



Methodological Evaluation of Ethiopian Secondary School Systems Using Panel Data for System Reliability Measurement

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Abstract

The Ethiopian secondary education system faces challenges in resource allocation and quality assurance. Panel data econometric techniques were employed to estimate model parameters and assess system performance across different time periods and schools. A significant proportion (78%) of variance in student academic outcomes was explained by school-level variables, indicating strong internal consistency within the educational environment. The study highlights the importance of standardised data collection to enhance system reliability and proposes targeted interventions for resource allocation. Implementing a uniform curriculum and standardising assessment methods are recommended as key strategies for improving secondary education in Ethiopia. secondary schools, panel data, system reliability, Ethiopian education Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{rVert}^2$, with performance evaluated using out-of-sample error.

Keywords: *Pan-African, Panel Data, Econometrics, System Reliability, Regression Analysis, Education Policy, Geographic Information Systems*

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