



# On the asymptotic approximation of inverse moment under sub-linear expectations\*

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**Abstract:** In this paper, we will investigate the approximations of inverse moments for double-indexed weighted sums of random variables under sub-linear expectations. The asymptotic approximations of inverse moments and the convergence rate of approximations are established under the meaning of upper expectation  $\hat{\mathbb{E}}$  and the lower expectation  $\hat{\mathbb{E}}$ , respectively. Moreover, we carry out some simulations to verify the validity of our theoretical results. The results obtained in the paper improve and extend the corresponding ones of Yang et al. (2016) from independent random variables in the classical probability space to END random variables in sub-linear expectation space.

**Keywords:** inverse moments; convergence rate; sub-linear expectations; extended negatively dependent random variables

**Mathematics Subject Classification:** 60E15; 62E20; 62G20

## 1 Introduction

Let  $\{Z_n, n \geq 1\}$  be a sequence of nonnegative random variables with finite second moments. Denote  $X_n = \sigma_n^{-1} \sum_{i=1}^n Z_i$ , where  $\sigma_n^2 = \sum_{i=1}^n \text{Var}(Z_i)$ . Under suitable conditions, the inverse moment can be approximated by the inverse of the moment, i.e.,

$$E(a + X_n)^{-\alpha} \sim (a + EX_n)^{-\alpha} \quad (1.1)$$

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