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Necessary and sufficient conditions for weak convergence of random sums of independent random variables

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Abstract: Let $\{X_n, n \geq 1\}$ be a sequence of independent random variables such that $EX_n = a_n$, $E(X_n - a_n)^2 = \sigma_n^2$, $n \geq 1$. Let $\{N_n, n \geq 1\}$ be a sequence od positive integer-valued random variables. Let us put $S_{N_n} = \sum_{k=1}^{N_n} X_k$, $L_n = \sum_{k=1}^{n} a_k$, $s_n^2 = \sum_{k=1}^{n} \sigma_k^2$, $n \geq 1$. In this paper we present necessary and sufficient conditions for weak convergence of the sequence $\{(S_{N_n} - L_n)/s_n, n \geq 1\}$, as $n \to \infty$. The obtained theorems extend the main result of M. Finkelstein and H.G. Tucker (1989).

Keywords: random sums, weak convergence, stable law, nonrandom centering, measure of dependence between σ-fields
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