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EDITORIAL

It is with profound pleasure, immense pride and a deep sense of professional responsibility that I welcome our readers, contributors, reviewers and members of the global financial community to the maiden edition of the International Journal of Finance, Securities and Investment Market (IJFSIM), the flagship scholarly and practitioner publication of the Chartered Institute of Stockbrokers (CIS), Nigeria. This inaugural issue marks a significant milestone in the evolution of the Institute's scholarly publishing journey. Formerly published as the Journal of Securities and Investment Market (JSIM), the Journal has now been repositioned and rebranded as the International Journal of Finance. Securities and Investment Market (IJFSIM) to reflect the increasingly global, interdisciplinary and technology-driven nature of contemporary financial markets.

The transformation from JSIM to IJFSIM represents more than a change in nomenclature. It embodies a renewed commitment to intellectual excellence, international visibility, rigorous peer review, methodological sophistication and policy relevance. The Journal seeks to serve as a bridge between academia and practice by publishing high-quality research that advances understanding of securities markets, investment management, financial institutions, risk management, financial technology, commodity markets, corporate finance, capital market regulation, sustainable finance and related disciplines.

As the professional body regulating and advancing the practice of stockbroking and investment management in Nigeria, the Chartered Institute of Stockbrokers recognises the critical role of evidence-based research in shaping sound investment decisions, strengthening market institutions, improving regulatory frameworks and promoting financial market development. Through the IJFSIM, we aim to contribute meaningfully to the global body of knowledge while simultaneously addressing issues of practical relevance to emerging and frontier financial markets.

The vast majority of members of the Chartered Institute of Stockbrokers work within the financial services industry as portfolio managers, research analysts, investment advisers, wealth managers, securities dealers, risk managers, compliance professionals and financial consultants. In an era characterised by rapid technological innovation, increasing market complexity, financial globalisation and evolving regulatory expectations, the need for timely, rigorous and practice-oriented research has never been greater. The IJFSIM therefore plays a critical role in helping practitioners remain informed about emerging ideas, innovative techniques, regulatory developments and empirical evidence capable of improving professional practice and investment outcomes.

Tribute to a Distinguished Scholar and Colleague

As we celebrate this important milestone, we are simultaneously saddened by the loss of one of our distinguished Editorial Board members, Professor Kabiru Isa Dandago, whose passing occurred during the preparation of this edition.

Professor Dandago was an eminent scholar, an accomplished public servant, a former Commissioner for Finance in Kano State, and a respected Professor of Accounting at Bayero University Kano. Beyond his impressive academic and professional accomplishments, he was a committed member of the Editorial Board who actively participated in the review and evaluation of manuscripts submitted to the CIS journals. His intellectual rigour, constructive criticism, professional integrity and unwavering commitment to academic excellence contributed immensely to the quality and credibility of our publications.

The Editorial Board, the Chartered Institute of Stockbrokers and the entire securities and investment management community mourn his passing. We extend our heartfelt condolences to his family, colleagues, students, associates and the management of Bayero University Kano. His contributions to scholarship, professional education and public service will remain enduring legacies.

May Almighty God grant him eternal rest and comfort all those he left behind.

May his gentle soul rest in perfect peace. Amen.

Overview of the Maiden Edition

The papers featured in this inaugural edition collectively address some of the most important contemporary issues confronting financial markets, investment management practice, capital market regulation, corporate value creation and financial intermediation in emerging economies.

The first paper, "Empirical Evaluation of the Out-of-Sample Performance of Asset Allocation Strategies in an Emerging Market," examines the relative effectiveness of alternative portfolio construction techniques in the Nigerian market. Using evidence from fifteen Nigerian equities and a broad range of performance metrics, the study provides important insights into whether sophisticated portfolio optimisation techniques outperform simpler allocation strategies. The findings challenge conventional assumptions regarding the superiority of complex optimisation frameworks and contribute significantly to the growing literature on portfolio management in emerging markets.

The second paper, "Recapitalisation, Proportional Regulation and Systemic Stability in the Nigerian Capital Market," offers a timely and comprehensive analysis of one of the most consequential regulatory reforms in Nigeria's capital market. The paper critically evaluates the implications of the Securities and Exchange Commission's recapitalisation framework and proposes an innovative risk-based and proportional regulatory model capable of balancing financial stability, investor protection, market accessibility, competition and financial inclusion. Given the ongoing policy debates surrounding prudential regulation, the study provides valuable guidance to regulators, policymakers and market operators.

The third paper, "Impact of Information Quality and Market Efficiency on Corporate Value Creation: A Rasch Model and PLS-SEM Analysis," explores the intricate relationships among information quality, market informational efficiency and corporate value creation. Employing advanced psychometric and structural modelling techniques, the study demonstrates how improved information quality contributes to more efficient markets and enhanced corporate value creation. The paper highlights the strategic importance of disclosure quality, transparency and information governance in modern capital markets.

The fourth paper, "Macroeconomic Risk Factors and Stock Market Returns in Nigeria: Evidence from ARDL and Toda-Yamamoto Causality Approaches," revisits the longstanding debate concerning the influence of macroeconomic fundamentals on stock market performance. By integrating cointegration analysis with causality testing, the study provides fresh evidence on the nature of macroeconomic transmission mechanisms within the Nigerian financial system and offers important implications for monetary authorities, investors and policymakers.

The fifth paper, "Effects of Supply Chain Financing on Palm Oil Value Chain Performance: Evidence from Baissa, Taraba State," extends the Journal's coverage beyond traditional securities markets by examining the role of innovative financing mechanisms in agricultural value chains. The findings underscore the transformative potential of inventory financing, contract farming arrangements and digital financial services in enhancing productivity, efficiency and profitability within agricultural ecosystems. The study contributes meaningfully to the broader discourse on financial inclusion, rural development and sustainable economic growth.

The sixth paper, "How Persistent are Nigerian Sector Stocks? A Long Memory Analysis," investigates the efficiency characteristics of sectoral stock prices within the Nigerian market. Through the application of long-memory techniques and fractional integration methods, the study provides valuable evidence regarding market predictability and informational efficiency across sectors, offering important implications for portfolio managers, traders and researchers.

Collectively, the papers in this issue reflect the Journal's commitment to methodological diversity, policy relevance, theoretical rigour and practical applicability. They also demonstrate the increasing sophistication of financial market research emerging from Nigeria and other developing economies.

Appreciation

The successful publication of this maiden international edition would not have been possible without the dedication and support of many individuals and institutions. I wish to express my profound appreciation to all authors whose research contributions form the foundation of this edition. I also acknowledge the invaluable contributions of our reviewers whose

expertise, professionalism and commitment to academic excellence ensured the quality and integrity of the published papers.

Special appreciation is extended to members of the Editorial Board, the Members of the Research and Technical Committee, the leadership of the Chartered Institute of Stockbrokers, and the Journal Management Team for their unwavering support throughout the rebranding and publication process.

Looking Forward

As financial markets continue to evolve under the influence of digital transformation, artificial intelligence, sustainable finance, fintech innovation, cybersecurity challenges and increasing global interconnectedness, the need for rigorous and policy-relevant research becomes even more critical.

The International Journal of Finance, Securities and Investment Market is committed to becoming a leading international platform for the dissemination of impactful research capable of advancing theory, informing policy and improving professional practice within the global financial services industry.

We therefore invite scholars, practitioners, regulators and policymakers from around the world to contribute to future editions of the Journal and join us in advancing excellence in securities, finance and investment market research.

On behalf of the Editorial Board, I thank you for your continued support and readership. We trust that the papers presented in this inaugural issue will stimulate intellectual discourse, inspire future research and contribute meaningfully to the development of efficient, inclusive and resilient financial markets.

Prof. R. A. Olowe, PhD, FCCA, ACS

Editor-in-Chief

TABLE OF CONTENTS

Editorial Board	i
Editorial	ii
Table of Contents	iii
List of Contributors	iv
Empirical Evaluation of the Out-of-Sample Performance of Asset Allocation Strategies in an Emerging Market Adedeji Ajadi	1
Recapitalisation, Proportional Regulation and Systemic Stability in the Nigerian Capital Market Rufus A. Olowe & Sola Oni	23
Impact of Information Quality and Market Efficiency on Corporate Value Creation: A Rasch Model and PLS-SEM Analysis Mustapha Bojuwon & Ayoka L. Akandebojuwon	88
Macroeconomic Risk Factors and Stock Market Returns in Nigeria: Evidence from ARDL and TODA-YAMAMA Causality Approaches Enitan O. Olurin, Joshua O. Omokehinde & Olurotimi B. Ajibola.	104
Effects of Supply Chain Financing on Palm Oil Value Chain Performance: Evidence from Baissa, Taraba State. Samuel T. Olabosinde & Saheed O. Adeyemi	139
How Persistent are Nigerian Sector Stocks? A Long Memory Analysis Abiodun M. Adetokunbo, Oluwasegun B. Adekoya & Ismail O. Fasanya	155

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EMPIRICAL EVALUATION OF THE OUT-OF-SAMPLE PERFORMANCE OF ASSET ALLOCATION STRATEGIES IN AN EMERGING MARKET

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Abstract

This study evaluates the out-of-sample performance of an equal-weighted portfolio relative to value-weighted, mean-variance, and Black-Litterman asset allocation strategies in an emerging market, using empirical evidence from Nigeria. Fifteen stocks listed on the Nigerian Exchange Limited as of January 1, 2010, were selected for the analysis. The portfolios were constructed on January 1, 2010, using historical market data, and their out-of-sample performance was evaluated from January 1, 2010, to April 30, 2023. Portfolio performance was assessed using Carhart's four-factor model, as well as the Treynor ratio, Sharpe ratio, Information ratio, M2 measure, and Omega ratio. This study provides a useful guide to retail investors on alternative asset allocation strategies to diversify their portfolios and their relative performance. Our findings indicate that, on a risk-adjusted basis, all the portfolio strategies underperformed the risk-free asset over the sample period, implying that none delivered positive excess returns per unit of risk. The empirical results suggest that while the Value-Weighted (VW) portfolio achieved the highest ordinal rank, there is no statistically significant performance alpha across the various strategies. Despite variations in construction methodology and theoretical complexity, the portfolios yielded comparable returns - a finding that deviates from the prevailing consensus in the literature. Consequently, the study recommends that retail investors in Nigeria may adopt simple portfolio strategies, as they tend to deliver comparable outcomes. However, given the overall negative Sharpe ratio observed, such recommendations should be interpreted with caution. This study is among the first in the Nigerian context to provide a comprehensive evaluation of multiple portfolio strategies using a range of portfolio performance measures, including Carhart's four-factor model.

Keywords: Mean-Variance Optimisation, Equally Weighted, 1/N, Value-Weighted, Black-Litterman, Portfolio Construction, Risk-adjusted Performance, Nigeria Exchange Limited

JEL classification: G11, G12, G23, G51

INTRODUCTION

Stock market participants, including investors, practitioners, and researchers, have always shown a keen interest in asset allocation strategies as they are central to successful investing. Markowitz (1952) laid the foundation of the mean-variance optimisation (MVO) theory, which is the reference point of modern portfolio theory. The essence of the theory is that rational investors will invest in a portfolio that maximises their returns for a given level of risk. Conversely, investors who are assumed to be risk-averse will select the less

risky portfolio for a given level of return. Markowitz also demonstrated that portfolio risk is generally less than the sum of the risks of its constituent securities; investors should therefore be more concerned about the risk of their portfolios than that of separate securities.

Over the years, portfolio managers have applied the principles of the MVO model in constructing portfolios, and researchers have built on it to develop enhanced models, leveraging innovations in fields such as computing technology, behavioural finance, and operational research (Alali & Tolga, 2019). Although the MVO model is theoretically appealing, it has several weaknesses (Lasse, Babu & Levine, 2021; Mynbayeva et al., 2022). The model produces unstable and impractical results, largely because the resulting portfolios are extremely sensitive to small changes in the inputs (Best and Grauer, 1991; Black and Litterman, 1992; Michaud, 1989). This problem is accentuated by the fact that the inputs, specifically the mean return and variance-covariance (VCV) matrix, are estimated from historical returns and are noisy estimates of the true parameters (Benninga, 2014). One asset allocation strategy that has evolved to address some of the weaknesses of the MVO was developed by Black and Litterman (1991, 1992). The model is flexible, allowing the investor's views to be incorporated into the optimisation process. This view can be expressed in relative or absolute terms and can project an increase or decrease in asset returns (Stoilov et al., 2021). The resulting weights of assets in the Black-Litterman (BL) portfolio are more rational than the output of the MVO process (Benninga, 2014).

