Hazard rates of a maximum-to-default distribution, and win-first probability under interest force

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Abstract

In this paper, the surplus of a non-life insurance company affected by a constant interest force is considered. The win-first probability is defined as the probability that the surplus reaches an upper barrier before a lower barrier. This risk-return indicator satisfies a life-insurance type equation. Hazard rates of a maximum-to-default distribution, regarded as a remaining future lifetime distribution, are studied, and provide an alternative derivation of the win-first probability, which had already been computed by Segerdahl (1970) and Dickson and Gray (1984b) without interest force. After generalizing closed-form formulae, bounds and approximations for the win-first probability, we also propose an algorithm to compute this risk-return indicator in the general case. Algorithm and numerical applications are detailed for practitioners.

Key words: Finite-time ruin probabilities, classical risk model, discrete claim-size distributions, pseudo-compound distributions, Appell polynomials.

Classification codes: IM10, IM11, IM13, G00, G22.

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