

Uraiwan Jaroengeratikun 2013: Statistical Inference Based on a Stochastic Analysis of Insurance Claim Counts. Doctor of Philosophy (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Assistant Professor Winai Bodhisuwan, Ph.D. 110 pages.

The aim of this research is to propose an estimation approach to non-life insurance claim counts related to the claim counting process. The considered processes are a homogeneous Poisson process (HPP) and a non-homogeneous Poisson process (NHPP) with bell-shaped and beta-shaped intensities. The claim counts $N(t)$ and predicting claim counts can be obtained by the estimated parameter $\widehat{\Lambda}(t)$ of process using an estimating function via a zero mean martingale. The model parameters of claim intensity of process are estimated by using the maximum likelihood estimation (MLE) and the Bayesian estimation (BE). Some situations based on estimation and prediction of claim counts are studied by using the simulation technique.

This study bases on the insurance claim counting process. The study found that, for HPP, the $\widehat{\Lambda}(t)$ using the BE provides the best fit to $N(t)$ when the number of observations is slightly larger than a constant intensity rate. For NHPP with a bell-shaped intensity, using BE for predicting $N(t)$ performs very well when the number of observations is slightly larger than an average number of claims over a period of time. Where a beta-shaped intensity, using BE fits $N(t)$ very well when the two parameters p and q of claim intensity are slightly more than 1 and the number of observations is small; however, using MLE fits $N(t)$ very well when p and q are much more than 1 and the number of observations is equal to the value of the peak level of claims over a period of time. In addition, this research presents a procedure of claim count estimation and prediction, which are demonstrated by the examples of sample paths from simulated data. An application of the proposed approach to real insurance claim data from a non-life insurance company in Thailand is illustrated. These procedures can be a clear and useful guide to actuaries and researchers in their works.

Student's signature

Thesis Advisor's signature