Similarly, DeMiguel et al. (2009) presented a piece of interesting evidence of significance in the investment management field with the conclusion from their study that the equally-weighted (EW) portfolio outperformed MVO portfolios in several respects out-of-sample, using sample data from the U.S. Following this, several researchers have corroborated their evidence (for example, Duchin & Levy, 2009; Tu & Zhou, 2009; Pflug et al., 2012; Bolognesi et al., 2013; Plyakha, Uppal, & Vilkov 2015; and Malladi & Fabozzi, 2017). In addition, Jacobs, Muller, and Weber (2010), using other datasets and asset classes, validated the superior performance of the EW portfolio.

Most of the above-referenced studies, however, were done in the developed markets. In emerging stock markets, there is a huge knowledge gap in this field, and only a few studies have been carried out to evaluate the relative performance of different portfolio strategies. Although Nwakanma & Gbanador (2014), Nnanwa et al. (2016), and Gbanador (2018) compared the performance of the EW portfolio with the MVO strategy in the Nigerian stock market, the studies were limited to just two alternative portfolios and a short sample period. This study extends the earlier efforts by evaluating the relative performance of five alternative portfolio strategies, thereby widening the scope. The study period also spans over sixteen years, which increases the statistical power of the analysis. In addition, this study uses Carhart's multiple regression model alongside a range of risk-adjusted performance models that have not been used in the Nigerian context, including the Information ratio, Modigliani-Miller measure, and Omega ratio to provide a robust appraisal.

The research question of this study is, "Does the EW portfolio outperform the VW portfolio, the Tangency Portfolio with short selling, the Tangency Portfolio without short selling, and the BL optimal active portfolio in the Nigerian stock market? 'Consequently, the objective of the study is to (1) evaluate the performance of the EW portfolio, VW portfolio, Tangency Portfolio with short selling, Tangency Portfolio without short selling, and BL portfolio in the Nigerian stock market, and (2) evaluate whether, on a risk-adjusted basis, the EW portfolio is superior to the alternative asset allocation strategies in the Nigerian stock market. To undertake this analysis, we selected fifteen of the top twenty stocks on the Nigeria Exchange Limited (NGX) as of January 1, 2010, and collected their historical price data. The historical returns and other relevant market statistics from January 1, 2017, to December 31, 2009, were used to construct the different portfolios of stocks. The performance of the portfolios was evaluated using the return data of the securities from January 1, 2010, to April 30, 2023. We used the statistical analysis of the difference of two means to assess whether the EW strategy is superior to the other asset allocation strategies.

This study bridges a knowledge gap by providing retail investors with alternative portfolio strategies to achieve diversification and grow their wealth in alignment with their risk-return preferences. Further, the output of the study enriches the literature on the performance of various asset allocation strategies in emerging markets generally and particularly in Nigeria. This should be of interest to key stakeholders as both the Nigerian economy and the stock market are rapidly evolving. It is critical that market participants gain access to quality information about the features of the stock markets to guide their investment decisions.

The remaining part of the paper is organised as follows: Section 2 provides the theoretical framework and summary of empirical studies on the performance of asset allocation strategies. This is followed by Section 3, which details the methodology adopted, including the market data collected, the sampling approach used, and the risk-adjusted models used for performance appraisal. Section 4 presents and discusses the findings of the study in light of the literature. We conclude in Section 5, highlighting our key findings and making policy recommendations.

LITERATURE REVIEW

The MVO theory developed by Markowitz (1952) allows investors to construct a portfolio that maximises their risk-return trade-offs by choosing one of several portfolios located on the efficient frontier. While the theory is theoretically sound and appealing, its use in practice has been challenging, as the tangency portfolio is blighted by various weaknesses (Black & Litterman, 1991). First, the weights, means, and variances of the MVO-based portfolios can be extremely sensitive to the means of underlying securities (Best & Grauer, 1991). This problem is accentuated by the fact that mean returns of assets used in the optimisation process are estimated and could be quite unreliable (Markowitz, 1952). Further, the weights of securities in the tangency portfolio are frequently unreasonable and tilted towards a few assets (Black & Litterman, 1991). Hence, over the years, efforts have been made to improve upon the outcome of Markowitz's MVO process. Black and Litterman (1991) developed a

model to improve the outcome of the MVO, which has been adjudged effective in constructing portfolios with a more intuitive composition (Benninga, 2014).

The findings of De Miguel et al. (2009) have also motivated more studies on the out-of-sample performance of the MVO portfolios relative to the EW and other heuristic portfolio strategies. DE Miguel et al. (2009) compared the performance of different portfolios for different data sets over a period spanning 20 to 50 years. They evaluated the mean-variance portfolio, minimum variance portfolio, Bayes-Stein portfolio, and VW portfolio and found evidence that, overall, the EW portfolio recorded the highest Sharpe ratio. Jacob et. al (2010) evaluated the performance of a large number of asset allocation strategies in the Eurozone using a large sample from January 1973 to December 2008. The study investigated both international diversification in stocks and in asset classes. They found evidence that MVO strategies did not beat simple rule-of-thumb strategies in international stock portfolios. Similarly, the MVO strategies failed to outperform EW allocations in the case of asset allocation strategies.

Overall, the study recommended simple, cost-effective allocation to retail investors as they achieved similar diversification gains as the more sophisticated portfolios. Bolognesi et al (2013) appraised the relative performance of the EW and VW portfolios on the DJ Euro Stoxx Index from January 2020 to December 2011. They assessed the performance of the portfolios using monthly, quarterly, semiannual, and annual frequencies. Their result corroborated existing literature that the EW portfolio beat the VW portfolio. They also concluded that the excess returns recorded were not due solely to the size premium. Ernst et al (2016) demonstrated the superiority of the EW S&P 500 portfolio over Sharpe's VW S&P 500 portfolio in their study. They also investigated the "MaxMedian rule", a non-proprietary trading strategy developed to aid retail investors who wish to invest in just 20 stocks in the S&P 500 and self-manage their portfolio. They found that the MaxMedian rule beat the EW portfolio 1.24 times. Edwards, Lazzara & Preston (2018) investigated the sources of the outperformance of EW portfolios. They argue that EW indexing and pragmatic, reasonable market gains have historically been attributed to a few difficult-to-predict stocks. They attribute the outperformance of EW indexes over VW ones to their bias toward smaller companies, which tend to outperform large companies, especially during bull markets. In addition, the requirement to rebalance regularly introduces an element of contrarian strategy into the EW index.

Taljaard and Eben (2020, 2021) reported that the South African EW portfolio of the Top 40 stocks on the Johannesburg Stock Exchange has underperformed by almost 20% since 2002 relative to the VW portfolio and sought to provide plausible explanations for the development. The study identified the following factors. First, there is an increasing concentration of market capitalisation weights in the Top 40 stocks. Second, correlations among Top 40 stocks have been increasing, reducing diversification benefits and the advantages of frequent rebalancing. Third, the rate of turnover of the index constituents has been high in recent years. The researchers recommended continuing to monitor the

performance of the EW portfolio and switching to market-cap weights when conditions are optimal. They found that this strategy improved both the risk-adjusted returns and the downside risk of the EW portfolio. Plyakha et al. (2021) sought to explain why EW portfolios beat VW portfolios. First, they suggested that part of the reason was the benefit of size and value effects, which EW portfolios enjoy relative to the VW portfolio. Moreover, they found evidence that regular rebalancing of the EW portfolio was even more important in driving higher total returns. The researchers reported that asset-pricing tests resulted in significantly different inferences depending on whether an EW portfolio or a VW portfolio was used.

Yuan and Zhou (2021) investigated the reasons for the historical outperformance of the EW portfolio over Markowitz's MVO portfolio. First, they suggested that estimation error is a major reason why the mean-variance model underperforms, especially when the sample size is small relative to dimensionality. In addition, they show that the EW portfolio delivers an optimal Sharpe ratio in a one-factor model with diversifiable risks as dimensionality increases, notwithstanding the sample size. They concluded that combining the EW strategy with mean-variance estimation when N is small, or combining it with anomalies or machine learning portfolios when N is large, can improve its robustness and outcome. Swade, Nolte et al. (2022) investigated the widely reported outperformance of the EW portfolio over the VW ones in their study, using the broad US equity universe and several factor models. They found evidence that EW portfolios have high exposure to the size factor and benefit from the short-term reversal effect, but suffer from the negative momentum effect. They suggested that an investor could benefit from the size premium by investing in the equal-weight minus value-weight spread in the US market at a lower cost than the long-short strategy.

Sanford (2019) developed an approach to improve the MVO by building an optimal portfolio that minimises the expected tail loss of the natural distribution of the Recovery Theorem. He reported that portfolios built using this approach outperformed the equally weighted portfolio and a portfolio formed based on the historical expected tail loss. This version of the MVO portfolio exhibited superior performance, recording the lowest historical tail loss, the smallest maximum drawdown, the highest Sortino ratio, and the highest Sharpe ratio. Huni and Sibindi (2020) appraised the feasibility of constructing mean-variance optimised portfolios on the Johannesburg Stock Exchange (JSE). They reported that the MVO can be an effective strategy for portfolio construction on the JSE. In addition, they demonstrated that the global minimum-variance portfolio derived from the optimisation process consistently reduced risk better than the benchmark JSE ALSI, thereby validating the effectiveness of the strategy. Lasse et al. (2021) proposed another approach to improve the performance of the mean-variance portfolio through enhanced portfolio optimisation. According to the researchers, this model addresses the noise in the estimates of the risk and returns used in the MVO model. They concluded that using this model in both equities and global asset classes resulted in the generation of alpha above the market, the equally weighted portfolio, and the well-known asset pricing factors. Kaczmarek and Perez (2022) applied machine learning tools to build optimised portfolios using Markowitz's MVO and

Hierarchical Risk Parity (HRP) optimisation models. They applied forest methods to predict expected excess returns and identify stocks with the highest projected monthly returns from the S&P 500 and STOXX 600 indexes. They reported that the out-of-sample performance of both the MVO and HRP models beat the equally-weighted portfolio.

In a similar study, Chaweewanchon and Chaysiri (2022) used machine learning tools to preselect stocks, which were then used as inputs into the MVO process. Using historical data from the Stock Exchange of Thailand 50 Index (SET50) covering January 2015 to December 2020, the study demonstrated that the performance of mean-variance portfolios could be improved substantially in terms of their Sharpe ratio, mean returns, and risk if stocks are preselected using machine learning techniques. Job (2022) compared the performance of the MVO model against several robustified models to identify and recommend the best model to investors in emerging and frontier markets of Africa. A portfolio was constructed from two Emerging Markets and five Frontier Markets indices in Africa. The study reached a similar conclusion to earlier studies that the enhanced models exhibited better characteristics and performance, with superior gross returns, annualised returns, and net portfolio returns over time compared to the basic MVO model. Mynbayeva et al. (2022) studied Markowitz's MVO model with a view to explaining why it fails in practice. They demonstrated both theoretically and empirically the high probability that the model will not produce the desired result even when the normal distribution is assumed and when an attempt is made to reduce estimation risk using a shrinkage estimator. They developed a method to address the problem by identifying assets that have similar means or variances. Using out-of-sample and bootstrap tests, they found that their method outperformed the naïve Markowitz MVO model and the EW portfolio. They also observed that the bootstrap approach performed better when asset means are identical and that covariance shrinkage improves model performance.

