

Nonparametric estimation of actuarial and financial risk measures

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Abstract

The asymptotic normality of the sample proportional hazard premium for heavytailed claim amounts with infinite variance cannot be obtained by classical results for L -statistics. In this paper, we propose an alternative estimator for this class of premiums and we establish its asymptotic normality.

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Risk measures are indices to quantifying financial losses. There exist several types of such measures: expected value, variance, standard deviation, modified variance, value at risk ... (see for instance, Rolski et *al.*, 1999). One of the most recent measures is that of Wang (1996) who has proposed a risk measure based on a proportional transformation of the hazard function. It corresponds to the certainty equivalent of the dual theory of expected utility developed by Yaari (1987). It treats insurance losses as positive random variables and produces premiums that are higher than the expected value of the insurance loss. The so-called Proportional Hazard Premium (PHP) (see for instance, Rolski et *al.*, 1999, page 82) belongs to this class of risks. Indeed, let X be an insured risk with distribution function (df) F , then the distorted risk X is defined as a distorted expectation of X , as follows

$$\rho(X) := \int_{-\infty}^{\infty} g(1 - F(x)) dx,$$

when $g : [0; 1] \rightarrow [0; 1]$ is non increasing function such that $g(0) = 0$ and $g(1)=1$: Our main goal is to present an asymptotically normal estimator of $\rho(X)$ for heavy tailed distributions.

Références

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