be classified under the heading of application of Gaussian processes to insurance problems as well whereas only the ideas originating from Iglehart, Gluckman and Bohman are devoted to what I would call the connection aspect Connection means then essentially the use of the exact results of the Wiener process to get approximate results for the compound Poisson process (It might have been worthwhile to get the reader familiarized with the Donsker invariance principle) From practical trials (and indepen dent of Grandell's warning) I have gained the impression that these ap proximations may become unreliable

In chapter six the reader learns about Kolmogorov statistics and Kac statistics Particularly the last ones have been little noticed in the actuarial literature inspite of the fact that they could be very useful for purposes of insurance statistics The book concludes by showing some applications in physics The problem of evaluating Feynman integrals dominates this chapter

Professor Beekman has written a very readable book At many junctions the reader may have to look up the original literature cited if he wants to perceive the details But "Two Stochastic Processes" may be the red threat of Ariadne on the way to a common interest of actuaries and theo retical physicists for stochastic processes and their applications

                                                        Hans BUHLMANN

KARL BORCH, *The Mathematical Theory of Insurance An Annotated Selection of Papers on Insurance published 1960-1972* D C Heath and Co Lexington, Mass , 1974

In May of 1969 the reviewer published the first book on the application of probability theory to general insurance business, the last of its six chapters was entitled "Utility Theory and Its Application to Reinsurance and Profit Prospects" Fourteen of the 35 references in this chapter were written by Karl Borch who has now collected most of them—and about a dozen other papers, some more recent—into the mis titled book quoted above As the author writes in his Preface "   all the papers are in one way or another based on the application of game theory and decision theory to problems in insurance "

We do not recollect any other attempt to assemble a prolific author's output into a book developing a subject *ab initio* Borch has done this very cleverly by grouping his papers under five heads and by writing an in troductory, explanatory note to each of these "Parts" Nevertheless the result suffers from heavy repetition which the author has made no attempt to remove In fact except for a few deletions of material, the papers are as originally written and the only novelty is the five introductory notes which strangely fail to mention DuMouchel's (1968) correction of Borch's important theorem on the Pareto optimality of an n company reinsurance treaty the utility function must have a non-increasing first derivative

An interesting feature of the book is that the articles have not been re produced photographically but have been reprinted in a uniform format so that, for example all references appear as e g "Feller [15]" instead of what may have been "Feller (1948)" in the original This would have allowed the

author to delete and insert material *ad lib* but he has not taken advantage of this except to delete without mention

(i) Two short historical sections in Borch (1960),
(ii) Several sections of incorrect mathematics in Borch (1964) pointed out by the reviewer in a footnote to his book,
(iii) The summary discussion reported on p 201 of Borch (1972) and
(iv) Segerdahl's contribution to the discussion of Borch (1967) and the author's (and Vajda's) reply to it

Of these deletions the least explicable are the last two Why omit the whole discussion of Borch (1972) and include most of that of Borch (1967) ? What is worse is that Segerdahl made what the reviewer considers to be a number of useful criticisms of Borch's procedures He stated that anyone who portrayed the probability distribution of aggregate claims of an insurance company as a function of such aggregate without reference to the number of claims underlying it—a common simplification which the reviewer has utilized[1]—was using a probability distribution that was essentially biased Furthermore the use of the negative exponential in this connection was necessarily incorrect as the true curve was bell-shaped Finally the possibility of zero claims had to be considered in any relatively small insurance company All three are good points and if the author reprinted the others that were made in the discussion (and he need not have done!) why not these ?

There is little need to review the content of the papers themselves The whole concept of the application of utility theory to modern insurance methods, particularly those of reinsurance, is brilliant and most actuaries know that, apart from an early, isolated attempt by de Finetti, this is Borch's own What is not obvious to the reviewer is for whom the book is intended The author says that he hopes that "the book will find readers also among economists" but we are sceptical of this eventuality He uses mathematics very freely and in his first introductory note refers to a "convolution" of probability distributions It is a very special breed of economist that can stomach this kind of talk! There are nearly 1 000 members of Astin and many of them will have a copy of nearly all the papers reprinted here Who is going to buy the 2,500 or 3,000 copies we guess the publisher has made of this volume ?

REFERENCES

BORCH, K (1960) Reciprocal Reinsurance Treaties seen as a Two-Person Co-operative Game *Skand Aktuar Tidskr*, Vol 43 pp 29 58
——, (1964) Payment of Dividend by Insurance Companies *Trans 17th Internat Cong Actu*, Vol 3, pp 131-143
——, (1967) The Theory of Risk *J Roy Statist Soc B* Vol 29 pp 432-452
——, (1972) Insurance and the Theory of Financial Markets *Trans 19th Internat Cong Actu*, Vol 3 pp 193-201
DuMOUCHEL, W (1968) The Pareto Optimality of an n-Company Reinsu rance Treaty *Skand Aktuar Tidskr*, Vol 51, pp 165 170
SEAL, H L (1969) *Stochastic Theory of a Risk Business* Wiley, New York

HILARY L SEAL