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IPS Paper

Unit level small area models for skewed business survey data

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Presentation File

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Brief Description

Small area estimation methods are generally based on mixed effects models which have assumptions of normal errors, but many types of data, and particularly those from business surveys, have skewed distributions which mean that this assumption is violated.

Several approaches have been suggested to deal with such skewed data.

Smith et al.

(2021, JRSS-C 70 312-334) examined a range of robust approaches, which reduce the impacts of observations in the tails of skewed distributions, in a dataset with known outcomes.

Here we replicate this analysis with a second dataset of Italian retail businesses, and compare with a second group of methods based on transformations of the initial data before modelling.

The back-transformed predictions need bias adjustments to produce estimates with acceptable quality.

We review the transformation-based methods which have been proposed in the literature, and make an assessment of the best approaches to use for business surveys based on our repeated sampling simulation study.

Abstract

Small area estimation methods are generally based on mixed effects models which have assumptions of normal errors, but many types of data, and particularly those from business surveys, have skewed distributions which mean that this assumption is violated. Several approaches have been suggested to deal with such skewed data. Smith et al. (2021, JRSS-C 70 312-334) examined a range of robust approaches, which reduce the impacts of observations in the tails of skewed distributions, in a dataset with known outcomes. Here we replicate this analysis with a second dataset of Italian retail businesses, and compare with a second group of methods based on transformations of the initial data before modelling. The back-transformed predictions need bias adjustments to produce estimates with acceptable quality. We review the transformation-based methods which have been proposed in the literature, and make an assessment of the best approaches to use for business surveys based on our repeated sampling simulation study.