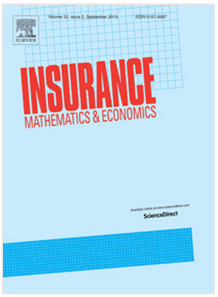
Accepted Manuscript



Full Bayesian analysis of claims reserving uncertainty

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PII: S0167-6687(16)30213-X
DOI: http://dx.doi.org/10.1016/j.insmatheco.2016.12.007
Reference: INSUMA 2312

To appear in: *Insurance: Mathematics and Economics*

Received date: May 2016
Revised date: September 2016
Accepted date: 30 December 2016

Please cite this article as: Peters, G.W., Targino, R.S., Wüthrich, M.V., Full Bayesian analysis of claims reserving uncertainty. *Insurance: Mathematics and Economics* (2017), http://dx.doi.org/10.1016/j.insmatheco.2016.12.007

Full Bayesian analysis of claims reserving uncertainty

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September 29, 2016

Abstract

We revisit the gamma-gamma Bayesian chain-ladder (BCL) model for claims reserving in non-life insurance. This claims reserving model is usually used in an empirical Bayesian way using plug-in estimates for the variance parameters. The advantage of this empirical Bayesian framework is that allows us for closed form solutions. The main purpose of this paper is to develop the full Bayesian case also considering prior distributions for the variance parameters and to study the resulting sensitivities.

Keywords. Chain-ladder method; claims reserving uncertainty; claims development result; Mack's formula; Merz-Wüthrich's formula; conditional mean square error of prediction; run-off uncertainty; full Bayesian chain-ladder model.

1 Introduction

The chain-ladder (CL) algorithm is probably to most popular method to set the reserves for non-life insurance claims. Originally, the CL method was introduced in a purely algorithmic fashion and it was not based on a stochastic model. Stochastic models underpinning the CL algorithm with a statistical model were only developed much later. The two most commonly used stochastic representations are Mack's [5] distribution-free CL model and the over-dispersed Poisson (ODP) model of Renshaw and Verrall [6] and England and Verrall [1]. In this paper we study the gamma-gamma Bayesian chain-ladder (BCL) model which provides in its non-informative prior limit another stochastic representation for the CL method. This model was first considered in a claims reserving context by Gisler [3] and Gisler and Wüthrich [4]. The typical application of the gamma-gamma BCL model was done under fixed (given) variance parameters, using plug-in estimates for these variance parameters, see Example 2.13 in Wüthrich and Merz [8] for such an empirical Bayesian analysis. Of course, this (partially) contradicts the Bayesian paradigm. In a full Bayesian approach one should also model these variance parameters with prior distributions. The aim of this paper is to study the influence of such a *full* Bayesian modeling approach and compare it to the *empirical* Bayesian modeling approach used in [8]. In particular, we aim at

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