



Methodological Evaluation of Smallholder Farming Systems in Ghana Using Quasi-Experimental Design to Measure Efficiency Gains

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Abstract

Smallholder farming systems in Ghana are pivotal to the country's agricultural productivity and environmental sustainability. However, there is a need for robust methodologies to evaluate their efficiency gains accurately. A quasi-experimental design will be utilised, incorporating pre- and post-intervention data from randomly selected comparison groups. The analysis will include regression discontinuity designs (RDD) to account for potential confounders such as soil quality and market access. Initial findings suggest that farm efficiency gains are significantly correlated with improved irrigation systems (direction: positive), indicating their critical role in enhancing productivity. This study establishes a robust framework for future evaluations of smallholder farming systems, offering insights into the most effective interventions to boost productivity and sustainability. Further research should explore long-term impacts and scalability of these findings across different regions and contexts within Ghana. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, GIS, econometrics, mixed methods, productivity enhancement, sustainable agriculture, agroecosystems*

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