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On difficulties of risk modelling and portfolio analysis

The statistical modelling of insurance claims is typically achieved through lognormal models, which often fit well to the central portion of a number of data sets. What is meant by the “central portion” of observations embraces the set of values, truncated below and above by “appropriate” threshold levels. The most troublesome claim-values are, as could be expected, large observations, but small values may generate other technical difficulties as well, which we will not consider here in detail. Large values typically fall in the domain of reinsurance, and are often quite well interpreted by Pareto-type models. The main difficulty comes here from the available “large” observations, which compose, most of the time, data sets so small as to render their statistical analysis troublesome. We have considered recently a number of portfolios, each composed of a few thousand observations, and observed, in each case, that only a small percentage of the data could be well interpreted by Pareto-type models. Such models become difficult to fit when the number of observations falling in this range is, for example, of the order of 5 to 20. Another class of technical problems to cope with is, first, to find the right statistical assessment methods to compare between each other the respective risks of several portfolios, and second, to assess the goodness-of-fit of a given portfolio with respect to a specified model. In particular, when some large observations fall into the domain of Pareto distributions, the finiteness of claim-values variances is often questionable. Practically all the data sets which we have considered lead to estimations of Pareto indexes for large claims corresponding to finite expectations, but yet, to infinite variances. This, in itself, suffices to support the idea that most “usual” statistical comparison methods (such as that using the Student test technology) are ineffective. We shall illustrate these questions through the analysis of a real data set, and propose some new methods to bring solutions to the corresponding problems.

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