Bayesian Hierarchical Model for Evaluating Secondary School Systems' Efficiency Gains in Kenya

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Abstract

This study aims to evaluate the efficiency gains of secondary school systems in Kenya by applying a Bayesian hierarchical model. A Bayesian hierarchical model will be employed to estimate efficiency gains, accounting for variability across different school types and regions. The model will incorporate both fixed effects and random effects to account for heterogeneity in school performance. The analysis revealed significant variations in the efficiency of secondary schools, with some achieving substantial gains in academic outcomes despite starting from a disadvantaged base. This study provides insights into how different educational interventions can be optimised to enhance student performance and resource utilization across Kenya's diverse secondary school system. Policy makers should consider targeted support programmes for underperforming schools, leveraging the identified efficiency gains as a benchmark for improvement. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African development, Bayesian statistics, efficiency measurement, hierarchical modelling, Monte Carlo methods, poverty analysis, rural education*

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