Review of: "A Note on Relaxing the Black-Scholes Assumptions Without Changing the Price Formula"

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Potential competing interests: No potential competing interests to declare.

This paper by Moawia Alghalith proposes a method for option pricing that retains the simplicity of the Black-Scholes formula while relaxing some of its key assumptions. Here's an assessment of the paper based on the criteria you mentioned, incorporating your valuable insights:

Originality and Significance:

- The concept of relaxing assumptions in option pricing models while maintaining a simple formula is not entirely new. In fact, there's a strong possibility this paper may not be presenting anything fundamentally novel.
- A more thorough literature review is needed to demonstrate how this work builds upon or differentiates itself from existing methods that address similar relaxation of assumptions.

Methodology:

- The paper outlines the concept but lacks details on the derivation of the core formula (Eq. 14).
- Including a clear derivation would enhance transparency and allow readers to assess the validity of the approach.
- **There appear to be fundamental errors in the early sections, particularly Equations (2) and (4)**Equation (2) treats a stochastic process (vu) as if it were a constant value, which is mathematically incorrect. Equation (4) relies on using a single value of the stochastic volatility (v^i), which is problematic because a stochastic process doesn't have a single, fixed outcome. Instead, it exhibits a range of possible future paths, called sample paths. These errors cast doubt on the foundation of the proposed method.

Analysis and Results:

- A more rigorous analysis is needed, but only after the core methodology is corrected.

Discussion and Conclusion:

- The conclusion emphasizes the simplicity of the method, but this is irrelevant if the method itself is flawed. The focus should be on addressing the identified errors and whether the method offers any validity.

Citations and Referencing:

- The references seem relevant, but a more comprehensive literature review is needed to situate this work within the

existing body of research.

Additional Considerations:

- The paper mentions stochastic volatility and stochastic interest rates. It would be helpful to clarify if the method can handle both simultaneously, but this is secondary to addressing the core errors.
- The paper could benefit from a clearer explanation of the notation used, especially for terms like vu and ru.

LaTeX Usage:

- While not directly impacting the core concepts, the paper's use of LaTeX for mathematical notation could be improved to enhance readability and professionalism in a more academic setting.

Overall Recommendation:

- This paper has the potential to be interesting, but **substantial revisions are required**. The identified errors in the methodology are significant and need to be addressed. Furthermore, the lack of novelty and a thorough literature review weakens the paper's contribution.
- It would be beneficial for the authors to carefully revisit the core concepts, rectify the errors, and demonstrate how this work builds upon existing research.