

ASYMPTOTIC THEORY OF LINEAR STATISTICS IN SAMPLING
PROPORTIONAL TO SIZE WITHOUT REPLACEMENT

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Abstract: Consider an ordered sample that is selected from a finite population successively without replacement and with probability proportional to some measure of size. In this paper, we study the asymptotic behavior of linear statistics from such a sampling scheme. Unlike previous results in the literature which consider only order-invariant statistics, we study the asymptotic distribution of linear statistics that depend on the order in which the sample is observed. Such statistics arise in the course of studying the nonparametric maximum likelihood estimators of the finite population and of the unknown population size. The asymptotic behavior is studied under conditions that are weaker than those assumed previously, and we also obtain simpler proofs of some existing results.

2000 AMS Mathematics Subject Classification: Primary: -; Secondary: -;

Key words and phrases: -

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