Relatively fewer studies have appraised the out-of-sample performance of the BL model over the MVO, EW, and other strategies. Bessler et al. (2017) developed a version of the BL model designed to overcome the challenge of the MVO and applied it to a multi-asset portfolio comprising global stocks, bonds, and commodity indices, covering from January 1993 to December 2011. They found evidence that the BL portfolio demonstrated superior out-of-sample Sharpe ratio performance over the naïve, mean-variance, minimum-variance, and Bayes-Stein strategies. In addition, the BL portfolio exhibited lower risk, less extreme asset allocation, and more efficient diversification. Harris et al. (2017) also evaluated the out-of-sample performance of the BL model over the equal-weighted and benchmark market strategy. Using several BL portfolios, they reported that the BL strategy outperformed naïve and benchmark portfolios under a variety of conditions. Allaj (2019) proposed a new approach to applying the BL model in asset allocation and evaluated the comparative out-of-sample performance of the strategy against others. The study concluded that constrained optimisation strategies generally outperformed unconstrained strategies, and that BL-based strategies produced portfolios with superior performance, thereby affirming earlier results by Bessler et al. (2017) and Haris et al. (2017). Another study to test the robustness of the Black-Litterman portfolio was done by Meyer-Bullerdiek (2021), who compared the out-of-

sample performance of the BL German stock portfolio to the Markowitz MVO portfolio, the DAX (Deutscher Aktienindex- German stock) Index, a reference portfolio, and an EW portfolio. The findings of the study were that the BL portfolio significantly outperformed the DAX, the reference portfolio, and the EW portfolio, although the MV portfolio beat it marginally.

Following the review of the literature, our hypotheses in null form are as follows:

- (a) The equally-weighted portfolio does not outperform the market value-weighted portfolio on a risk-adjusted basis.
- (b) The equally-weighted portfolio does not outperform the Black-Litterman portfolio on a risk-adjusted basis.
- (c) The equally -weighted portfolio does not outperform the Tangency portfolio with short-selling on a risk-adjusted basis.
- (d) The equally -weighted portfolio does not outperform the Tangency portfolio without short-selling on a risk-adjusted basis.

METHODOLOGY

Stock Market Data

Fifteen of the top twenty stocks by market capitalisation on the NGX as of January 1, 2010, were purposively selected into the sample for this study. This sampling approach was adopted based on three key considerations: data availability, liquidity, and market relevance. Only stocks with continuous price data covering both the estimation and evaluation periods were considered suitable. Further, actively traded stocks are liquid, which enhances price discovery and reduces the distortions caused by thin trading. In addition, large-cap stocks dominate large portfolios and overall market capitalisation in Nigeria. For instance, as of March 2026, the NGX 30 accounts for approximately 90% to 95% of the total market capitalisation of the NGX All-Share Index (ASI).

However, we do acknowledge that this sampling approach may introduce survivorship bias, as firms that were delisted, suspended, or lacked complete data over the study period were excluded. Furthermore, a concentration on large-cap stocks implies a large-cap bias, which could limit the generalizability of the findings to smaller or less liquid securities. To this end, we admit that the results are most relevant to the performance of the liquid, large-cap segment of the Nigerian equity market rather than the full universe of listed equities.

Table I provides a list of the sample stocks, their ticker symbols, and their market capitalisations as of January 1, 2010.

The weekly close prices of the sample stocks were collected from January 1, 2007, to April 31, 2023, a period of 16 years and 4 months. The required portfolios were created on January 1, 2010, using return data from January 1, 2007, to December 31, 2009 (estimation

period), along with other relevant market statistics. The out-of-sample performance of the portfolios was evaluated over the subsequent period from January 1, 2010, to April 30, 2023.

Construction of Stock Portfolios

Returns were computed as simple returns (percentage price changes) rather than continuously compounded (log) returns. Further, due to data constraints, the returns reflect capital gains only and do not include dividends or other corporate actions. The limitation of this is that it could underestimate total returns, particularly for dividend-paying stocks. In addition, all the portfolios were constructed at the beginning of the out-of-sample period (January 1, 2010) and held without rebalancing throughout the evaluation period. Portfolio returns were subsequently computed as the weighted sum of constituent equity returns using the initial portfolio weights.

Portfolio 1 is a VW portfolio. The weight of each security in this portfolio is determined by its relative market capitalisation to the total market capitalisation of the portfolio as illustrated in Equation 1.

$$W_i = \frac{MC_i}{\sum_{i=1}^{15} MCAP_i} \quad (1)$$

Σ = Portfolio 2 is an EW portfolio (1/N). All the securities in the portfolio have equal weights. Specifically in this study, since we have 15 stocks in our sample, the weight of each security is 1/15, which is 6.67% of the total portfolio weight.

Portfolio 3 is the tangency portfolio with no short selling. In constructing this portfolio, historical price data from the estimation period were converted to return series (Equation 3), from which mean returns (Equation 2) and the variance–covariance (VCV) matrix were derived (Appendix 1) using Equation 4. The tangency portfolio was consequently obtained by maximising the Sharpe ratio subject to the constraint: $w_i \geq 0$. The optimisation was implemented using the Excel Solver tool, following the methodology (Benninga, 2014).

$$\bar{R}_t = \frac{1}{N} \sum_{t=1}^N R_t \quad (2)$$

$$E(R) = \begin{bmatrix} E(R_T) \\ \vdots \\ E(R_{10}) \end{bmatrix} \quad (3)$$

$$V = \frac{1}{T-1} (R - \bar{R}^{Transpose})^{Transpose} (R - \bar{R}^{Transpose}) \quad (4)$$

Portfolio 4 is a Tangency Portfolio without short-selling restrictions. Its construction follows the same procedure as Portfolio 3 but allows for negative weights, implying that short selling is permitted in the optimisation process. This assumption is a theoretical optimisation concept and does not reflect the short-selling constraints applicable in the Nigerian market.

Portfolio 5 is a Black–Litterman (BL) Portfolio. The BL model was implemented following the framework presented in Benninga (2014), Financial Modelling (4th Edition). The model

begins with the derivation of market-implied equilibrium returns, based on market capitalisation weights and the VCV matrix (Equations 5, 6, and 7).

$$E(R_p) = \lambda VP + R \quad (5)$$

$$\lambda = \frac{E(R_p) - R_f}{\sigma_p} \quad (6)$$

$$\sigma_p^2 = P^TVP \quad (7)$$

The investor (analyst) views were formed based on observed performance patterns and earnings forecasts during the estimation period. Two securities- ETI and Oando - were assigned non-zero views, reflecting expected excess returns of 0.02% and 0.01% per week, respectively, above their implied equilibrium returns. These securities were selected based on their relative return patterns and perceived potential for outperformance. In practice, specifying investor views involves an element of subjectivity, which is a key feature of the Black–Litterman model. The procedure is designed to incorporate market-implied views with informed expectations in a systematic and controlled manner. This view was incorporated into the analyst's expected return vector. To obtain the final expected returns of the portfolio, we took cognisance of the fact that an analyst's view on one or more securities inadvertently reflects on all securities, since they are correlated. To reflect this interdependence among asset returns, a tracking factor matrix was constructed to incorporate the impact of views across all securities based on their covariance structure. This approach is a simplified adaptation of the traditional Black–Litterman framework, as the confidence matrix (Ω) is not explicitly estimated but implicitly incorporated through the adjustment mechanism.

The adjusted expected returns were then used to derive optimal portfolio weights using mean-variance optimisation.

$$\theta = \frac{Cov(r_i, r_i)}{Var(r_i)} \quad (8)$$

$$E(R_{adjusted}) = E(R) + \theta\delta \quad (9)$$

$$P = \frac{V^{-1}(E(R) - R_f)}{1^T V^{-1}(E(R) - R_f)} \quad (10)$$

We minimised the difference between the analyst's expected returns vector and the final adjusted return vector by linear optimisation (Equation 9). The adjusted returns are finally used to construct the BL-optimized portfolio (Equation 10).

Risk-Adjusted Performance Measures

The out-of-sample performance of the portfolios was evaluated using a range of risk-adjusted performance evaluation models, including the Treynor ratio, Sharpe ratio, Information ratio, Modigliani-Modigliani (M^2) measure, Omega ratio, and Jensen alpha.

Table II shows the performance evaluation models used and their operational definitions. The Treynor and Sharpe ratios assess portfolio performance from the perspective of excess returns over the risk-free rate per unit of risk. While the Sharpe ratio uses total risk proxied by the standard deviation of returns, the Treynor ratio uses systematic risk, measured by portfolio beta. The Information ratio measures another dimension of portfolio performance by evaluating a portfolio's active returns relative to tracking error, which measures the deviation between the fund's return and the index return.

The Modigliani-Modigliani (M^2) measure appraises the returns of a portfolio relative to the level of risk undertaken and the performance of a benchmark. The Omega measure is useful in weighing the chances of the portfolio winning compared to losing by covering all the risk attributes of a portfolio, including the mean, standard deviation, kurtosis, and skewness.

Finally, we applied Carhart's (1997) model, which is an extension of Fama and French's (1993) model. The four-factor model incorporates the momentum effect, which measures the difference between the returns of past winners and past losers and thus the persistence of performance. The systematic risk factors: SMB (size), HML (value), and WML (momentum) were obtained from Kenneth R. French's data library for emerging markets ([French Data Library](#)). The factors were constructed using standard portfolio-sorting procedures based on firm size, book-to-market ratios, and past returns. A limitation of this approach is that these factors are not Nigeria-specific and only serve as proxies for systematic risk factors in emerging markets. They may, therefore, not fully capture the Nigerian local market dynamics.

In this study, the NGX All Share Index (NGX ASI) was used as the benchmark, while the return on the Federal Government 2-year bond served as the proxy for the risk-free rate.

Table 1: Performance Evaluation Models and Measurement Approach

S/N	Performance Measure	Operational Definition
1	Carhart's Model	$R_{it} - R_{ft} = \beta_1 (R_{Mt} - R_{ft}) + \beta_2 (SMB) + \beta_3 (HML) + \beta_4 (WML) + e$
2	Sharpe Ratio	$\frac{R_p - R_f}{\text{Standard deviation}}$
3	Treynor Ratio	$\frac{R_p - R_f}{\text{Beta}}$
4	Information Ratio	$\frac{R_p - R_b}{\text{Tracking Error}}$
5	Modigliani- Modigliani (M^2)	$M^2 = \text{Sharpe Ratio} * \text{Std. deviation of benchmark} + R_f$
6	Omega	$\frac{\sum \text{Winning} - \text{Benchmarking}}{\sum \text{Benchmarking} - \text{Losing}}$

*** In Table 2, R_p is the return of the portfolio; R_f is the risk-free rate, and R_b is the return of the benchmark

Implementation Considerations

The analysis in this study is done on a gross return basis and does not incorporate brokerage fees and bid-ask spreads, rebalancing costs, liquidity constraints, or the impact of regulatory restrictions on short selling. Therefore, this limitation should be factored in when interpreting the results, as it may materially affect actual portfolio performance.

RESULT AND DISCUSSION

Portfolio Composition

Table 2 shows the 5 portfolios constructed and the respective weights of the constituent stocks in each portfolio. It can be observed that the weights of stocks in Portfolios 3 and 4 are rather extreme and lopsided. This is one of the well-documented weaknesses of Markowitz's mean-variance portfolios. Portfolio 3 is concentrated in just 5 stocks and is therefore not well diversified. On the other hand, Portfolio 4 has a couple of unreasonable negative weights (representing short selling) in FBNH, GTCO, WAPCO, and UBN. This is not normal in an equilibrium market. Portfolio 5, the BL portfolio, demonstrates an improvement over the MVO strategy. Its components have more reasonable and intuitive weights, and it allows some flexibility by incorporating investors' views into the asset allocation process while using the market-implied returns as a starting point.

Table 2: 5 Portfolios of Stocks with the weight of each Component Security

Stock/ Ticker Symbol	Portfolio 1 (Value Weighted)	Portfolio 2 (Equal Weighted)	Portfolio 3 (Tangency without short selling)	Portfolio 4 (Tangency with short selling)	Portfolio 5 (Black - Litterman)
NB	13.60%	6.67%	6.98%	64.2%	10.98%
FBNH	13.32%	6.67%	0.00%	-33.6%	9.76%
ZENITHBANK	12.47%	6.67%	0.00%	6.1%	9.26%
GTCO	10.64%	6.67%	0.00%	-31.6%	9.48%
UBA	8.84%	6.67%	0.00%	-16.6%	7.29%
GUINNESS	6.00%	6.67%	0.00%	10.7%	1.30%
NESTLE	5.62%	6.67%	0.00%	12.1%	7.70%
DANGCEM	6.19%	6.67%	0.00%	34.5%	5.87%
FCMB	4.73%	6.67%	32.75%	52.8%	3.92%
ETI	4.36%	6.67%	24.28%	19.9%	7.14%
WAPCO	3.35%	6.67%	0.00%	-59.6%	6.24%
UNILEVER	3.00%	6.67%	19.41%	47.2%	4.47%
OANDO	2.68%	6.67%	16.59%	23.5%	6.33%
PZ	2.62%	6.67%	0.00%	1.5%	7.43%
UBN	2.59%	6.67%	0.00%	-31.0%	2.83%
	100.00%	100.00%	100.00%	100.00%	100.00%

Raw Risk and Returns Results

Table 3 shows the return and risk measures used as inputs to evaluate the portfolios' risk-adjusted performance. It highlights that the VW portfolio recorded the highest mean return over the study period, followed by the BL portfolio. In terms of risk, the least risky portfolio is the EW portfolio, with a total risk of 0.0050 and a systematic risk of 0.0037, indicating the robust diversification typically associated with EW portfolios. The Tangency Portfolio with short-selling exhibited the highest total and systematic risks at 0.0246 and 0.0048, respectively. This is not surprising given the extreme weights of securities (both positive and negative) in the portfolio and the attendant volatility of returns (Figure I).

