Likelihood Ratio Tests for Lorenz Dominance

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Abstract

Testing the hypotheses of Lorenz dominance, second- and third-order stochastic dominance has been examined using empirical Lorenz processes and integrated stochastic processes through the bootstrap analysis. There was no study of testing crossing (generalized) Lorenz curves, which were used to explain third-order stochastic dominance (TSD) based on the notion of risk aversion. In this study, distinct patterns of unequal quantiles between dominant and crossing (generalized) Lorenz curves are used to construct likelihood ratio (LR) goodness-of-fit tests for the hypotheses of dominant and crossing (generalized) Lorenz curves through approximate chi-square distributions. A set of LR tests for the TSD property in absence of second-order stochastic dominance are also constructed. The proposed LR tests are evaluated using simulated distribution pairs and an empirical study of the WHO COVID-19 regional death counts of various bivariate samples between March, 2020 and February, 2021.

Keywords: Crossing (generalized) Lorenz curves, Likelihood ratio test, Lorenz dominance, Third-order stochastic dominance.