Robust density power divergence estimates for panel data models

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Abstract
The panel data regression models have become one of the most widely applied statistical approaches in different fields of research, including social, behavioral, environmental sciences, and econometrics. However, traditional least-squares-based techniques frequently used for panel data models are vulnerable to the adverse effects of data contamination or outlying observations that may result in biased and inefficient estimates and misleading statistical inference. In this study, we propose a minimum density power divergence estimation procedure for panel data regression models with random effects to achieve robustness against outliers. The robustness, as well as the asymptotic properties of the proposed estimator, are rigorously established. The finite-sample properties of the proposed method are investigated through an extensive simulation study and an application to climate data in Oman. Our results demonstrate that the proposed estimator exhibits improved performance over some traditional and robust methods in the presence of data contamination.

Keywords Robust estimation · Minimum density power divergence · Panel data · Random-effect model