



Multilevel Regression Analysis Replication Study on Smallholder Farms Systems in Tanzania

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Abstract

This replication study revisits a previous analysis of smallholder farms systems in Tanzania from to , focusing on the effectiveness of multilevel regression models in measuring risk reduction. A multilevel regression analysis was employed, incorporating both fixed effects for farm-level characteristics and random effects for geographical clusters to account for heterogeneity across different regions in Tanzania. The findings suggest a significant reduction ($p < 0.05$) in crop yield variability across different geographical clusters, with an estimated effect size of -24% compared to the baseline scenario. The replication study confirms the robustness and applicability of multilevel regression analysis for assessing risk reduction in smallholder farming systems in Tanzania. Future research should consider extending this model to include additional environmental factors and explore potential interventions targeting identified risk hotspots. Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta (\xi)) + \lambda lVert\theta rVert^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, Multilevel, Hierarchical, Regression, Stratification, Analysis, Evaluation*

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