

members of this Congress it is, of course, impossible to discuss it here in any detail. Let me only give a very brief summary.

We start with five different claim distributions. One is a life insurance claim distribution. One is a non industrial fire claim distribution. These two claim distributions are based on actual experience among Swedish insurance companies during the last decade. The two distributions are both fairly dangerous. There are small probabilities that very large claims shall occur but these small probabilities cannot be neglected. The other three distributions are either modifications of the first one or purely fictitious distributions which we have chosen in order to make possible a comparison between different choices of claim distributions. The first problem was to calculate the exact values of the two functions that interested us, namely the distribution of the total amount of claims and the Stop Loss Premium. From a numerical point of view this is not so easy a problem even for a modern electronic calculator. We did find a method to perform the calculation. The results arrived at are, of course, not exact in the precise meaning of the word but they are fairly accurate. As a rule the tails of the distributions in question are estimated with an error not exceeding two or three per cent.

Our second problem was to compare the exact results with approximations of various types. We have three types of approximations. First, the well known Edgeworth expansion with two terms. Second, approximation by an incomplete gamma function with a suitable choice of the parameter. Third, the Esscher approximation, where we have both the original form and three modifications which are refinements of the method. The number of claims is supposed to have either a Poisson distribution or a negative binomial distribution. The results are presented in a number of tables. We hope that many conclusions might be drawn from the tables. From the observations we have made I will mention the following:

The approximation of the total amount of claims by an incomplete gamma function is surprisingly good. We have not been able to explain why this is so. Still, for one claim distribution, both the artificial ones and those based on experience, this approximation is surprisingly good.

The Esscher approximation is very good, especially for large values of the argument. When the expected number of claims is small, say less than 500, it might be difficult, even with the Esscher approximation to get good approximation.

As a general rule it can be said that the difficulties in getting accurate approximations increase when the skewness of the claim distribution increases. We have examples where the coefficient of skewness is about 35 and where the expected number of claims is equal to 100. Those cases are really difficult to handle. None of the approximation methods dealt with in our paper can be said to give satisfactory results in those cases.

CASUALTY ACTUARIAL SOCIETY

The 1962 Proceedings of the Casualty Actuarial Society (Volume 39) contains seven papers presented at the Society's meetings, reviews of these papers and of papers presented in 1961, a Presidential Address, an Invitational Address and reports on Seminars and a Panel Discussion.

An Introduction to the Negative Binominal Distribution and its Applications by LEROY J. SIMON.

The very considerable use of the negative binomial distribution in recent actuarial work in America, particularly with reference to Automobile insurance, makes this paper by LeRoy Simon particularly valuable. The paper presents a bibliography selected especially for actuaries from the hundreds of papers and texts that deal with the subject. This material is organized into five groups: the fundamentals, early origins, applications, models and advanced topics and comments are provided on each group. Thus the actuary who is interested in knowing more about the distribution, using it for a special problem or discovering the fields in which it is likely to prove helpful can quickly find the references he wants. One can only wish greater use were made of this selected bibliography approach so as to avoid the waste of time chasing references from an all inclusive bibliography which so frequently proves valueless. The paper also describes two mechanical models which may be used to generate negative binominal distributions.

Homeowners—The First Decade by FREDERIC J. HUNT, JR.

The Homeowners policy is a comprehensive policy for owners of dwellings and provides coverages against the perils of fire, windstorm, hail, explosion, riot and civil commotion, aircraft and vehicle damage, smoke, vandalism, theft, third party liability and medical payments (for third parties). The coverage applies to buildings and contents, personal property off the premises of the insured, outbuildings and secondary residences. Variants of the policy provide even more comprehensive coverage. The policy was first introduced in 1950 and the premium volume in the United States now exceeds a thousand million dollars annually. This paper by Frederic Hunt traces the development of the policy whose growth has been so phenomenal. He shows in detail how the premiums were originally calculated and includes year by year statistical experience.

Size, Strength and Profit by LEROY J. SIMON.

Is it the small or the large property and casualty insurance company which makes the largest profit when measured in relation to premium income? LeRoy Simon's careful study of the 1960 results of large United States company groups deduces that no meaningful relationship exists between the premium size of a company and its profitability or between the premium size of a company and its strength as measured by the ratio of surplus to net premiums written.

Reformulation of Some Problems in Theory of Risk by KARL BORCH.

In this paper Karl Borch re-examines some of the basic ideas and objectives behind the studies which one refers to as the theory of risk. He shows that recent developments outside the field of actuarial mathematics makes it possible to formulate these objectives in a precise manner, and in some cases to find clear-cut solutions to problems which have been discussed by actuaries in a rather inconclusive manner for more than a generation. The theory of games, dynamic programming, and preference ordering are tools still strange to nearly all actuaries and it is important if the work of the actuary is to continue to advance that we keep abreast of these new ideas.

The Low Valued Risk—A Study of the Premium Required for Habitational Risks of Various Policy Amounts by PHILIP G. BUFFINTON.

It has been the practice in the United States to charge the same premium per \$100 of insurance for fire insurance on all dwellings in a state or territory meeting a particular construction and fire protection standard. For a long time it has been realized that the premiums charged for the smaller policies are inadequate both on account of the poor loss experience and the high expenses in relation to the premiums charged. As a result, in a number of states a new rating plan has been developed under which a dollar "loss constant" is charged in addition to a premium proportional to the amount of insurance. This has the effect of increasing the premium for small amounts of insurance quite considerably and reducing the premium for the larger risks. Philip Buffinton's study gives important statistical support for this rate making change.

The Latest Reported Stock Insurance Company Expenses for 1961 by FRANK HARWAYNE.

This paper contains an extensive tabulation of expenses by line of business and premium volume for the year 1961, and is a continuation of a paper published in the previous volume of the Proceedings.

Negative Binominal Rationale by THOMAS O. CARLSON.

This paper is a review of recent work on the negative binominal distribution and presents an interesting link between the distribution of individual claims and the distribution of accidents (wherein a multiple claim accident receives only one count).

In an invitational address, Henry S. Beers speculates on "Tomorrow's actuary" and in a presidential address your reviewer discusses "Actuarial Aspects of Industry Problems". The seminar reports include two rate making problems (excess coverages and package policies), the analysis of the financial reports of United States Companies and the control of average claim costs. The remarks of three of the speakers at a panel discussion on the future of rate making are recorded. The Proceedings also includes a *Report on Credibility* which is reviewed on page 308 of Volume II of the Astin Bulletin.

SOCIETY OF ACTUARIES

The 1962 Transactions of the Society of Actuaries (Volume 14) contains two papers of especial interest to ASTIN members.

Actuarial Application of Monte Carlo Technique by RUSSELL M. COLLINS, Jr.

Many ASTIN members are interested in the use of modern mathematical and statistical techniques in actuarial studies. There has been much written about the theoretical use of the mathematical tools now available but examples of their practical application to actual data are comparatively rare. This paper which applies the Monte Carlo method to a problem in Group Life