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Title: An insurance risk model with periodic capital injections and its applications

Abstract:

The analysis of capital injection strategy in the literature of insurance risk models (e.g. Pafumi (1998), and Dickson and Waters (2004)) typically assumes that whenever the surplus becomes negative, the amount of shortfall is injected so that the company can continue its business forever. Recently, Nie et al. (2011) has proposed a more realistic model in which capital is immediately injected to restore the surplus level to a positive level b when the surplus falls between zero and b , and the insurer is still subject to a positive ruin probability. Inspired by the idea of randomized observations in Albrecher et al. (2011), we further generalize Nie et al. (2011)'s model by assuming that capital injections are only allowed at a sequence of time points whose intervals are Erlang distributed. When the claim amount is distributed as a combination of exponentials, explicit formulas for the Gerber-Shiu expected discounted penalty function (Gerber and Shiu (1998)) and the expected total discounted cost of capital injections before ruin are obtained. The derivations rely on a resolvent density associated with an Erlang random variable, which is shown to admit an explicit expression. Numerical examples are provided, including an application to price a perpetual reinsurance that makes the capital injections. We will demonstrate how to choose an optimal reinsurance to minimize the insurer's ruin probability. This is joint work with Hailiang Yang and Zhimin Zhang.