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A Multivariate Analysis of Intercompany Loss Triangles

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The prediction of insurance liabilities often requires aggregating experience of loss payment from multiple insurers. The resulting dataset of intercompany loss triangles displays a multilevel structure of claim development, where a portfolio consists of a group of insurers, each insurer several lines of business, and each line various cohorts of claims. Current studies on loss reserving methods, thought emphasizing the dependency among business lines, have been focusing on single company experience. In this paper, we propose a Bayesian hierarchical model to analyze intercompany claim triangles. Some features of our approach are: Within triangles, both parametric and semi-parametric formulations are considered for modeling the process of loss development over time; the association among triangles of each individual firm is accommodated through a parametric copula; a hierarchical structure is specified on major parameters to allow for information-sharing across insurers. Numerical analysis is performed for a insurance portfolio of multivariate loss triangles from the National Association of Insurance Commissioners. The Bayesian inference enables us to derive the predictive distributions of outstanding payments at different levels of interest, be it industry, company, business line, or year. We show that prediction could be improved through borrowing strength within and between insurers based on training and hold-out observations.