



# Asymptotic Analysis and Identifiability Checks of Partial Differential Equations in Financial Risk Estimation within Nigeria's Context

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## Abstract

Financial risk estimation in Nigeria is critical for regulatory compliance and resource allocation. Partial differential equations (PDEs) are used to model financial risks, but their application requires rigorous analysis. Theoretical derivations and mathematical proofs are employed without empirical data. The approach includes identifying key assumptions that affect model accuracy and stability. The theoretical framework establishes thresholds for model reliability and provides guidelines for parameter selection in financial risk estimation models within Nigeria's economic landscape. Developers of financial risk models should prioritise the identification and quantification of uncertainties, especially those that influence long-term predictions. Model validation through real-world data is recommended to confirm analytical findings. Under standard regularity and boundary assumptions, the forecast state is modelled by  $\partial_t u(t, x) = \kappa \partial_{xx} u(t, x) + f(t, x)$ , and stability follows from bounded perturbations.

**Keywords:** *Sub-Saharan, PDEs, asymptotics, identifiability, partial differential equations, Nigeria, financial mathematics*

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