African Geometry and Topology (Pure Science)

Functional Analysis of Financial Risk Estimation in Ethiopia Using Finite-Element Discretization and Error Bounds

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Abstract

Financial risk estimation in Ethiopia is crucial for economic stability and development. However, traditional methods often fail to capture the complexity of financial systems within such contexts. The research employs a novel approach combining functional analysis with finite-element methods for modelling financial risks. An assumption is made that financial data can be represented as continuous functions over time. The convergence property of the finite element method ensures reliable approximation of risk estimates. A specific dataset from Ethiopian banks revealed significant discrepancies in estimated risks when compared to actual outcomes, highlighting the need for refined methodologies. The study concludes that integrating functional analysis with finite-element discretization significantly improves the precision of financial risk predictions, offering a robust framework for policymakers and practitioners. Further research should explore applications in real-world scenarios and evaluate the impact on decision-making processes within Ethiopian financial institutions. 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: *Ethiopia, Functional Analysis, Financial Risk, Finite-Element Method, Error Bounds, Optimization, Stochastic Processes*

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