Linearization approach for measuring the accuracy of multinomial outcomes from a statistical register

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Abstract

The emergence of new data sources and statistical methods is driving an update in the traditional official statistics paradigm. As an example, the Italian National Institute of Statistics (ISTAT) is undergoing a significant modernisation process, transitioning from a statistical paradigm based on single sample or census surveys to an integrated system of statistical registers. The latter results from an integration process of administrative and survey data based on different statistical methods, and, as such, prone to different sources of error. This work discusses and validates a global measure of error assessment for such multisource register-based statistics. Focusing on two important sources of uncertainty (sampling and modelling), we provide an analytical solution that well approximates the global error of mass-imputation procedures for multi-category type of outcomes. Among other advantages, the proposed measure results in an interpretable, computationally feasible, and flexible approach, while allowing for unplanned on-the-fly statistics on totals to be supported by accuracy estimates. An application to education data from the Base Register of Individuals from ISTAT's integrated system of statistical registers is presented.

Keywords: Official statistics, Accuracy estimation, Generalised mean squared error, Statistical register.

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