African Geometry and Topology (Pure Science)

Spectral Methods and Condition-Number Analysis in Time-Series Econometrics for Financial Risk Estimation in South Africa

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Abstract

This study focuses on time-series econometrics for financial risk estimation in South Africa, emphasising the application of spectral methods and condition-number analysis. Spectral methods were applied to decompose the financial time series into its constituent frequencies, facilitating the detection of anomalies. Condition-number analysis was employed to evaluate the stability and reliability of the econometric models used for risk estimation. A clear pattern emerged in the spectral decomposition indicating potential periods of financial instability. The condition-number analysis revealed that certain model parameters significantly influenced the overall stability of the econometric models, necessitating their adjustment for improved accuracy. The findings suggest a need to re-evaluate and possibly refine existing financial risk estimation models by incorporating more sophisticated spectral methods and robust condition-number analyses. Financial institutions should consider integrating these advanced analytical tools into their risk management strategies. Policy makers are encouraged to review current regulations in light of the identified model vulnerabilities. The analytical core is $\hat{\{} y\} t = mathcal\{F\}(xt;\theta)$ with $\hat{\{}\theta\} = argmin_{\theta} L(\theta)$, and convergence is established under standard smoothness conditions.

Keywords: *Sub-Saharan, Multivariate, Time-Series, Eigenvalues, Condition-Number, Monte-Carlo, Principal-Agent*

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