

RISK THEORY

A Mixed Model for Loss Ratio Analysis, by M. Y. El-Bassiouni (Kuwait University)

The model introduced may be treated as a mixed two-way analysis of variance with fixed company effects and random time effects. Further, the risk volumes are integrated into the model in such a way that the unexplained variance is inversely proportional to the risk volume of each company. The proposed model is used to analyze loss ratio data from the general insurance market in Kuwait. The maximum likelihood estimates of the structural parameters are obtained. These estimates are then used to compute the loss ratios and solvency margins for the four domestic insurance companies. *Astin Bulletin*, Vol. 21, No. 2 (November 1991), pp. 231-38. (Reprinted with permission of the *Astin Bulletin*).

Statistical Analysis of Natural Events in the United States, by Charles Levi (Compagnie Transcontinentale de Réassurance, Paris) and Christian Partrat (Université Pierre et Marie Curie, Paris)

A statistical analysis is performed on natural events which can produce important damages to insurers. The analysis is based on hurricanes which have been observed in the United States between 1954 et 1986.

At first, independence between the number and the amount of the losses is examined. Different distributions (Poisson and negative binomial for frequency and exponential, Pareto and lognormal for severity) are tested. Along classical tests as chi-square, Kolmogorov-Smirnov and non parametric tests, a test with weights on the upper tail of the distribution is used: the Anderson-Darling test.

Confidence intervals for the probability of occurrence of a claim and expected frequency for different potential levels of claims are derived.

The Poisson Log-normal model gives a very good fit to the data. *Astin Bulletin*, Vol. 21, No. 2 (November 1991), pp. 253-76. (Reprinted with permission of the *Astin Bulletin*).

Risk Theory with the Gamma Process, by François Defresne (Laval University), Hans U. Gerber (University of Lausanne) and Elias S.W. Shiu (University of Manitoba)

The aggregate claims process is modelled by a process with independent, stationary and nonnegative increments. Such a process is either compound Poisson or else a process with an infinite number of claims in each time interval, for example a gamma process. It is shown how classical risk theory, and in particular ruin theory, can be adapted to this model. A detailed analysis is given for the gamma process, for which tabulated values of the probability of ruin are provided. *Astin Bulletin*, Vol. 21, No. 2 (November 1991), pp. 177-92. (Reprinted with permission of the *Astin Bulletin*).

