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REVIEWER'S REPORT

Manuscript No.: IJAR-52122 Date: 06.06.2025

Title: Applying Bayesian Weighted Linear Discriminant Analysis for the Classification of Commercial and Personal Loans in the Liberia Banking Sector

Recommendation:

Accept as it is ………………………………

✓ Accept after minor revision………………

Accept after major revision ………………

Do not accept (*Reasons below*) ………

Rating	Excel.	Good	Fair	Poor
Originality	✓			
Techn. Quality		✓		
Clarity		✓		
Significance	✓			

Reviewer Name: Ms. S. Lavanya, AP/IT **Date:** 06.06.2025

Reviewer's Comment for Publication.

(*To be published with the manuscript in the journal*)

The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewers name.

This manuscript presents a significant contribution to credit risk assessment by introducing a Bayesian Weighted Linear Discriminant Analysis (BwLDA) model tailored to the Liberian banking sector. The integration of Bayesian methods with discriminant analysis enhances classification accuracy, especially under data imbalance. The study is methodologically sound, offers practical implications for financial institutions, and is highly relevant for emerging markets.

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Detailed Reviewer's Report

"Applying Bayesian Weighted Linear Discriminant Analysis for the Classification of Commercial and Personal Loans in the Liberia Banking Sector"

1. General Assessment

This paper proposes and applies a **Bayesian Weighted Linear Discriminant Analysis (BwLDA)** model to classify commercial and personal loans within the Liberian banking sector. It addresses a critical challenge in financial risk modelling, especially in emerging economies — namely, class imbalance, limited historical data, and variable credit risk patterns. The manuscript is well-structured and technically competent, providing empirical evidence from five banks and offering policy-relevant insights.

2. Strengths

- **Originality and Relevance**:
  The paper innovatively combines class-weighted LDA with Bayesian inference, an approach not commonly applied in African financial contexts. Its originality lies in tailoring advanced statistical methods to a low-data environment with practical financial implications.
- **Technical Depth**:
  The authors use appropriate techniques such as MCMC for posterior estimation, logistic transformation for classification probabilities, and the integration of Merton's distance-to-default concept for asset volatility modelling.
- **Empirical Value**:
  Data from five major banks over a two-year period enhances the robustness and practical relevance of the findings. The model's predictive performance is validated through confusion matrices and classification accuracy metrics.
- **Policy and Practical Implications**:
  The study recommends the adoption of the BwLDA model by Liberian banks and potentially by regulators. The insights are applicable in similar developing financial systems.

3. Areas for Minor Revision

- **Notation and Formatting**:
  Several variables (e.g., xihk, θj, Δihkx) are inconsistently formatted or lack clarity in presentation. Subscripts and equations would benefit from standardized LaTeX formatting or clearer typesetting.
- **Language and Grammar**:
  The paper is generally well-written but includes minor grammatical inconsistencies. A language edit is recommended to enhance clarity and professionalism.

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- **Model Limitations**:
  While the paper briefly discusses overfitting in GTBLL and the variability of distance-to-default, a more explicit section on model limitations would provide balance.
- **Threshold Interpretation**:
  The explanation of threshold (Δihk) estimation and its use in classification could be better articulated for a broader audience, especially those less familiar with statistical modelling.

4. Recommendation

Recommendation: *Accept after minor revision*

5. Overall Ratings

Criteria	Rating
Originality	Excellent
Technical Quality	Good
Clarity	Good
Significance	Excellent

6. Final Comment for Editor

This manuscript offers a well-executed, original contribution to the field of credit risk modelling in emerging markets. It balances technical innovation with practical application and policy relevance. With minor revisions to formatting and language, the paper is fit for publication