1 Introduction

The evaluation risk is crucial in the insurance industry. Companies are tasked with dealing with a multitude of potential risks. Whether it be for capital allocation where laws are becoming more and more stringent, as outline in recent regulatory documents Solvency II (2016) or OSFI (2015), or for pricing of products, being able to accurately evaluate the associated risks is paramount to their success as a business. In this project, we focus on the pricing of insurance premiums in a property and casualty scenario. When consider a policy holder's portfolio, the total loss associated to it is often modelled using a compound distribution, i.e. something of the form

$$S = \begin{cases} \sum_{i=1}^{N} X_i & \text{if } N > 0 \\ 0 & \text{if } N = 0 \end{cases},$$

where the random variables $X_i \sim X$ for all i, denote the severity distributions, that is the amount of each individual claim, and N denotes the frequency distribution, that is the number of claims made by each policyholder. Pricing an individuals policy premium is then often calculated using the expected loss of the portfolio. There are a variety of models that exist in this context. The oft-used choice of compound model is taking $X \sim Ga(\alpha, \beta)$ and $N \sim Pois(\lambda)$. This combination of these severity and frequency random variables results in what is known as the tweedie distribution. It's use is widely documented in actuarial science, for instance see Murphy et al. (2000) or Peters et al. (2008). In particular, this model has the advantages of effectively modelling both the large quantity of zero claims.

References

European Commission. Solvency II, 2016. URL http://ec.europa.eu/finance/insurance/solvency2/index_en.htm.

Karl P Murphy, Michael J Brockman, and Peter KW Lee. Using generalized linear models to build dynamic pricing systems. In *Casualty Actuarial Society Forum, Winter*, pages 107–139. Citeseer, 2000.

OSFI. Minimum capital test for federally regulated property and casualty insurance companies, 2015. URL http://www.osfi-bsif.gc.ca/Eng/fi-if/rg-ro/gdn-ort/gl-ld/Pages/mct2015.aspx.

Gareth W Peters, Pavel V Shevchenko, and Mario V Wüthrich. Model risk in claims reserving within tweedies compound poisson models. *ASTIN Bulletin, to appear*, 2008.