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ABSTRACT PROCEEDING

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APPROXIMATE EVALUATION OF THE DISTRIBUTION OF THE RANDOM SUM OF I.I.D. RANDOM VARIABLES THROUGH A DISCRETIZATION APPROACH

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ABSTRACT

Finding the distribution of the random sum of N independent and identically distributed continuous positive random variables is a statistical problem that covers a great importance in the insurance field, where such random variables can represent the size of N claims occurring in a given time interval and their sum S can be regarded as the aggregate risk the insurance company has to sustain. Determining the exact distribution of S is not generally an easy task, as it requires the computation of convolutions, which can be usually made only numerically. Alternatively, one can appropriately discretize the continuous random variable modelling the claim size and then apply Panjer's recursive formula, which is able to provide the exact distribution of S if the count distribution of N belongs to the so called $(a, b, 0)$ class and the claim size is a count random variable itself. This paper explores different discretization techniques, some of which were recently introduced in the literature and are derived from the minimization of a statistical distance between cumulative distribution functions; they are applied to the above problem, by considering several distributions for the claim size, among the others the exponential, and for N. The resulting approximate distributions of S are compared to the exact one (recovered either analytically or, more often, numerically) and to the normal approximation obtained by applying the central limit theorem. Preliminary results show that the approximation-by-discretization can lead to a satisfactory degree of accuracy and can be much more precise than the normal approximation.

Keywords: Compound Distribution, Discretization, Panjer's Formula, Statistical Distance.
JEL Codes: C15, C46, G22.