

Non-Life Insurance Pricing with Generalized Linear Models

Bearbeitet von
Esbjörn Ohlsson, Björn Johansson

1st ed. 2010, Corr. 3rd printing 2014 2015. Taschenbuch. xiii, 174 S. Paperback

ISBN 978 3 642 10790 0

Format (B x L): 15,5 x 23,5 cm

Gewicht: 296 g

Wirtschaft > Betriebswirtschaft: Theorie & Allgemeines > Wirtschaftsmathematik und -
statistik

schnell und portofrei erhältlich bei


DIE FACHBUCHHANDLUNG

Die Online-Fachbuchhandlung beck-shop.de ist spezialisiert auf Fachbücher, insbesondere Recht, Steuern und Wirtschaft. Im Sortiment finden Sie alle Medien (Bücher, Zeitschriften, CDs, eBooks, etc.) aller Verlage. Ergänzt wird das Programm durch Services wie Neuerscheinungsdienst oder Zusammenstellungen von Büchern zu Sonderpreisen. Der Shop führt mehr als 8 Millionen Produkte.

Preface

Non-life insurance pricing is the art of setting the price of an insurance policy, taking into consideration various properties of the insured object and the policy holder. The main source on which to base the decision is the insurance company's own historical data on policies and claims, sometimes supplemented with data from external sources. In a *tariff analysis*, the actuary uses this data to find a model which describes how the claim cost of an insurance policy depends on a number of explanatory variables. In the 1990's British actuaries introduced generalized linear models (GLMs) as a tool for tariff analysis and this has now become the standard approach in many countries.

This book focuses on methods based on GLMs that we have found useful in our actuarial practice, and intend to provide a set of tools that fills most needs for a tariff analysis. Successive versions of the text have been the basis for a course in non-life insurance mathematics at Stockholm University since 2001. This course is part of the curriculum set up by the *Swedish Actuarial Society* to meet the European *Core Syllabus* for actuarial education.

The aim is to present the basic theory of GLMs in a tariff analysis setting, and also to give some useful extensions of standard GLM theory that are not in common use, viz. the incorporation of random effects and the use of smoothing splines. Random effect models can be used to great advantage for handling categorical variables with a large number of possible levels, and there is an interesting connection with the traditional actuarial field of credibility theory that will be developed here. Smoothing splines is a powerful method for modeling the effect of continuous variables; such analyses are often presented under the name generalized additive models (GAMs). While GAMs have been used in biostatistics for several years, they have not yet found their way into the actuarial domain to any large extent.

The text is intended for practicing actuaries and actuarial students with a background in mathematics and mathematical statistics: proofs are included whenever possible without going into asymptotic theory. The prerequisites are basic university mathematics—including a good knowledge of linear algebra and calculus—and basic knowledge of probability theory, likelihood-based statistical inference and regression analysis. A second course in probability, say at the level of Gut [Gu95], is useful.

In order to provide students with the possibility to work with real data of some complexity, we have compiled a collection of data sets to be used in connection with a number of case studies. The data was provided by Länsförsäkringar Alliance and is available at www.math.su.se/GLMbook.

For working through the case studies, a suitable software is needed. In Appendix we have given some hints on how to proceed using the SAS system, since this is a standard software at many insurance companies. Matlab and R are other possibilities for a course based on this text. There are also some good specialized software packages for tariff analysis with GLMs on the market, but these are not generally available to students; we also believe that having to write your own programs helps in understanding the subject.

Some sections that are not necessary for understanding the rest of the text have been indicated by a star.

We wish to acknowledge the support from Stockholm University, Division of Mathematical Statistics, where we both have been senior lecturers for several years, and the Non-life actuarial group at Länsförsäkringar Alliance, where we are now working as actuaries. Special thanks to Professor Rolf Sundberg for providing the justification for the pure premium confidence intervals. Finally, we wish to thank Viktor Grgić for valuable comments and help with the graphics.

Stockholm

Esbjörn Ohlsson
Björn Johansson