Table 3: 5 Portfolios of Stocks with their Return and Risk Measures

	Portfolio 1 (VW)	Portfolio 2 (EW)	Portfolio 3 (Tangency without short selling)	Portfolio 4 (Tangency with short selling)	Portfolio 5 (BL)
Mean Returns	0.8191%	0.7337%	0.6050%	0.7576%	0.7988%
Standard Deviation	0.0760	0.0705	0.0966	0.1569	0.0745
Beta	1.0829	1.0146	1.2081	1.3052	1.0697
Adjusted Beta	1.0556	1.0098	1.1394	1.2045	1.0467
Total Risk	0.0058	0.0050	0.0093	0.0246	0.0056
Systematic Risk	0.0040	0.0037	0.0044	0.0048	0.0039
Idiosyncratic Risk	0.0018	0.0012	0.0049	0.0198	0.0016

Figure I: Stream of Returns for 5 Portfolios of Stocks Highlighting the Volatility of Returns



Discussion of Risk-Adjusted Performance

Table 4 presents the performance of the five portfolios in our study and their relative rankings on each risk-adjusted performance measure. The empirical results show that all five portfolios studied recorded negative Sharpe ratios over the out-of-sample period. This finding has significant implications for interpreting portfolio performance and therefore requires careful consideration. Several factors may have accounted for the persistence of negative Sharpe ratios across all portfolios. A key factor is macroeconomic volatility, in particular, persistent inflationary pressures and exchange rate instability, coupled with an attendant high-interest-rate environment during the study period. This raises the benchmark for achieving positive excess returns. In addition, the impact of market inefficiencies, liquidity constraints, information asymmetry, and other structural issues may have further constrained

portfolio performance. Further, the relative underperformance of equities compared to fixed-income instruments during parts of the sample period contributed to this outcome. It is particularly noteworthy that the out-of-sample period largely coincides with the post-global-economic-meltdown decade in the Nigerian stock market, characterised by massive erosion of investors' confidence and a general downturn in the stock market. The factors highlighted above point to the fact that even well-diversified or optimised portfolios may struggle to deliver superior risk-adjusted returns in certain macroeconomic environments.

Apart from the Sharpe ratio, which provides a total-risk perspective, other performance measures such as the Treynor ratio, Information ratio, M2 measure, Omega ratio, and Jensen alpha provide complementary insights. The Treynor ratio assesses how well portfolios are compensated for systematic risk exposure, while the Information ratio evaluates how closely active returns track the benchmark. The M2 measure translates risk-adjusted performance into percentage return terms, enhancing its interpretation. In addition, the Omega ratio captures other dimensions of return distributions, such as skewness and kurtosis, while Jensen alpha - estimated using the Carhart framework- measures excess returns after controlling for systematic risk factors.

Significantly, the rankings across the measures provide some degree of consistency, indicating ¹a considerable level of reliability. However, their economic significance is hampered by the overall negative risk-adjusted performance recorded across the strategies.

Absolute vs Relative Performance

The implication of the persistence of a negative Sharpe ratio in the portfolios evaluated is that all the portfolios underperformed the risk-free rate on a risk-adjusted basis, suggesting that an investor would have been better off investing in the risk-free asset, proxied by the Federal Government 2-year bond, rather than investing in any of the constructed equity portfolios. However, the primary objective of this study is a comparative evaluation of the portfolios rather than absolute performance optimisation. To this end, the rankings across

portfolios should be interpreted as measures of relative efficiency, rather than as indicators of overall investment attractiveness.

Table 4: Risk-adjusted Performance of Five Portfolios of Stock and Their Respective Rankings

Risk Adjusted Measure/Ranking	Portfolio 1 (VW)	Portfolio 2 (EW)	Portfolio 3 (Tangency, no short selling)	Portfolio 4 (Tangency with short selling)	Portfolio 5 (BL)
Sharpe Ratio	-0.01995	-0.03362	-0.03787	-0.01359	-0.02308
Rank	2	4	5	1	3
Treynor	-0.00144	-0.00235	-0.00321	-0.00177	-0.00164
(Rank)	1	4	5	3	2
Jensen Alpha	0.00033	-0.00061	-0.00167	-0.00003	0.00011
(Rank)	1	4	5	3	2
Information	0.00775	-0.01720	-0.02384	-0.00019	0.00273
(Rank)	1	4	5	3	2
M2	0.00054	-0.00029	-0.00055	0.00092	0.00035
(Rank)	2	4	5	1	3
Omega	0.94848	0.91542	0.90226	0.96365	0.94114
(Rank)	2	4	5	1	3
FINAL RANKINGS	1st	4th	5th	3rd	2nd

Figure 2: Sharpe Ratio, Treynor Ratio, and Jensen Alpha of the Five Portfolios of Stocks

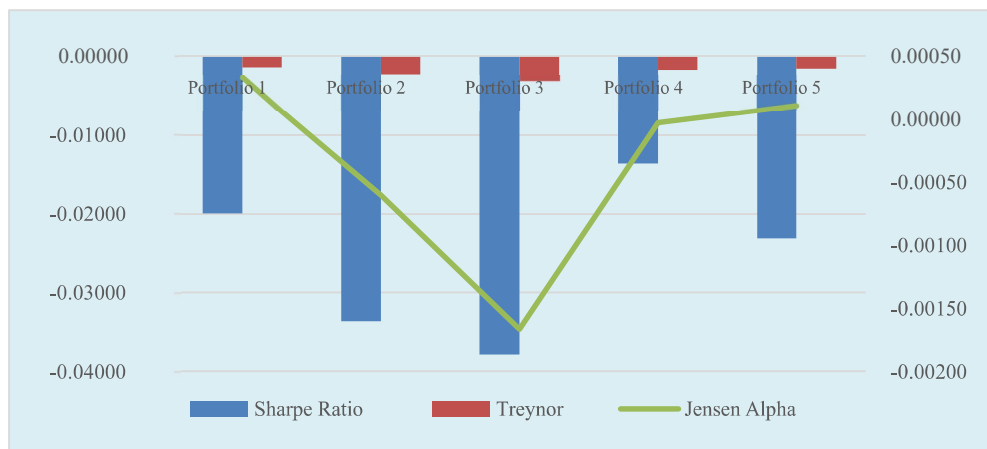


Table 5: Risk-adjusted Performance of Four Alternative Portfolios Using the Jensen Alpha Regression Model with the EW as the Benchmark

	Value-weighted Portfolio (VW)	Tangency no short selling	Tangency with short selling	Black-Litterman Portfolio (BL)
Alpha	0.000367	-0.00156	0.000142	0.000143
P-value	0.9037	0.7550	0.9894	0.9608
Market risk premium (Rm- Rf)	1.0779**	1.2024**	1.3012**	1.0656**
P-value	0.0000	0.0000	0.0000	0.0000

Interpretation of Portfolio Rankings

Table 5 shows the final rankings of the portfolios based on the average scores from the performance measures. Based on the performance metrics presented in Table 5, the value-weighted (VW) portfolio emerges as the superior strategy. It is followed in descending order of performance by the Black-Litterman portfolio, the Tangency portfolio with short-selling, and the Equal-Weighted (EW) portfolio. The Tangency portfolio, without short-selling, consistently ranks as the least effective strategy. It is important to reiterate, however, that this outperformance is relative rather than absolute. The VW emerged as the least inefficient among the evaluated strategies under the market conditions prevailing during the study period. This distinction is particularly relevant in emerging markets such as Nigeria, where macroeconomic instability, market inefficiencies, and structural constraints may collectively erode overall risk-adjusted returns. It should be emphasised that although the average ordinal ranking approach, used across multiple performance metrics to determine overall portfolio performance, is intuitive and easy to interpret, its weakness is that it is not a formal statistical decision rule and does not test the statistical significance of the observed performance differences. Therefore, the ranking results should not be interpreted as conclusive evidence of portfolio superiority.

From a statistical standpoint, the Jensen Alpha derived from the Cahart's Model (Table 5) presents a more robust conclusion. The empirical results indicate that while the VW, Tangency (with short selling), and BL portfolios yielded marginal positive alphas, and the Tangency (no short selling) portfolio yielded a negative alpha (0.00156), none of these values achieved statistical significance (all $p > 0.75$). On the other hand, all the strategies demonstrated statistically significant betas (> 1.0), suggesting they exhibited higher systematic risk relative to the EW benchmark. Consequently, the findings suggest that none of the tested portfolio strategies yielded superior risk-adjusted returns, and their

performance remains statistically indistinguishable from the benchmark after accounting for market exposure.

Based on these results, we do not reject our hypotheses that state as follows:

- a) The equally-weighted portfolio does not outperform the market value-weighted portfolio on a risk-adjusted basis.
- b) The equally-weighted portfolio does not outperform the Black-Litterman portfolio on a risk-adjusted basis.
- c) The equally-weighted portfolio does not outperform the Tangency portfolio with short-selling on a risk-adjusted basis.
- d) The equally-weighted portfolio does not outperform the Tangency portfolio without short-selling on a risk-adjusted basis.

Our findings contradict a large body of work in the literature that reported the superiority of the EW portfolio over the VW portfolio (Plyakha et al, 2012; Bolognesi et al, 2013; Malladi & Fabozzi, 2017; Yuan & Zhou, 2021). Further, our result is inconsistent with the evidence of Taljaard & Eben (2020, 2021) in South Africa and Meyer-Bullerdiek (2021) in Germany, who reported that the VW portfolio outperformed the EW portfolio in their respective stock markets. Our evidence, therefore, suggests that simpler strategies, such as value-weighted portfolios, may perform comparably with more complex optimisation-based strategies in the Nigerian market. However, given the negative risk-adjusted returns observed across all portfolios, investors should exercise caution in interpreting these results as actionable investment strategies. While diversification through broad market exposure, such as value-weighted strategies, remains a reasonable approach, this study does not provide sufficient evidence to conclude that such strategies will consistently outperform risk-free assets or alternative investments across all market conditions.

CONCLUSION AND POLICY RECOMMENDATION

Summary

The objective of the study is to evaluate (1) evaluate the performance of the EW portfolio, VW portfolio, Tangency Portfolio with short selling, Tangency Portfolio without short selling, and BL portfolio in the Nigerian stock market, and (2) analyse whether, on a risk-adjusted basis, the EW portfolio is superior to the alternative asset allocation strategies in the Nigerian stock market. The study bridges a knowledge gap by providing a guide to retail investors on alternative portfolio strategies to achieve diversification and grow their wealth in alignment with their risk-return preferences. Further, the study enriches the literature on the performance of various asset allocation strategies in emerging markets generally and particularly in Nigeria. This should be of interest to key stakeholders as both the Nigerian economy and the stock market are rapidly evolving. It is critical that market participants gain

access to quality information about the features of the stock markets to guide their investment decisions.

Weekly data on fifteen stocks covering January 1, 2007, to December 31, 2009, were obtained from the NGX to construct five portfolios of stocks using the different asset allocation strategies. The performance of the portfolios was evaluated from January 1, 2010, to April 30, 2023, using the Sharpe ratio, Treynor ratio, Jensen alpha, Information ratio, M² measure, Omega ratio, and Carhart's Four Factor regression model. The return of the Federal Government's 2-year bond was used as a proxy for the risk-free rate, while the NGX All Share Index (NGX ASI) was adopted as the benchmark portfolio.

