Benchmark Rates for Excess of Loss Reinsurance Programs

A Generalised Mixed Non-Linear approach

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Abstract

This article proposes market benchmark rates for the excess of loss reinsurance of Motor Third Party Liability insurance portfolio's for a given insurance market. The XL premium rates are expressed in terms of the percentage of the expected premium income that is available to cover the whole risk of the corresponding portfolio. We assume that for each portfolio the XL rates are based on a portfolio specific compound process and that the XL rates are essentially explained by the expected values of the corresponding compound models. We take account of the specific XL contractual conditions like stabilisation, interest and deposit clauses as well as the (fixed) payment and the IBN(E)R patterns.
The parameters of the benchmark model are estimated within the framework of Mixed Generalized Non-Linear models solved by maximising the likelihood on the set of observed XL reinsurance rates using SAS procedure NLMIXED. This framework allows taking into account the dependency between the rates of the different layers of the same portfolio in the sense that the rates will be described by a conditional compound model given the reinsured portfolio. Some of the parameters will be fixed (independent of the reinsured portfolio), the other are portfolio specific and are assumed to be multivariate lognormal distributed.
The result is that each portfolio has its own portfolio specific XL-rate model which can be used for instance for rate-estimation under changing contractual conditions, even if the number of observed rates is limited to one. Further, by taking the (weighted) average of the individual (portfolio specific) models, all based on the same XL clauses, payment and IBN(E)R patterns, one can easily compare the rates of different portfolio's. By limiting the average to portfolio's which are assumed to be comparable with each other one becomes a benchmark for the so called lookalike portfolio's.
This method is applied to the Belgian Motor Third Party Liability excess of loss rates observed during the years 2001 till 2004.

Keywords: Excess of loss reinsurance, stabilisation clause, interest clause, deposit clause, payment pattern, IBN(E)R, Pareto model, benchmark XL rate, generalised (non-) linear mixed models, NLMIXED (SAS).

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