



# Asymptotic Analysis and Identifiability Checks in Time-Series Econometrics for Water-Resource Allocation in Uganda

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## Abstract

This study addresses a current research gap in Mathematics concerning Time-Series Econometrics for water-resource allocation in Uganda: asymptotic analysis and identifiability checks in Uganda. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A theorem-driven mathematical framework was developed under explicit regularity assumptions, with stability and convergence analysis of the proposed estimator. The main results show stability of the proposed functional under bounded perturbations and convergence of the estimator to a well-defined limit, characterised by  $R(x) = \operatorname{argmin}_{\theta} L(\theta; x)$ . The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Time-Series Econometrics for water-resource allocation in Uganda: asymptotic analysis and identifiability checks, Uganda, Africa, Mathematics, theoretical This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims.

**Keywords:** *Sub-Saharan, Time-Series, Econometrics, Identification, Consistency, Estimation, Cointegration*

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