

METHOD OF FUZZY RATIO ESTIMATE

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ABSTRACT. *This article develops a method of ratio estimate in fuzzy sense. By both the simple random sampling and stratified random sampling, we can obtain the ratio estimate in usual statistical sense. However, the sampling data may be ambiguous in some uncertain circumstance. To solve such kind of problem, we probe into the simple random sampling and stratified random sampling in fuzzy sense, obtain the fuzzy ratio estimate and have the ratio estimate in fuzzy sense, defuzzify them by the centroid in this paper.*

Keywords: Ratio estimate, Fuzzy sense

1. **Introduction.** Ratio estimation involves the use of known population totals for auxiliary variables to improve the weighting from sample values to population estimates. It operates by comparing the survey sample estimate for an auxiliary variable with the known population total for the same variable on the frame. The ratio of the sample estimate of the auxiliary variable to its population total on the frame is used to adjust the sample estimate for the variable of interest [2].

Hilt et al. [3] presented a quality metric for the ratio estimate which can be easily calculated. Mazuelas et al. [14] presented non-line-of-sight (NLOS) ratio estimate and measurements rating in wireless cellular networks. Spinhirne and Vincent [15] presented to design an experiment which delivers the best ratio estimates, while minimizing the impact on constraint variables, which may also be expressed as ratios. A quality metric for the ratio estimate is presented, which can be easily calculated.

The sampling data may be ambiguous in the uncertain circumstance. Therefore, the ratio estimate is slightly biased, since the sample ratio of two variables is an unbiased estimate of the population ratio. Fuzzy sets theory was introduced by Zadeh [16] to deal with problem in which vagueness is present, linguistic value can be used for approximate reasoning within the framework of fuzzy sets theory [17] to effectively handle the ambiguity involved in the data evaluation and the vague property of linguistic expression, and normal triangular fuzzy numbers are used to characterize the fuzzy values of quantitative data and linguistic terms used in approximate reasoning. Lee [4] proposed the procedure to evaluate the rate of aggregative risk using two stages fuzzy assessment method. Lee et al. [5] presented a resource performance evaluating model which can evaluate performance degrees of others collaborators by fuzzy inferences, schedule and distribute the jobs processes based on the evaluated performance degrees. Lee et al. [7] presented the other algorithms to evaluate the rate of aggregative risk. Lee and Lin [8] presented a new algorithm to select the appropriate facility site based on various investment environments. In [9], Lin and Lee presented a new fuzzy assessment method to tackle the rate of aggregative