Panel Data Evaluation of Off-Grid Communities Systems in Uganda: A Methodological Replication Study

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Abstract

This study aims to replicate a previous analysis of off-grid communities systems in Uganda, focusing on evaluating yield improvements through panel data estimation. Panel data from a representative sample of off-grid communities in Uganda were analysed using a fixed effects regression model, accounting for potential endogeneity issues with instrumental variables. The analysis revealed that yield improvements varied significantly across different community types, with an average increase of 15% in solar-powered irrigation systems compared to traditional methods. The replication study confirms the reliability and applicability of the original model for evaluating off-grid communities' yield improvement. The fixed effects approach effectively controlled for unobserved heterogeneity. Further research should explore interaction effects between technology types and environmental conditions, as well as long-term sustainability impacts. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Panel data, Uganda, Panel approach, Econometrics, Estimation, Time series, Spatial econometrics*

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