The empirical results, using ordinal rankings, indicate that the VW portfolio relatively outperformed other portfolio strategies; however, there is no evidence of a statistically significant difference in performance across the portfolios. This suggests that, despite differences in construction methods and theoretical sophistication, the strategies ultimately deliver comparable outcomes over the study period. From a practical standpoint, this finding has important implications for retail investors. Given the similarity in performance, investors may be better off adopting simple and cost-effective portfolio strategies, such as equal-weighted or value-weighted approaches, rather than more complex optimisation models that may require large amounts of data, expertise, and transaction costs without compensating with superior returns. Furthermore, the analysis reveals that all portfolios underperform the risk-free rate on a risk-adjusted basis. This highlights a fundamental challenge of generating returns that adequately compensate for the level of risk undertaken in the Nigerian market.

Limitations

While this study offers empirical insights into the out-of-sample performance of asset allocation strategies within an emerging market context, several methodological constraints must be acknowledged. First, the adoption of purposive sampling with a concentration on fifteen large-cap, actively traded stocks on the Nigerian Exchange (NGX) introduces potential survivorship and large-cap biases. This is because delisted firms, merged firms, or those with lower liquidity were excluded. Consequently, the findings may not be fully generalizable to the broader market, particularly to smaller securities, which often exhibit different risk-return profiles. Second, data constraints necessitated the use of price returns alone. This implies that dividends and other corporate actions are excluded from the analysis. Therefore, the study may underestimate total shareholder returns, potentially affecting the relative comparisons between portfolios. Third, the study assumes a static buy-and-hold strategy with no rebalancing. While this simplifies the comparative analysis, it neither fully replicates real-world investment management nor accounts for the impact of transaction costs or liquidity constraints that would inevitably affect actual portfolio performance. Furthermore, the Black-Litterman model was implemented using simplified assumptions regarding investor views and confidence levels (Ω matrix), which may impact the precision of the estimated returns. Similarly, the Carhart four-factor model utilised broad emerging market

proxy data rather than Nigeria-specific factors. This may fail to capture the unique Nigerian market dynamics.

Directions for Future Research

Future studies can build upon the findings of this effort by exploiting several avenues for improvement. Subsequent studies in the field with a focus on the Nigerian market should employ a broader and more representative sample to enhance generalizability and mitigate survivorship bias. The sample should include mid-cap and small-cap stocks, as well as historical data from delisted firms. Further, incorporating total return data (inclusive of dividends and corporate actions) would provide a more comprehensive assessment of the true investment performance of the portfolios. From a practical perspective, future models could incorporate dynamic rebalancing strategies while accounting for transaction costs and liquidity friction. This would align theoretical allocations with real-world conditions. From a methodological perspective, the robustness of the Black–Litterman framework could be improved by explicitly estimating the confidence matrix (Ω matrix). Moreover, developing Nigeria-specific factor portfolios would enable tailor-made asset pricing analysis. Finally, future researchers should replace heuristic rankings with formal statistical testing methods, such as bootstrap techniques or stochastic dominance analysis, to provide a more robust statistical basis for evaluating performance differences across competing asset allocation strategies.

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Appendices

Appendix 1: The Variance-Covariance Matrix of the Fifteen Stocks Listed on the NGX used to Construct the Mean Variance and
Black-Litterman Portfolios Variance-Covariance Matrix

	NB Plc	FBN	Zenith	GTB	UBA	Guinn.	Nestle	Dangote	FCMB	ETI	WAP	Unilev.	Oando	PZ	Union
NB Plc	0.0039	0.0023	0.0019	0.0022	0.0018	0.0021	0.0005	0.0003	0.0013	-0.0003	0.0013	0.0022	0.0014	0.0009	0.0014
FBN	0.0023	0.0065	0.0047	0.0035	0.0038	0.0016	0.0004	0.0018	0.0019	0.0002	0.0023	0.0029	0.0013	0.0018	0.0035
Zenith	0.0019	0.0047	0.0081	0.0037	0.0050	0.0017	0.0001	0.0029	0.0028	0.0003	0.0025	0.0035	0.0017	0.0018	0.0043
GTB	0.0022	0.0035	0.0037	0.0067	0.0041	0.0013	0.0015	0.0021	0.0036	0.0007	0.0024	0.0041	0.0012	0.0019	0.0021
UBA	0.0018	0.0038	0.0050	0.0041	0.0093	0.0013	0.0013	0.0026	0.0029	0.0009	0.0029	0.0044	0.0008	0.0026	0.0042
Guinn.	0.0021	0.0016	0.0017	0.0013	0.0013	0.0034	-0.0001	0.0002	0.0011	-0.0003	0.0010	0.0020	0.0004	0.0007	0.0009
Nestle	0.0005	0.0004	0.0001	0.0015	0.0013	-0.0001	0.0039	0.0013	0.0009	0.0003	0.0009	0.0009	0.0008	0.0004	0.0003
Dangote	0.0003	0.0018	0.0029	0.0021	0.0026	0.0002	0.0013	0.0067	0.0022	0.0004	0.0020	0.0019	0.0014	0.0016	0.0017
FCMB	0.0013	0.0019	0.0028	0.0036	0.0029	0.0011	0.0009	0.0022	0.0072	0.0001	0.0022	0.0029	0.0014	0.0016	0.0024
ETI	-0.0003	0.0002	0.0003	0.0007	0.0009	-0.0003	0.0003	0.0004	0.0001	0.0307	0.0006	0.0014	0.0008	0.0012	0.0005
WAPCO	0.0013	0.0023	0.0025	0.0024	0.0029	0.0010	0.0009	0.0020	0.0022	0.0006	0.0052	0.0035	0.0017	0.0018	0.0025
Unilever	0.0022	0.0029	0.0035	0.0041	0.0044	0.0020	0.0009	0.0019	0.0029	0.0014	0.0035	0.0095	0.0018	0.0036	0.0027
Oando	0.0014	0.0013	0.0017	0.0012	0.0008	0.0004	0.0008	0.0014	0.0014	0.0008	0.0017	0.0018	0.0072	0.0019	0.0015
PZ	0.0009	0.0018	0.0018	0.0019	0.0026	0.0007	0.0004	0.0016	0.0016	0.0012	0.0018	0.0036	0.0019	0.0058	0.0021
Union	0.0014	0.0035	0.0043	0.0021	0.0042	0.0009	0.0003	0.0017	0.0024	0.0005	0.0025	0.0027	0.0015	0.0021	0.0092

Appendix 2: The Tracking Factor Matrix Showing the Relative Sensitivity of the Fifteen Listed Stocks in our Sample Used in Computing the Adjusted Returns of Stocks in the Black-Litterman Model Tracking Factor Matrix

	NB	FBNH	Zenith	GTBank	UBA	Guinness	Nestle	Dangote	FCMB	ETI	WAPCO	Unilever	OANDO
NB Plc	1.0000	0.3565	0.2350	0.3236	0.1886	0.6192	0.1176	0.0382	0.1792	-0.0090	0.2564	0.2297	0.1869
FBNH	0.5984	1.0000	0.5817	0.5248	0.4110	0.4878	0.1091	0.2649	0.2668	0.0059	0.4510	0.3063	0.1770
Zenith	0.4890	0.7212	1.0000	0.5481	0.5366	0.4904	0.0322	0.4271	0.3902	0.0110	0.4848	0.3712	0.2413
GTBank	0.5590	0.5401	0.4550	1.0000	0.4376	0.3935	0.3890	0.3090	0.5010	0.0231	0.4578	0.4285	0.1691
UBA	0.4523	0.5872	0.6183	0.6074	1.0000	0.3994	0.3240	0.3942	0.3999	0.0301	0.5590	0.4683	0.1087
Guinness	0.5351	0.2511	0.2036	0.1968	0.1439	1.0000	-0.0260	0.0301	0.1505	-0.0090	0.1935	0.2087	0.0535
Nestle	0.1169	0.0646	0.0154	0.2238	0.1343	-0.0303	1.0000	0.1946	0.1277	0.0110	0.1740	0.0961	0.1118
Dangote	0.0655	0.2709	0.3523	0.3070	0.2821	0.0599	0.3361	1.0000	0.3088	0.0139	0.3796	0.2017	0.1878
FCMB	0.3298	0.2926	0.3452	0.5339	0.3070	0.3206	0.2365	0.3312	1.0000	0.0041	0.4187	0.3025	0.1902
ETI	-0.0710	0.0276	0.0415	0.1052	0.0988	-0.0828	0.0871	0.0636	0.0173	1.0000	0.1096	0.1521	0.1077
WAPCO	0.3415	0.3578	0.3102	0.3530	0.3105	0.2982	0.2332	0.2946	0.3029	0.0186	1.0000	0.3720	0.2353
Unilever	0.5576	0.4430	0.4330	0.6022	0.4740	0.5863	0.2347	0.2853	0.3988	0.0469	0.6780	1.0000	0.2461
OANDO	0.3474	0.1961	0.2156	0.1820	0.0843	0.1150	0.2092	0.2035	0.1921	0.0254	0.3284	0.1884	1.0000
PZ	0.2373	0.2726	0.2167	0.2881	0.2733	0.2023	0.1042	0.2384	0.2210	0.0377	0.3384	0.3818	0.2597
Union	0.3661	0.5328	0.5316	0.3086	0.4508	0.2750	0.0691	0.2589	0.3286	0.0166	0.4812	0.2809	0.2112

RECAPITALISATION, PROPORTIONAL REGULATION AND SYSTEMIC STABILITY IN THE NIGERIAN CAPITAL MARKET

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Abstract

The Securities and Exchange Commission (SEC) of Nigeria's revised minimum capital requirements for capital market operators represent one of the most significant prudential regulatory reforms in the Nigerian capital market in recent years. While recapitalisation is traditionally justified on the grounds of strengthening institutional resilience, investor protection and financial stability, its implications extend far beyond balance-sheet strengthening. Recapitalisation influences intermediary diversity, competition, retail participation, financial inclusion, market accessibility, liquidity provision, operational resilience and the long-term development of capital markets. This paper critically examines the theoretical, regulatory and market-structure implications of the SEC recapitalisation framework and evaluates whether contemporary capital market regulation should continue to rely on uniform capital requirements or transition towards a more sophisticated risk-based and proportional regulatory architecture. Drawing on Financial Intermediation Theory, Delegated Monitoring Theory, Market Microstructure Theory, Financial Development Theory and Systemic Risk Theory, the study develops an integrated analytical framework linking recapitalisation, financial inclusion, market structure and systemic stability. The paper demonstrates that while stronger capitalisation enhances institutional resilience and investor confidence, uniform recapitalisation requirements may unintentionally generate market concentration, reduce intermediary diversity, weaken retail participation and constrain financial inclusion. The analysis further shows that capital market operators generate heterogeneous risks arising from differences in operational complexity, proprietary exposure, custody functions, liquidity obligations, technological dependence and systemic interconnectedness. Consequently, prudential requirements should be calibrated according to actual risk exposure rather than applied uniformly across all operators. Drawing on international regulatory experiences from the United States, United Kingdom, European Union, South Africa, India and Singapore, the study proposes a Nigerian Risk-Based Recapitalisation Framework grounded in the principles of proportional regulation, risk sensitivity, activity-based supervision, operational resilience, investor protection, financial inclusion and systemic stability. The framework seeks to align capital requirements with institutional risk profiles while preserving competition, innovation, accessibility and sustainable capital market development. The paper concludes that the future of capital market regulation in Nigeria lies not in indiscriminate escalation of minimum capital requirements but in the development of intelligent, risk-sensitive and proportionate regulatory frameworks capable of simultaneously promoting financial stability, investor confidence, financial inclusion and market development. The proposed framework provides a practical pathway for strengthening the resilience, competitiveness and sustainability of the Nigerian capital market in an increasingly digital and interconnected financial environment.

Keywords: Recapitalisation; Capital Market Regulation; Risk-Based Supervision; Proportional Regulation; Financial Inclusion; Retail Participation; Investor Protection; Operational Resilience; Systemic Stability; Nigerian Capital Market.

JEL Classification: G18, G21, G28, G32, G38, O16.

