

Cheung, Eric C. K.; Landriault, David

A generalized penalty function with the maximum surplus prior to ruin in a MAP risk model. (English) [Zbl 1231.91156](#)

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Summary: A risk model where claims arrive according to a Markovian arrival process (MAP) is considered. A generalization of the well-known Gerber-Shiu function is proposed by incorporating the maximum surplus level before ruin into the penalty function. For this wider class of penalty functions, we show that the generalized Gerber-Shiu function can be expressed in terms of the original Gerber-Shiu function (see e.g. [*H. U. Gerber* and *E. S.W. Shiu* [*N. Am. Actuar. J.* 2, No. 1, 48–78 (1998; [Zbl 1081.60550](#))] and the Laplace transform of a first passage time which are both readily available. The generalized Gerber-Shiu function is also shown to be closely related to the original Gerber-Shiu function in the same MAP risk model subject to a dividend barrier strategy. The simplest case of a MAP risk model, namely the classical compound Poisson risk model, will be studied in more detail. In particular, the discounted joint density of the surplus prior to ruin, the deficit at ruin and the maximum surplus before ruin is obtained through analytic Laplace transform inversion of a specific generalized Gerber-Shiu function. Numerical illustrations are then examined.

MSC:

91B30 Risk theory, insurance (MSC2010)

Cited in **18** Documents

Keywords:

generalized penalty function; maximum surplus level before ruin; Markovian arrival process; discounted joint distribution

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