

**Cheung, Eric C. K.**

**A unifying approach to the analysis of business with random gains.** (English) Zbl 1277.60148  
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Summary: In this paper, we consider a stochastic model in which a business enterprise is subject to constant rate of expenses over time and gains which are random in both time and amount. Inspired by *H. Albrecher* and *O. J. Bozma* [Insur. Math. Econ. 35, No. 2, 245–254 (2004; Zbl 1079.91048)], it is assumed in general that the size of a given gain has an impact on the time until the next gain. Under such a model, we are interested in various quantities related to the survival of the business after default, which include: (i) the fair price of a perpetual insurance which pays the expenses whenever the available capital reaches zero; (ii) the probability of recovery by the first gain after default if money is borrowed at the time of default; and (iii) the Laplace transforms of the time of recovery and the first duration of negative capital. To this end, a function resembling the so-called Gerber-Shiu function [*H. U. Gerber* and *E. S. W. Shiu*, N. Am. Actuar. J. 2, No. 1, 48–78 (1998; Zbl 1081.60550)] commonly used in insurance analysis is proposed. The function's general structure is studied via the use of defective renewal equations, and its applications to the evaluation of the above-mentioned quantities are illustrated. Exact solutions are derived in the independent case by assuming that either the inter-arrival times or the gains have an arbitrary distribution. A dependent example is also considered and numerical illustrations follow.

**MSC:**

**60K20** Applications of Markov renewal processes (reliability, queueing networks, etc.)

Cited in 14 Documents

**62P05** Applications of statistics to actuarial sciences and financial mathematics

**91B30** Risk theory, insurance (MSC2010)

**Keywords:**

random gains; dual risk model; delayed renewal process; defective renewal equation; perpetual insurance; time of recovery

**Full Text:** [DOI](#)

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