INTRODUCTION

Financial markets play a fundamental role in economic development by mobilising savings, facilitating capital formation, improving resource allocation and supporting investment activities. Within this broader financial architecture, capital markets serve as critical mechanisms through which governments, corporations and other entities access long-term finance required for economic growth and development. The effectiveness of capital markets depends significantly on the strength, integrity, efficiency and resilience of the institutions that operate within them. Consequently, regulatory authorities across the world continuously seek to strengthen prudential standards to protect investors, preserve market confidence, and promote financial stability (Levine, 1997, 2005; Allen & Gale, 2000; IOSCO, 2018, 2024). In pursuit of these objectives, the Securities and Exchange Commission (SEC) of Nigeria introduced revised minimum capital requirements for capital market operators in 2025/2026 as part of a broader strategy aimed at repositioning the Nigerian capital market for greater resilience, competitiveness and sustainable development. The revised framework represents one of the most significant regulatory interventions in the Nigerian capital market since the post-global financial crisis reforms and has generated considerable interest among regulators, practitioners, investors and academics.

The rationale for recapitalisation is relatively straightforward. Inflationary pressures, exchange-rate depreciation, rising technology costs, cyber-security requirements, compliance obligations and increasing operational complexity have significantly eroded the real value of historical capital thresholds. Institutions operating under outdated capital structures may therefore lack the financial capacity required to support modern securities-market operations. Stronger capitalisation is expected to improve operational resilience, strengthen governance structures, enhance investor confidence and reduce the probability of institutional failure (Berger et al., 1995; Basel Committee on Banking Supervision, 2011).

However, recapitalisation also raises important questions regarding market structure and financial development. Capital requirements influence not only institutional solvency but also intermediary diversity, competition, liquidity provision, investor access and market participation. Excessively stringent requirements may encourage consolidation, increase concentration and reduce the number of market intermediaries. While such outcomes may strengthen individual institutions, they may simultaneously affect market accessibility and financial inclusion. Consequently, recapitalisation should be viewed not only as a prudential exercise but also as a market-structure intervention capable of reshaping the architecture of financial intermediation within the capital market ecosystem (Acharya, 2009; Allen & Gale, 2000; OECD, 2024). The implications of recapitalisation are particularly important for

retail participation and financial inclusion. Retail investors constitute an important component of capital market development because they contribute to liquidity, ownership dispersion, savings mobilisation and domestic capital formation. Smaller brokerage firms and specialised intermediaries frequently serve as important channels through which retail investors access securities markets. Regulatory reforms that significantly alter intermediary structures may therefore influence market accessibility, investor participation and financial inclusion (Beck et al., 2007; Demirgüç-Kunt et al., 2018; Ozili, 2021).

At the same time, developments in international financial regulation increasingly challenge the traditional assumption that all institutions should be subject to identical prudential requirements. Following the Global Financial Crisis and subsequent episodes of market disruption, regulators around the world have increasingly adopted risk-based, proportional and activity-based supervisory approaches. These frameworks recognise that financial institutions generate heterogeneous risks and therefore require differentiated regulatory treatment based on size, complexity, business model, systemic importance and operational characteristics (Goodhart, 2011; Haldane, 2012; FCA, 2024; ESMA, 2024; IOSCO, 2024; FSB, 2024). The growing international preference for proportional regulation raises important questions regarding the future design of prudential frameworks within the Nigerian capital market. Should recapitalisation continue to rely primarily on uniform capital thresholds, or should regulatory requirements be aligned more closely with institutional risk profiles and market functions? Can stronger resilience be achieved without undermining competition, financial inclusion and market accessibility? How can prudential regulation simultaneously support investor protection, operational resilience, market development and systemic stability?

Despite the significance of these questions, much of the existing literature on recapitalisation focuses primarily on banking systems and capital adequacy while paying relatively limited attention to capital market operators. Similarly, relatively few studies examine the interaction between recapitalisation, retail participation, financial inclusion, proportional regulation and market structure within emerging capital markets. The Nigerian capital market therefore provides an important context for examining these relationships. Against this background, this paper investigates the theoretical, regulatory and market-structure implications of the SEC recapitalisation framework and evaluates the case for a Nigerian Risk-Based Recapitalisation Framework. Specifically, the study seeks to:

- Examine the theoretical foundations of recapitalisation and prudential regulation;
- Analyse the relationship between recapitalisation, retail participation and financial inclusion;
- Evaluate the role of proportional regulation in promoting systemic stability;
- Assess the implications of the SEC recapitalisation framework for market structure and capital market development;
- Review international regulatory experiences and lessons for Nigeria; and

- Propose a risk-based recapitalisation framework capable of balancing resilience, investor protection, financial inclusion, competition and sustainable market development.

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature. Section 3 examines recapitalisation, retail participation and financial inclusion. Section 4 discusses proportional regulation and systemic stability. Section 5 analyses the SEC recapitalisation framework and its implications for market structure dynamics. Section 6 reviews international regulatory experiences and lessons for Nigeria. Section 7 develops a proposed Nigerian Risk-Based Recapitalisation Framework. Section 8 discusses policy implications, while Section 9 concludes the study.

LITERATURE, THEORY AND ANALYTICAL FRAMEWORK

Capital Market Intermediation, Financial Inclusion and Market Development

Capital markets constitute a critical component of modern financial systems because they facilitate the mobilisation of long-term savings, allocation of capital to productive investments, risk diversification, corporate financing, infrastructure development, and wealth creation. Financial development literature consistently demonstrates that efficient capital markets contribute significantly to economic growth through improved resource allocation, enhanced liquidity, lower transaction costs, and broader investment opportunities. Seminal studies by Levine (1997, 2005) established that financial systems promote economic development by facilitating savings mobilisation, information production, risk management, investment monitoring, and efficient capital allocation. Similarly, Merton and Bodie (1995) identified the core functions of financial systems as facilitating payments, pooling resources, transferring risk, producing information, and enabling intertemporal resource allocation.

Within this broader financial architecture, capital market intermediaries perform indispensable economic functions. Financial Intermediation Theory provides the principal analytical foundation for understanding the role of intermediaries in securities markets. Gurley and Shaw (1960) and Goldsmith (1969) argue that financial intermediaries emerge because they reduce transaction costs, facilitate information flows, and improve the efficiency of financial transactions. Diamond (1984) further demonstrates that intermediaries perform delegated monitoring functions, thereby reducing information asymmetry and agency costs that individual investors would otherwise incur. Although Diamond's model was originally developed within the banking context, its underlying logic extends naturally to securities markets where brokers, dealers, underwriters, registrars, custodians, asset managers, and other intermediaries facilitate market participation and information processing.

However, important distinctions exist between banking intermediation and securities-market intermediation. Banking institutions engage primarily in balance sheet

intermediation through deposit mobilisation and credit creation, exposing them to liquidity risk, maturity transformation risk, and potential bank runs (Diamond & Dybvig, 1983). By contrast, most securities brokers, particularly agency brokers, function mainly as transaction facilitators rather than balance-sheet intermediaries. Their principal risks relate to operational failures, compliance weaknesses, technology disruptions, conduct breaches, cybersecurity vulnerabilities, and reputational damage rather than deposit runs or credit losses. This distinction is fundamental to contemporary debates regarding recapitalisation and prudential regulation because it suggests that identical capital standards may not be appropriate for institutions with fundamentally different risk characteristics.

The role of securities intermediaries extends beyond transaction execution. Brokerage firms facilitate investor access, provide market information, support portfolio management, assist with securities registration and settlement, promote investor education, and enhance market participation. In emerging markets, these functions assume even greater importance because financial literacy levels, technological adoption, and market familiarity often remain uneven. Consequently, brokers frequently serve as the primary institutional link between households and formal capital markets. Financial Intermediation Theory also emphasises the importance of intermediary diversity. Allen and Santomero (1997) argue that financial systems operate more efficiently when different categories of intermediaries coexist because they serve different investor segments, financing needs, and risk preferences. Diverse intermediary ecosystems promote competition, innovation, resilience, and market accessibility. In the Nigerian capital market, large institutional broker-dealers, medium-sized firms, regional brokers, digital investment platforms, and retail-focused intermediaries collectively contribute to market development by serving heterogeneous categories of investors. Excessive consolidation resulting from disproportionate recapitalisation requirements may therefore weaken the diversity of intermediation channels through which savings are mobilised, and investment opportunities are distributed.

The developmental significance of intermediary diversity becomes particularly evident when examined through the lens of Financial Inclusion Theory. Financial inclusion broadly refers to the ability of individuals and businesses to access and utilise affordable, appropriate, reliable, and regulated financial services. While much of the financial inclusion literature focuses on banking services, payment systems, and digital finance, capital market participation represents an equally important dimension of inclusive finance because it enables households to participate directly in long-term wealth creation and productive investment. Beck et al. (2007) demonstrate that broader access to financial services contributes to poverty reduction, income growth, and economic inclusion. Demirgüç-Kunt et al. (2018) further show that access to formal financial services enhances savings behaviour, financial resilience, and economic participation. More recent studies continue to emphasise that inclusive financial systems are essential for sustainable development and economic resilience, particularly within emerging and frontier markets. The World Bank (2024) similarly argues that inclusive financial systems strengthen economic growth, reduce

vulnerability, and improve household welfare by expanding access to investment opportunities and financial services.

Within capital markets, financial inclusion extends beyond access to bank accounts or payment systems. It encompasses the ability of households and small investors to purchase securities, invest in collective investment schemes, participate in public offerings, access investment advice, receive dividends efficiently, and benefit from capital appreciation. Consequently, capital market inclusion represents an advanced stage of financial development because it connects household savings directly to productive investment opportunities. Retail investors occupy a central position within this process. A broad retail investor base contributes to market depth, enhances domestic ownership of securities, strengthens liquidity, reduces excessive dependence on foreign portfolio flows, and promotes market legitimacy. Emerging-market experience suggests that sustainable capital market development depends not only on institutional participation but also on widespread retail engagement. World Bank studies on capital market development consistently emphasise the importance of broadening investor participation as a mechanism for strengthening domestic capital formation and improving market resilience.

The role of brokerage firms in supporting retail participation is therefore strategically important. Smaller and medium-sized brokers often maintain closer relationships with first-time investors, cooperative societies, family portfolios, small businesses, regional investors, and underserved communities than larger institutional firms whose business models may focus primarily on institutional clients, pension funds, foreign investors, and high-net-worth individuals. These brokers frequently perform educational, advisory, and relationship-management functions that extend beyond pure transaction execution. This observation introduces a critical policy dimension to the recapitalisation debate. Excessively stringent capital requirements may unintentionally reduce the number of intermediaries serving retail investors, particularly where smaller firms are unable to satisfy revised capital thresholds. Such outcomes may weaken access channels, reduce competition, diminish regional market penetration, and undermine financial inclusion objectives. Ozili (2021) argues that financial inclusion should be viewed not only as an access issue but also as an institutional design issue. In this context, the structure of regulation becomes a determinant of whether financial systems remain accessible to broad segments of the population.

Recent international regulatory developments increasingly recognise the importance of balancing prudential resilience with retail participation and market accessibility. IOSCO's recent strategic priorities continue to emphasise investor protection, market integrity, retail investor participation, and systemic resilience as mutually reinforcing objectives of securities regulation. Likewise, ESMA's evolving regulatory framework for investment firms increasingly incorporates proportionality principles designed to preserve market efficiency while maintaining adequate prudential safeguards. For frontier and emerging markets such as Nigeria, these considerations are particularly important. Recent World Bank evidence suggests that many frontier markets continue to suffer from underdeveloped capital

markets, limited investor participation, weak domestic savings mobilisation, and insufficient financial depth. Strengthening capital market intermediation therefore remains a critical development priority.

The implication for recapitalisation policy is therefore clear. Capital adequacy remains necessary for investor protection, operational resilience, governance quality, technological capability, and institutional sustainability. However, recapitalisation should not be evaluated solely in terms of stronger balance sheets. It should also be assessed in relation to its effects on intermediary diversity, retail participation, market accessibility, competition, liquidity formation, and financial inclusion. A regulatory framework that strengthens prudential resilience while preserving broad-based participation is more likely to support sustainable capital market development than one that focuses exclusively on institutional size. Accordingly, Financial Intermediation Theory and Financial Inclusion Theory jointly suggest that effective recapitalisation should strengthen the financial and operational capacity of capital market operators without undermining the intermediation channels through which investors access the market. Sustainable market development therefore requires a regulatory architecture capable of balancing prudential soundness with inclusiveness, accessibility, competition, and long-term developmental effectiveness.

