



## **Comparison of estimation methods on two-stage cluster sampling with unknown each cluster size**

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### **Abstract**

Cluster sampling has been widely used for effective estimation of mean, and total by reducing time and cost. When the size of cluster varies greatly, usually pps(probability proportional to size) method is used. However sometimes one cannot use the pps by lack of information. Also the difference is small, simple random sampling is commonly used for simplicity. In this study, when the simple random sample is used for the first stage sampling design with the different cluster size, three estimation methods are studied with replication variance estimation. A small simulation study is performed and Taxi Company Data is used for real data analysis.

**Keywords:** calibration; ratio estimator; repeated variance estimation.