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**On the joint distribution of surplus before and after ruin under a Markovian regime switching model.** (English) [Zbl 1093.60051](#)

*Stochastic Processes Appl.* 116, No. 2, 244-266 (2006).

The paper considers the Markov-modulated risk model introduced by *S. Asmussen* [*Scand. Actuar. J.* 1989, No. 2, 69–100 (1989; [Zbl 0684.62073](#))], the joint distribution of the surplus before and after ruin assuming that the claim sizes are phase-type distributed. If the problem can be solved in the case of phase-type distribution, the problem in the general case can be approximated by using a sequence of phase-type distributions which converge to the desired probability distribution. The authors show when the initial surplus is zero or the claim size distributions are phase-type, it is possible to obtain a closed form solution to the joint distribution being considered. For the study of ruin probability, joint distribution of surplus, moments of surplus at moments of the ruin and the time of ruin, a set of integro-differential equations satisfied by the *H. U. Gerber* and *E. S. W. Shiu* expected discounted penalty function [*N. Am. Actuar. J.* 2, No. 1, 48–78 (1998; [Zbl 1081.60550](#))] is derived.

Reviewer: [Laszlo Lakatos \(Budapest\)](#)

**MSC:**

[60J27](#) Continuous-time Markov processes on discrete state spaces  
[91B30](#) Risk theory, insurance (MSC2010)

Cited in **26** Documents

**Keywords:**

Markov-modulated risk model; phase-type distribution; surplus before and after ruin

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