt that a 4th edition will be necessary within 10 years. The book, for example, only contains a few paragraphs about genetic testing, and yet surmises that "Genetic testing may become standard practice within the medical community by the year 2000."

Although I have made a few critical comments, that is only to be expected in a work of this size. It is also inevitable that a reviewer will concentrate on passages at variance with his own thoughts. The 3rd edition of *Medical Selection of Life Risks* is a colossal undertaking, and all the contributors are to be congratulated for producing a book which is readable, up-to-date and thought-provoking, as well as being an invaluable guide to underwriting practice. Every life office should have at least one copy—and every underwriter and every actuary should know where it is.

T. S. LEIGH

Expectations of Life. By H. O. Lancaster (Springer-Verlag, 1990) £114.50

This book has a pleasantly ambiguous title. One can imagine it being chosen for the autobiography of an unsuccessful politician, but the sub-title, *A Study in the Demography, Statistics, and History of World Mortality*, gives away its real subject matter.

I could not claim that the book is of immediate importance for the underwriting actuary. It is world-wide in scope, and historical rather than prospective; but it makes fascinating reading.

Professor Lancaster is an emeritus Professor of Mathematical Statistics at the University of Sydney, and this book represents the fruits of a long lifetime in the field. He was born in 1913, and the first of his own publications to which he refers dates from 1950. Although he often uses historic mortality data from England and Wales, Australian data this century has not been upset so much by world wars, and his use of it is therefore interesting for everyone.

One might expect 500 pages of text on this subject to be heavy going, but the author makes his subject so interesting that your reviewer found it entertaining bedtime reading, at a chapter or so a night, for several weeks.

After a few introductory chapters, in which the measurement of mortality and classification of diseases are covered, the author works through the International Classification of Diseases in sequence. Infectious diseases receive 15 chapters, all other causes another 15. A couple of chapters review mortality rates by age, separating out childhood and adult mortality, and then in 8 chapters he moves round the world, starting with the British Isles and ending in Africa. The remaining chapters discuss a miscellany of other subjects, including the role of therapy, hygiene and ecology, and the mortality of sub-populations, including a brief reference to those insured by insurance companies.

The main interest of the book, at least to your reviewer, is in the discussion of infectious diseases, their effect, history, spread, control, and persistence. A number of diseases are headlined as 'great pestilences': African and American trypanosomiasis, bubonic plague, cholera, enteric (typhoid) fever, gastroenteritis, influenza, leprosy, malaria, measles, relapsing fever, schistosomiasis, smallpox, syphilis, tuberculosis, typhus and yellow fever. The inclusion of measles in this list "will come as a surprise to many observers in the developed world, in which the status of measles has sunk during this century to a mere nuisance . . .", but it has been a great killer in the past, and remains a great killer of infants "in less developed areas, such as Latin America, India and Africa".

Only smallpox among the great pestilences has been wholly eradicated. This was possible because humans are the only host of the smallpox virus. Some of the other diseases are anthropozoonoses, affecting both animals and man, and are therefore much harder to get rid of. Some are purely tropical diseases, and have never been significant in Britain. Others have entered Britain as plagues, and have died out again or been eradicated. This part of the book has the excitement of a military history, the war against disease.

Most deaths in Britain nowadays are caused by degenerative diseases, and, since we must all eventually die of something, these necessarily increase their proportion of the take. The author's tables show the facts most clearly.

His chapters on 'Food, Malnutrition, Avitaminoses, and Famine'; 'Pregnancy, Childbirth, and the Puerperium' and 'War' also have much of interest. His description of the work of Semmelweis in reducing puerperal fever in the 1840s in Vienna and in Budapest, before the discovery of bacterial infection, and in the face of much opposition, is illuminating. Poor Semmelweis appears again under a different heading of 'The Psychoses', since he "was beaten up and died within a fortnight of admission to a mental institution".

Puerperal fever was spread by poor hygiene in maternity hospitals. 'Hospital gangrene' seems to have been spread by equally poor hygiene in military hospitals. It is interesting to discover that "the actual causal organisms of hospital gangrene have never been established . . . . Possibly no such identification is possible, for the disease has not occurred since the development of bacteriologic techniques for identifying it." It was a serious killer during the Napoleonic wars, but the work of Florence Nightingale and others reduced it substantially during the Crimean war and later.

Readers may like to consider what it is that connects: "infants, old people caring for themselves, victims of famines, pioneering groups in developing countries, polar explorers, soldiers, especially 'native' troops, merchant seamen, naval men, alcoholics, the chronically ill, persons on unbalanced

diets, and inmates of residential schools, prisons or mental asylums". The answer is that they may all suffer from avitaminoses, or lack of vitamins in their diet.

