

CONDITIONED RANDOM WALKS WITH RANDOM INDICES

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Abstract: Let $\{X_k, k \geq 1\}$ be a sequence of i.i.d. random variables with $EX_1 = 0$, $EX_1^2 = \sigma^2 < \infty$, and let $\{N_m, m \geq 0\}$, $N_0 = 0$ a.s., be a sequence of positive integer-valued random variables. Let $\{S_n, n \geq 0\}$ and $\{S_{N_m}, m \geq 0\}$ be defined by $S_0 = 0$ a.s., $S_n = X_1 + \dots + X_n$, $n \geq 1$, $S_{N_0} = 0$ a.s., $S_{N_m} = X_1 + X_2 + \dots + X_{N_m}$, $m \geq 1$. Put

$$N = \inf\{n : S_n < 0\}, \quad M = \max\{S_n : n \leq N\}.$$

In this note, under additional conditions on sequences $\{X_k, k \geq 1\}$ and $\{N_m, m \geq 0\}$, we investigate the limit behaviour of $P[M/\sigma\sqrt{N_m} \leq \nu | N > N_m]$, $P[\max_{0 \leq k \leq N_m} S_k/\sigma\sqrt{N_m} \leq \nu | N > N_m]$, and $P[N > N_m | M > \nu\sigma\sqrt{N_m}]$, where $\nu > 0$.

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