Prudential Regulation, Risk-Based Supervision and Proportional Regulation. Prudential regulation constitutes one of the most important pillars of modern financial governance. Its primary objective is to ensure that financial institutions possess sufficient financial, operational, governance, technological, and risk-management capacity to perform their functions safely, efficiently, and sustainably. Prudential regulation seeks to protect investors, preserve market confidence, reduce institutional failures, contain systemic risk, and enhance the resilience of the broader financial system. Although prudential regulation has traditionally been associated with banking supervision, it has increasingly become a central feature of securities-market regulation as financial markets become more interconnected, technologically sophisticated, and systemically significant. The theoretical foundation of prudential regulation derives from market failure theory, information asymmetry theory, agency theory, and systemic risk theory. Stiglitz (1989, 2000) argues that financial markets are inherently imperfect because information asymmetries prevent investors from accurately assessing the risk profiles of financial institutions. Consequently, regulation becomes necessary to mitigate market failures, reduce moral hazard, protect investors, and preserve financial stability. Similarly, Mishkin (2007) contends that prudential regulation emerges because unregulated financial markets may generate excessive risk-taking behaviour, adverse selection, and systemic vulnerabilities capable of undermining economic stability.

One of the principal instruments of prudential regulation is capital adequacy. Capital serves as a financial buffer capable of absorbing unexpected losses, supporting operational continuity, enhancing institutional credibility, and strengthening confidence among investors and counterparties. Berger et al. Szegö (1995) identify several important functions of regulatory capital, including loss absorption, reduction of insolvency risk, mitigation of moral

hazard, enhancement of market confidence, and promotion of prudent managerial behaviour. Within securities markets, capital also supports investments in technology infrastructure, cybersecurity systems, compliance frameworks, governance arrangements, business continuity mechanisms, and operational resilience. The prudential rationale for recapitalisation is therefore well established. Financial institutions operating within increasingly complex markets face growing operational, technological, cyber-security, regulatory, and reputational risks. Capital thresholds that were considered adequate a decade ago may become insufficient under conditions of inflation, currency depreciation, technological transformation, heightened compliance requirements, and increasing market complexity. Periodic review of capital requirements therefore constitutes a legitimate regulatory response to changing market realities.

However, contemporary prudential literature increasingly recognises that capital adequacy alone cannot guarantee institutional soundness or systemic stability. Goodhart (2008, 2011) argues that effective regulation requires a broader understanding of risk transmission mechanisms, institutional incentives, governance quality, and market structure. Similarly, Haldane (2012) observes that financial systems have become sufficiently complex that regulatory effectiveness cannot be achieved merely through the uniform application of increasingly stringent capital requirements. Rather, regulation must be aligned with the nature, scale, complexity, and interconnectedness of institutional activities.

These insights contributed significantly to the emergence of Risk-Based Supervision Theory. Risk-based supervision represents a fundamental departure from traditional compliance-oriented regulation. Rather than treating all institutions identically, risk based supervision allocates regulatory attention, supervisory resources, and prudential requirements according to the probability and potential consequences of institutional failure. Under this approach, institutions that pose greater risks to investors, market integrity, or systemic stability are subject to more intensive supervision and stronger prudential obligations.

The intellectual foundations of risk-based supervision are closely linked to developments in systemic risk management and post-crisis regulatory reforms. The Global Financial Crisis of 2007–2009 exposed major weaknesses in regulatory systems that focused primarily on rule compliance while insufficiently addressing interconnectedness, leverage, liquidity vulnerabilities, and systemic contagion. In response, international standard-setting bodies increasingly embraced supervisory frameworks that emphasise forward-looking risk assessment, institutional differentiation, and systemic relevance. The Basel Committee on Banking Supervision (BCBS, 2011; 2021) emphasises that supervisory frameworks should allocate regulatory attention according to institutional risk profiles, systemic importance, leverage, liquidity exposures, and governance quality. Similarly, IOSCO increasingly advocates risk-sensitive approaches to securities regulation that consider operational complexity, client asset exposure, liquidity risk, technology risk, conduct risk, cyber-security vulnerabilities, and systemic interconnectedness. IOSCO's guidance for emerging market

regulators explicitly recognises risk-based supervision as a central component of effective oversight of securities intermediaries.

Risk-Based Supervision Theory is particularly relevant within securities markets because capital market operators are highly heterogeneous. Unlike banks, which perform relatively similar functions involving deposit mobilisation and credit creation, capital market intermediaries undertake a wide range of activities including agency brokerage, proprietary trading, underwriting, market-making, custody services, securities lending, derivatives trading, clearing operations, asset management, registrar services, and investment advisory activities. These functions generate significantly different operational, liquidity, market, conduct, and systemic risks. For example, a small agency broker that merely executes client orders under segregated custody arrangements poses fundamentally different risks from a broker dealer engaged in proprietary trading, securities underwriting, margin financing, market-making, or clearing activities. The former is primarily exposed to operational, compliance, technological, and conduct risks, whereas the latter may generate substantial market risk, leverage risk, liquidity risk, counterparty exposure, and systemic interconnectedness. Risk-Based Supervision Theory therefore argues that prudential requirements should reflect actual risk exposures rather than institutional labels alone.

This logic provides the intellectual foundation for Proportional Regulation Theory. Proportional regulation refers to the principle that regulatory obligations should be commensurate with the size, complexity, risk profile, business model, and systemic significance of regulated entities. Avgouleas and Goodhart (2015) argue that proportionality is necessary because uniform regulation may impose excessive burdens on smaller institutions while failing adequately to address risks generated by larger and more complex institutions. Herring and Carmassi (2016) similarly demonstrate that systemic importance depends not only on institutional size but also on interconnectedness, substitutability, leverage, operational complexity, and concentration.

The growing international acceptance of proportional regulation is reflected in contemporary regulatory reforms. Within the European Union, the Investment Firms Regulation (IFR) and Investment Firms Directive (IFD) introduced a differentiated prudential framework that classifies investment firms according to their activities, size, client asset exposure, trading activities, and systemic relevance. The framework distinguishes among different categories of firms and imposes prudential requirements according to actual risk profiles rather than applying a uniform regulatory standard to all institutions. Recent reviews by ESMA and the European Banking Authority continue to reinforce proportionality as a central objective of the investment firms' prudential framework.

Similarly, the United States applies differentiated prudential requirements across introducing brokers, carrying brokers, clearing brokers, broker-dealers, investment advisers, and other categories of securities intermediaries. Capital requirements vary according to whether firms hold client assets, carry customer accounts, engage in proprietary trading, provide clearing services, or assume significant market exposures. This reflects the principle that institutions

performing different functions should not automatically be subjected to identical prudential obligations. Recent international regulatory developments further strengthen the case for proportional regulation. The Financial Stability Board (FSB) has increasingly emphasised activities-based supervision and risk-sensitive regulatory frameworks for non-bank financial intermediaries. Recent FSB assessments highlight the growing importance of non-bank financial intermediation and stress the need for regulatory frameworks that address systemic risks according to actual vulnerabilities, leverage, liquidity exposures, and interconnectedness rather than relying solely on institutional classifications.

The importance of risk-sensitive supervision has become even more pronounced as non-bank financial institutions continue to expand globally. Recent FSB evidence indicates that non-bank financial intermediaries now account for approximately half of global financial assets, increasing concerns regarding leverage, liquidity mismatches, interconnectedness, and systemic contagion. Consequently, modern regulatory thinking increasingly supports the principle of “same risk, same regulatory treatment,” whereby regulatory burdens are aligned with risk generation rather than organisational form alone. Within the Nigerian capital market, the relevance of proportional regulation is particularly significant. Capital market operators differ substantially in terms of business models, scale, client profiles, operational complexity, technology requirements, and systemic importance. Large integrated broker-dealers, custodians, market-makers, underwriters, clearing members, and market infrastructure institutions perform functions that may generate significant systemic implications. By contrast, many retail-focused agency brokers primarily facilitate investor access and trade execution under highly regulated settlement and custody arrangements.

The Nigerian market also benefits from important institutional safeguards that reduce the systemic consequences of brokerage failures. These include client asset segregation, Direct Cash Settlement mechanisms, Central Securities Clearing System (CSCS) infrastructure, enhanced market surveillance, Investor Protection Fund arrangements, anti-money laundering controls, cyber-security standards, and movement toward shorter settlement cycles. These safeguards substantially reduce the likelihood that the failure of a small agency broker would generate contagion comparable to that observed within banking systems. Risk-Based Supervision Theory therefore suggests that recapitalisation policy should be calibrated according to the actual risk profiles of different categories of operators. A differentiated framework may classify operators into three broad categories.

Tier I Institutions would comprise systemically important entities such as market makers, proprietary traders, underwriters, custodians, clearing members, securities lenders, and market infrastructure providers. These institutions would attract stronger capital, liquidity, governance, technology, and operational resilience requirements.

Tier II Institutions would include medium-sized broker-dealers, institutional brokers, and diversified intermediaries whose activities generate moderate levels of operational and market risk. These institutions would be subject to intermediate prudential standards.

Tier III Institutions would comprise pure agency brokers, retail-focused intermediaries, and non-clearing brokers whose activities generate relatively limited systemic exposure. These operators would remain subject to credible prudential requirements combined with strong conduct supervision, technology standards, governance obligations, cyber-risk controls, and investor-protection measures.

Such a framework aligns closely with contemporary international regulatory trends that emphasise proportionality, risk sensitivity, supervisory efficiency, and systemic relevance. More importantly, it enables regulators to strengthen prudential resilience without unnecessarily undermining intermediary diversity, retail participation, financial inclusion, competition, and market development. The central implication of this literature is therefore clear. Effective recapitalisation should not be understood as a mechanical increase in minimum capital thresholds. Rather, recapitalisation should form part of a broader prudential framework that combines capital adequacy with risk-sensitive supervision, operational resilience, governance quality, technological capability, investor protection, and proportional regulation. Sustainable systemic stability ultimately depends not on imposing the highest possible capital requirements, but on achieving an appropriate balance between prudential soundness, market accessibility, intermediary diversity, competition, innovation, and financial inclusion.

Market Microstructure, Systemic Stability and Regulatory Trade-Offs The relationship between recapitalisation, market structure, liquidity formation, investor participation, and systemic stability is best understood through the combined lenses of Market Microstructure Theory, Systemic Risk Theory, and Regulatory Trade-Off Theory. Collectively, these frameworks explain how regulatory interventions influence not only the financial strength of institutions but also the efficiency, inclusiveness, resilience, and developmental effectiveness of financial markets. Traditional prudential regulation often focuses on institutional solvency and capital adequacy. However, modern financial economics increasingly recognises that systemic stability depends not merely on the financial condition of individual institutions but also on the structure of markets, the diversity of intermediaries, the quality of liquidity, the efficiency of price discovery, and the interconnectedness of market participants (Allen & Gale, 2000; Acharya, 2009; Brunnermeier & Pedersen, 2009). Consequently, recapitalisation policies must be evaluated not only from a prudential perspective but also from a market-structure perspective.

Market Microstructure and Capital Market Efficiency

Market Microstructure Theory emerged as an important branch of financial economics to explain how securities are traded and how trading mechanisms influence market outcomes. Unlike traditional asset-pricing theories that assume frictionless markets, market microstructure focuses on the institutional processes through which information is incorporated into prices, orders are executed, liquidity is generated, and transaction costs arise.

Kyle (1985) developed one of the most influential market microstructure models by demonstrating how informed traders, liquidity traders, and market makers interact to determine price formation. His framework established that liquidity is not an automatic characteristic of markets but rather the outcome of continuous interactions among market participants. Similarly, Glosten and Milgrom (1985) showed that information asymmetry significantly influences transaction costs because market makers adjust bid-ask spreads to protect themselves against adverse selection risks. O'Hara (1995) further expanded the field by defining market microstructure as the study of the mechanisms and outcomes of trading under explicit market rules. According to O'Hara, market quality depends on several interrelated factors, including liquidity, transaction costs, transparency, information dissemination, order-flow diversity, and trading efficiency. Hasbrouck (2007) similarly demonstrates that trading systems, intermediary structures, and information flows significantly influence price discovery and market quality.

