A Novel Weighted Estimator to Minimize the Bias Problem in the Gini Index Estimation

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Abstract

Income inequality is a prominent topic in recent research and represents a significant challenge for many countries and institutions. The Gini index is the most widely used indicator to measure inequality. However, this index introduces a substantial bias when applied to distributions that are heavily skewed or exhibit high levels of inequality. The primary goal of this work is to develop a novel estimator that minimizes this bias. The proposed methodology first involves fitting the sample data to a continuous probabilistic distribution and estimating the corresponding parameters using the empirical likelihood method. The Gini index is then estimated using this model-based approach. Additionally, we calculate the Gini index using the standard non-parametric method. The suggested estimator combines both approaches by weighting them, with the weight derived from the p-value obtained through the Kolmogorov-Smirnov test. As a result, the proposed estimator assigns a higher weight to the model-based estimator when the probability distribution fits well, and a higher weight to the non-parametric estimator when the distribution does not fit well. This approach effectively mitigates the bias inherent in the standard method while also protecting against potential misspecifications of the assumed continuous probabilistic distribution.

Keywords

Income inequality, Gini, bias, Kolmogorov-Smirnov, Empirical Likelihood.

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