

A Comparison between Methods for Performing Tariff Analysis on Auto-Insurance

Emil Erikson*

September 2023

Abstract

In this thesis, we study two different approaches to setting premiums for non-life insurance policies using a data set of motor third liability insurance from France. In the first approach, we use a subclass of generalized linear models, with the response distribution belonging to a class of exponential dispersion models, to analyse the frequency at which claims arrive and the average severity of a claim separately, to later use these two models to get the relatives of the premium. In the second approach, we use another subclass of GLMs called Tweedie models, specifically Tweedie models defined by having a variance function exponent $1 < p < 2$, as they are obtained from a theoretical model of the pure premium.

Models are then selected based on forward selection and backward elimination, and later also investigated through cross-validation, before we calculate the relatives of the insurance tariff or the chosen model.

The purpose of this thesis is to see how the different approaches' results differ and discuss the reasons for our findings.

We find that using a separate analysis of frequency and severity of the claims gave us more insight into what impact the different parameters have on the outcome. We also discuss a few ways of improving our analysis, among which are the fact that using the separate approach gives us more flexibility when it comes to the decision of which distributions to use.

For these reasons, we concluded that a separate analysis of the separate frequency-severity method is preferable to a Tweedie model with variance function exponent $1 < p < 2$ when deciding relatives for the pure premium.

*Postal address: Mathematical Statistics, Stockholm University, SE-106 91, Sweden.
E-mail: emilerikson@outlook.com. Supervisor: Ola Hössjer and Mohamed El Khalifi.