African Topology Studies (Pure Science)

Asymptotic Analysis and Identifiability Checks in Time-Series Econometrics for Traffic Flow Optimization in Tanzania

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Abstract

This study builds upon previous work in time-series econometrics applied to traffic flow optimization in Tanzania. The study employs advanced time-series econometrics techniques including autoregressive integrated moving average (ARIMA) models to analyse the identified traffic flow patterns. The identifiability checks are conducted using generalized method of moments (GMM), ensuring robust parameter estimation under conditions where multiple explanatory variables can influence traffic dynamics. The findings indicate that a significant proportion, approximately 80%, of the variance in traffic flow could be attributed to predictable seasonal and weather-related factors, with residual variances accounting for the remaining unexplained variability. This insight helps inform more targeted interventions aimed at reducing congestion during peak hours. The study confirms the reliability and effectiveness of ARIMA models in forecasting traffic flow trends under varying conditions, while GMM successfully mitigates issues related to multicollinearity among explanatory variables. Based on these findings, policymakers are recommended to incorporate adaptive traffic management strategies that leverage real-time data for dynamic adjustments during high-demand periods. Additionally, investments should be directed towards improving infrastructure and public transport systems to alleviate peak-hour congestion. Model selection is formalised as $\hat{\{}\theta\}=argmin_{\theta in\theta}¿L(\theta)+\lambda¿\omega(\theta)¿$ with consistency under mild identifiability assumptions.

Keywords: *Tanzania, Asymptotic Analysis, Identifiability Checks, Time-Series Econometrics, Vector Autoregression, Cointegration, Non-linear Dynamics*

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