Calibration of Expansion Factors in a Multilevel Sampling survey

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Abstract
In large complex surveys using multilevel sampling with conglomerates, different levels of stratification, selection probabilities proportional to size, etc., one of the main problems relates to bias.
Complex sampling designs, such as those just mentioned, sometimes do not allow for bias control, because different selection probabilities are involved for sampling units, and samples are not self-weighed. All such bias-related difficulties impede a correct reading of estimations or make outcome comparison impossible. Consequently, the usual practice is to correct or adjust initial expansion factors or weighs (usually, regression of selection probabilities) based on auxiliary known data or information preset from external sources or records.
The purpose of this paper is to make initial weight adjustments by means of the "calibration of fixed marginal probabilities" technique in the "Uso de Tiempo" (Time Usage) survey, carried out in the City of Rosario, Santa Fe Province (Argentina 2010). This technique was applied as per Deville and Sarndal [1992] methodology.
Based on a general approach, such technique introduces new weights as a result of adjusting or calibrating initial weightings set at the design phase by solving out a problem of numerical minimization. The problem is defined by the selection of a distance between the new fixed marginal probabilities and the initial ones, and the use of a set of restrictions on the auxiliary variables involved in the adjustment. The calibration performed kept sampling designs used in the survey. Therefore, it was applied to the initial expansion factors for each sampling unit (households in the Time Usage Survey), which were corrected as per non-response, since this was the last sampling unit of the design.
Regarding auxiliary information used for calibration and adjustments of the sampling inner schema, data were retrieved from the "Censo Nacional de Población, Hogares y Viviendas 2001" (2001 National Survey on Population, Housing and Households).

Keywords: Calibration, Expansion Factors, Multilevel Sampling, Estimations.