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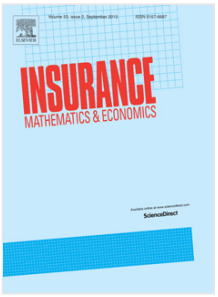

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On a risk model with claim investigation

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Abstract

In this paper, a queue-based claims investigation mechanism is considered to model an insurer's claim processing practices. The resulting risk model may be viewed as a first step in developing models with more realistic claim investigation mechanisms. Related to claim investigations, claim settlement delays and time dependent payments have been studied in a ruin context by, e.g. Taylor [1979], Cai and Dickson [2002], and Trufin et al. [2011]. However, little has been done on queue-based investigation mechanisms. We first demonstrate the impact of a particular claim investigation system on some common ruin-related quantities when claims arrive according to a compound Poisson process, and investigation times are of a combination of exponential form. Probabilistic interpretations for the defective renewal equation components are also provided. Finally, via numerical examples, we explore various risk management questions related to this problem such as how claim investigation strategies can help an insurer control its activities within its risk appetite.

Keywords: claim investigation; queueing system; Gerber-Shiu analysis; defective renewal equation; queueing theory; risk theory.

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1 Introduction

Contemporary insurer surplus models do not typically consider claim investigation practices in an explicit manner. Rather, features related to claim investigation have to be a priori embedded in the defined risk model of interest by adjusting the model's parameters. In this paper, we directly model claim investigation practices by considering a particular queue-based claim investigation mechanism. Investigation practices and strategies are developed to determine the extent of liability and identify ineligible or inflated claims which are crucial components of a sound insurance practice. For example, Juri [2002] discusses a risk process where claims are sums of dependent random variables. Such processes allow for the modelling of (allocated) loss adjustment expenses generated by claim investigations. As a result of investigation practices, claim

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