

MULTIVARIATE MODELS AND RESERVING

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Abstract

Main Key points:

- Reserving Actuarial Methodology in the Non-Life business.
- Estimation of Ultimate Claims and reserves using new statistical methods.
- Claim size distribution analysis.
- Multivariate regression models for better estimation of the tail of Loss distribution.
- Real data application based on motor insurance data.

Introduction

Loss Reserving and Large Claims Estimation

- Loss reserving is a classic actuarial reserving problem encountered extensively in property and casualty as well as in health insurance. Losses are arranged in a triangular fashion as they develop over time and as different obligations are incurred from year to year.

- The most common actuarial method used for reserving is the Chain Ladder Method. The chain-ladder or development method is a prominent actuarial loss reserving technique. Its intent is to estimate incurred but not reported claims (IBNR) and project ultimate loss amounts. The primary underlying assumption of the chain-ladder method is that historical loss development patterns are indicative of future loss development patterns.
- The primary goal of loss reserving is to set an adequate reserve to fund losses that have been incurred but not yet developed. For a single line of business written by an insurance company, there is an extensive actuarial literature describing alternative approaches for determining loss reserves.
- Large claims estimation is very significant for the capital requirement calculation.

Data

Short Description of data used

- The study is based on data from automobile policies from a major insurance company.
- "Bodily Injuries" and "Property Damage" Claims are modelled.
- The cost of these claims is represented by the estimated ultimate cost.
- Explanatory variables which affect these two type of claims are described below

Variables Description	
V_i	Short Description
V1	Driver's Age
V2	Automobile Brand
V3	Car Cubism
V4	Policy Maintenance
V5	City Population
V6	Vehicle Age

- New data sources will be incorporated in order to analyse the tail behaviour of losses distribution to different type of claims ("NAT-CAT" events etc.).

Model

Main approach:

- Model characteristics of claims using appropriate families of multivariate distributions and other statistical measures.
- Better capture the tail behaviour of losses via copula based regression models.
- Applications to reserving and risk management calculations taking into account specific characteristics of the composition of the portfolio.
- Explore the model for possible applications to natural catastrophe hazards claims estimation and health claims.

Remarks and next steps

Model remarks:

- Models are built in "R" programming language.

Next steps:

- Publicize and present results and conclusions.