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Randomly weighted sums of subexponential random variables with application to ruin theory. (English) Zbl 1049.62017

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Summary: Let $\{X_k, 1 \leq k \leq n\}$ be n independent and real-valued random variables with common subexponential distribution function, and let $\{\theta_k, 1 \leq k \leq n\}$ be other n random variables independent of $\{X_k, 1 \leq k \leq n\}$ and satisfying $a \leq \theta_k \leq b$ for some $0 < a \leq b < \infty$ for all $1 \leq k \leq n$. This paper proves that the asymptotic relations

$$\mathbb{P}\left(\max_{1\leq m\leq n}\sum_{k=1}^{m}\theta_k X_k > x\right) \sim \mathbb{P}\left(\sum_{k=1}^{n}\theta_k X_k > x\right) \sim \sum_{k=1}^{p}\mathbb{P}(\theta_k X_k > x)$$

hold as $x \to \infty$. In doing so, no assumption is made on the dependence structure of the sequence $\{\theta_k, 1 \leq k \leq n\}$. An application to ruin theory is proposed.

MSC:

62E20 Asymptotic distribution theory in statistics
91B30 Risk theory, insurance (MSC2010)
60G50 Sums of independent random variables; random walks

Keywords:

asymptotics; dominated variation; ruin probability; subexponentiality; uniformity; heavy tailed distributions

Full Text: DOI