The book is well illustrated with maps and tables of figures, and has a magnificent bibliography, covering 88 pages, with perhaps 3,000 references. Among them are a few works by actuaries, Benjamin Gompertz, A. H. Bailey, W. M. Makeham, Bernard Benjamin and G. T. Humphrey among them. They rub shoulders with O. W. Holmes, who was a doctor as well as an essayist, Halley, Koch, Pasteur and J. Y. Simpson, and 75 of the author's own papers.

This book is the fitting culmination to a great career, and it can be recommended both for office reference and educational reading to any actuary, statistician, demographer or medical person. Its only disadvantage is its rather high price.

DAVID WILKIE

Insurance Risk Models. BY H. H. PANJER & G. E. WILLMOT (Society of Actuaries, 1992) $35 plus $17.50 shipping & handling

This is an excellent book. Let me, first of all, praise it (and there is a lot to praise) and then I will give my criticisms.

The book is very nicely set out and treats risk theory in a mathematically pleasing way. It is thorough and concise. There is a good balance struck between mathematical rigour and ease of exposition, so that the reader feels that things are being done properly without getting bogged down in technical details. It will give actuaries who are mathematically inclined (and does not this mean all actuaries?) a very firm foundation in the statistical and probabilistic basis of insurance. In addition, because of the rigour of the treatment, it will give the reader the opportunity to move on to studying the actuarial research literature. As an introduction to research, it is very suitable.

There is a good, though brief, treatment of estimation, which leads towards the claim distributions, which are useful in practice, in general insurance. This chapter illustrates well the nature of the book. Maximum likelihood estimation is not limited to the familiar examples, e.g. a set of independent, identically distributed Poisson observations. The authors go on to consider generalised linear models, which allow for a wider range of modelling structures. They also consider the scoring algorithm in some detail. While the technical details of the algorithm may be of interest to some readers, most would be happy to leave it to a package, such as GLIM.

I have now moved towards my criticisms of the book. The penalty for being rigorous is that some people would describe the book as 'too mathematical'. The adherence to a unified approach, which holds the exposition together well, can lead to problems. Let me give a couple of examples:

The Laplace transform is used throughout the book:

$$L_X(z) = E(e^{-zX}).$$

Of course, this can be related to the probability generating function, P_X, the moment generating function, M_X, and the cumulant generating function, C_X, using the following:

$$P_X(z) = M_X(\ln z)$$
$$L_X(z) = M_X(-z)$$
$$C_X(z) = \log M_X(z).$$

When the authors have to prove the well-known result for a compound sum, S, where:

$$S = X_1 + \ldots + X_N$$

the proof becomes rather cumbersome:

$$L_S(z) = \sum_{k=0}^{\infty} E(e^{-zS}|N = k)P(N = k)$$
$$= P_N(L_X(z)).$$

They now go straight to the result:

$$C_S(z) = C_N(C_X(z))$$

using results on Laplace transforms given in an early chapter. The missing lines in the proof are:

$$L_S(z) = P_N(L_X(z))$$
$$= P_N(M_X(-z))$$
$$= M_N(\ln M_X(-z))$$
$$= M_N(C_X(-z)).$$
$$\therefore M_S(-z) = M_N(C_X(-z)).$$

Taking logs of both sides:

$$C_S(-z) = C_N(C_X(-z)).$$

So we should have started with $L_S(-z)$! There are easier ways of proving this, and it is hard to see what is gained by insisting on the use of Laplace transforms other than the consistency mentioned earlier.

In other places, for example in the proof of the recursive formula for the compound Poisson distribution, the reader who is not efficient in the use of Laplace transforms will get lost.

These are a couple of examples which are symptomatic of the whole book. It does not make any compromises.

I now outline the content of the book.

It is divided into 5 sections. Section 1 covers the mathematical and statistical background, and examines those distributions which are useful in insurance applications. Section 2 covers the basic risk models: the individual risk model and the compound Poisson distribution. Section 3 is a continuation of Section 2, using the developments of the basic risk models which have been suggested in the actuarial literature. Section 4 covers fitting risk models and some tail approximations. Section 5 covers ruin theory. The authors state in the introduction that they have devoted 'much less attention to ruin theory'. It would have been interesting to know the reasons for this.

In conclusion, this is an outstanding book which will be welcomed by students of risk theory everywhere.

R. J. VERRALL