Antonio, Katrien; **Beirlant, Jan**; **Hoedemakers, Tom**; **Verlaak, Robert**
Lognormal mixed models for reported claims reserves. (English) Zbl 1479.91303
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Summary: Traditional claims-reserving techniques are based on so-called run-off triangles containing aggregate claim figures. Such a triangle provides a summary of an underlying data set with individual claim figures. This contribution explores the interpretation of the available individual data in the framework of longitudinal data analysis. Making use of the theory of linear mixed models, a flexible model for loss reserving is built. Whereas traditional claims-reserving techniques don't lead directly to predictions for individual claims, the mixed model enables such predictions on a sound statistical basis with, for example, confidence regions. Both a likelihood-based as well as a Bayesian approach are considered. In the frequentist approach, expressions for the mean squared error of prediction of an individual claim reserve, origin year reserves, and the total reserve are derived. Using MCMC techniques, the Bayesian approach allows simulation from the complete predictive distribution of the reserves and the calculation of various risk measures. The paper ends with an illustration of the suggested techniques on a data set from practice, consisting of Belgian automotive third-party liability claims. The results for the mixed-model analysis are compared with those obtained from traditional claims-reserving techniques for run-off triangles. For the data under consideration, the lognormal mixed model fits the observed individual data well. It leads to individual predictions comparable to those obtained by applying chain-ladder development factors to individual data. Concerning the predictive power on the aggregate level, the mixed model leads to reasonable predictions and performs comparable to and often better than the stochastic chain ladder for aggregate data.

MSC:

91G05 Actuarial mathematics
62P05 Applications of statistics to actuarial sciences and financial mathematics

Full Text: DOI

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