These insights are highly relevant to the Nigerian recapitalisation debate. Brokerage firms are not merely administrative intermediaries; they constitute essential components of the market's liquidity-generation mechanism. Brokers facilitate order transmission, connect buyers and sellers, support investor participation, reduce information frictions, and contribute to price discovery. Consequently, the structure and diversity of brokerage participation influence overall market efficiency. Recent market microstructure research continues to confirm the central importance of liquidity and intermediary participation in price formation. Omar (2026) finds that liquidity provision, order-flow diversity, and information transmission remain critical determinants of trading efficiency and price discovery in modern securities markets. Similarly, recent studies on market quality and liquidity demonstrate that intermediary competition improves market depth, narrows spreads, and enhances informational efficiency.

The implication for recapitalisation policy is important. If recapitalisation significantly reduces the number of active intermediaries, market concentration may increase, and order-flow diversity may decline. While larger firms may possess stronger capital bases and superior technology infrastructure, excessive concentration may reduce competition, increase transaction costs, weaken service accessibility, and diminish retail participation. Consequently, market efficiency depends not only on the strength of individual firms but also on the structure of intermediary participation. This issue is particularly relevant in frontier markets such as Nigeria, where market depth remains relatively limited. Smaller brokers frequently serve retail investors, regional investors, cooperatives, SMEs, and first-time market participants. Their contribution to liquidity may appear modest individually, but collectively they expand the investor base and support broader market participation.

Systemic Stability and Market Architecture

Systemic Stability Theory extends the analysis beyond individual institutions to the functioning of the financial system as a whole. Systemic stability refers to the ability of the

financial system to continue performing its essential functions—including trading, clearing, settlement, custody, liquidity provision, capital allocation, and price discovery—even under conditions of severe stress. Allen and Gale (2000) demonstrate that systemic risk arises primarily through interconnectedness among institutions. Financial distress can spread through direct exposures, common asset holdings, liquidity shortages, confidence effects, and network contagion. Acharya (2009) similarly argues that systemic risk is fundamentally linked to correlated exposures and common vulnerabilities rather than the failure of individual institutions alone.

Brunnermeier and Pedersen (2009) further develop this perspective by demonstrating the interaction between market liquidity and funding liquidity. Their liquidity spiral model shows that reductions in funding availability can trigger declines in market liquidity, leading to asset sales, price declines, and further liquidity deterioration. This mechanism became particularly evident during the Global Financial Crisis and has subsequently become central to contemporary systemic risk analysis. More recent international evidence reinforces these concerns. The Financial Stability Board (FSB) increasingly emphasises that systemic vulnerabilities arise not only within banking systems but also within non-bank financial intermediation sectors, including securities markets, investment funds, broker-dealers, and other market intermediaries. Recent FSB monitoring reports indicate that non-bank financial intermediaries now account for approximately half of global financial assets, significantly increasing concerns regarding interconnectedness, liquidity mismatches, leverage, and contagion risks.

Similarly, recent FSB and IOSCO policy initiatives have focused on strengthening liquidity resilience, margin preparedness, and risk management among market-based financial institutions following episodes of market stress. However, systemic importance varies substantially across categories of institutions. A central counterparty, clearing house, securities depository, custodian, or market infrastructure provider performs functions whose disruption may affect the entire market. By contrast, the failure of a small agency broker operating under segregated custody arrangements may have significantly more limited systemic implications. This distinction is particularly relevant within the Nigerian capital market. The existence of institutional safeguards such as the Central Securities Clearing System (CSCS), Direct Cash Settlement, investor protection mechanisms, electronic settlement systems, surveillance infrastructure, and client asset segregation substantially reduces the probability that the failure of an individual retail broker would trigger widespread systemic contagion. Consequently, systemic stability should be evaluated in relation to actual risk transmission channels rather than institutional size alone.

Moreover, excessive concentration itself may become a source of systemic vulnerability. If recapitalisation encourages consolidation to the point where market activity becomes heavily dependent on a few dominant institutions, systemic risk may increase rather than decline. Concentrated markets often exhibit stronger interconnectedness, greater common exposures, and higher dependence on a limited number of critical intermediaries. Therefore,

systemic stability requires a balance between institutional resilience and intermediary diversity.

Regulatory Trade-Offs and Optimal Regulatory Design

The interaction between prudential regulation and market development is best explained by Regulatory Trade-Off Theory. Regulatory interventions rarely generate benefits without costs. Policies designed to strengthen stability may reduce competition. Measures intended to enhance investor protection may increase compliance burdens. Regulations aimed at reducing risk may simultaneously restrict innovation and accessibility. The intellectual foundations of Regulatory Trade-Off Theory derive from welfare economics, information economics, and financial regulation literature. Stiglitz (1989, 2000) argues that financial regulation is necessary because financial markets are characterised by information asymmetries, externalities, and market failures. However, he also cautions that excessive regulation may create distortions capable of reducing efficiency, innovation, and market dynamism. Similarly, Barth, Caprio and Levine (2006) demonstrate that financial regulation is most effective when it strengthens market discipline and prudential oversight without unnecessarily suppressing competition, entrepreneurship, and financial development. Effective regulation therefore requires balancing multiple objectives simultaneously.

The recapitalisation debate represents a classic regulatory trade-off. Stronger capital requirements can enhance operational resilience, governance quality, cybersecurity capacity, technological investment, business continuity, and investor confidence. Better-capitalised firms are generally more capable of absorbing shocks, investing in infrastructure, and maintaining compliance systems. At the same time, excessively stringent recapitalisation requirements may generate unintended consequences. They may increase barriers to entry, accelerate market concentration, reduce intermediary diversity, weaken competition, increase operating costs, and diminish financial inclusion. Smaller intermediaries often play important roles in investor education, retail mobilisation, regional outreach, and market accessibility. Their displacement may weaken the developmental role of the capital market even while improving prudential indicators.

Recent international regulatory thinking increasingly recognises these trade-offs. IOSCO's recent work on market liquidity, retail participation, and market resilience emphasises that investor protection, market development, and systemic stability should be pursued simultaneously rather than as competing objectives. Similarly, contemporary FSB policy frameworks emphasise the principle of "same risk, same regulatory treatment," thereby promoting risk-sensitive rather than institution insensitive regulation. For emerging markets, the challenge is particularly acute because regulators must simultaneously pursue prudential strengthening and market deepening. Capital markets that remain shallow, concentrated, and inaccessible may struggle to mobilise domestic savings, broaden investment participation, and support long-term economic development. Accordingly, Regulatory Trade-Off Theory suggests that effective recapitalisation should not seek to maximise any single objective in isolation. Instead, optimal regulation should balance prudential resilience,

systemic stability, liquidity preservation, financial inclusion, intermediary diversity, investor protection, competition, and innovation. A proportionate regulatory framework capable of differentiating among institutions according to actual risk exposures offers the most effective mechanism for achieving this balance.

In summary, Market Microstructure Theory demonstrates that intermediary diversity, liquidity, and price discovery are essential determinants of market quality. Systemic Stability Theory emphasises that financial resilience depends on market architecture, interconnectedness, and concentration rather than capital adequacy alone. Regulatory Trade-Off Theory highlights the need to balance prudential objectives with market development goals. Together, these perspectives provide a strong theoretical foundation for evaluating recapitalisation as a multidimensional policy intervention that affects not only institutional strength but also market accessibility, liquidity, competition, financial inclusion, and long-term capital market development.

Integrated Conceptual Framework, Analytical Gap and Theoretical Synthesis

The preceding discussions on Financial Intermediation Theory, Financial Inclusion Theory, Risk-Based Supervision Theory, Market Microstructure Theory, Systemic Stability Theory, and Regulatory Trade-Off Theory collectively suggest that recapitalisation should be viewed as a multidimensional regulatory intervention rather than a narrow capital adequacy exercise. Although each theoretical perspective examines different aspects of financial systems, they converge on a common proposition: sustainable capital market development depends on achieving an appropriate balance between institutional resilience, investor protection, market accessibility, liquidity formation, competition, innovation, financial inclusion, and systemic stability. Historically, recapitalisation policies have been justified primarily on prudential grounds. Regulatory authorities frequently increase minimum capital requirements to strengthen institutional solvency, improve operational resilience, enhance governance standards, support technology investments, mitigate operational risks, and promote investor confidence. The underlying assumption is that larger capital bases enhance the ability of financial institutions to absorb losses and continue operating during periods of stress (Berger et al., 1995; Goodhart, 2011). This prudential perspective has strongly influenced regulatory reforms in banking, insurance, securities markets, and other financial sectors across both developed and emerging economies.

However, contemporary regulatory scholarship increasingly recognises that financial systems operate as complex adaptive networks in which institutional resilience represents only one dimension of market stability. Haldane (2012) argues that modern financial systems are characterised by intricate interconnections, feedback mechanisms, and behavioural responses that cannot be effectively managed through simplistic regulatory approaches. Similarly, Brunnermeier et al. (2013) demonstrate that financial stability depends not merely on the soundness of individual institutions but also on interactions among institutions, market structures, and regulatory frameworks. These insights imply that recapitalisation policies generate both direct and indirect effects. Direct effects include

stronger capital positions, enhanced operational capacity, improved governance arrangements, better technological infrastructure, and increased resilience to shocks. Indirect effects may include changes in market concentration, intermediary diversity, investor participation, liquidity provision, market accessibility, and competitive dynamics. Consequently, evaluating recapitalisation solely on the basis of institutional capital strength may provide an incomplete understanding of its broader developmental consequences.

Financial Intermediation Theory provides the first component of the integrated framework. According to Gurley and Shaw (1960), Goldsmith (1969), Diamond (1984), and Levine (1997, 2005), financial intermediaries perform critical economic functions that facilitate capital mobilisation, information production, transaction efficiency, risk management, and resource allocation. Within securities markets, brokerage firms, dealer firms, custodians, registrars, asset managers, and other intermediaries facilitate investor participation and support market development. From this perspective, recapitalisation influences not only institutional solvency but also the capacity of intermediaries to perform their developmental functions. Financial Inclusion Theory contributes a second dimension to the framework. Beck et al. (2007), Demirgüç-Kunt et al. (2018), Sahay et al. (2020), and Ozili (2021) demonstrate that broad access to financial services contributes to economic growth, poverty reduction, wealth accumulation, and financial resilience. Applied to capital markets, financial inclusion extends beyond access to bank accounts and encompasses participation in securities markets, collective investment schemes, public offerings, pension products, and other long-term investment opportunities. Consequently, regulatory reforms that significantly alter intermediary structures may affect investor access and participation, particularly among retail and underserved investor segments.

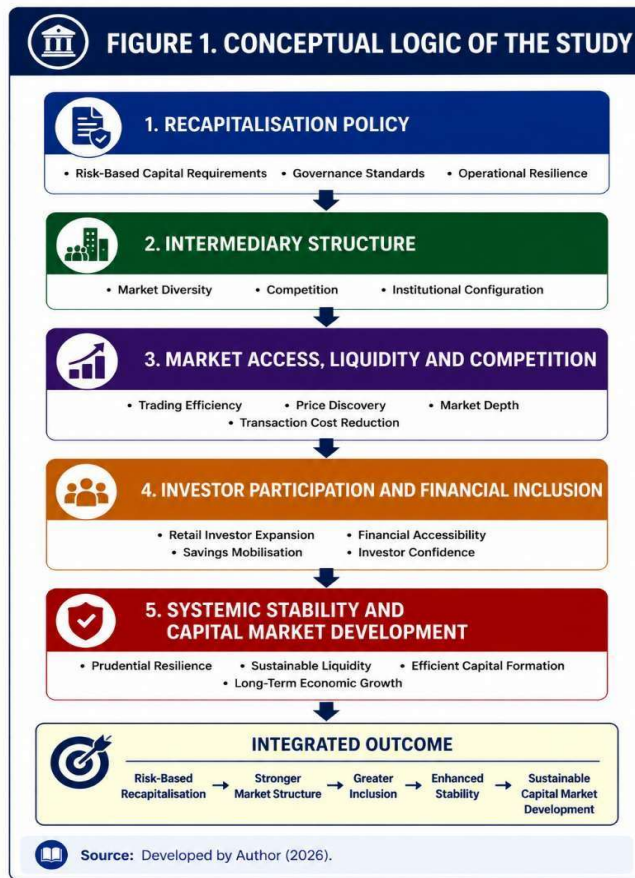
Risk-Based Supervision Theory provides the third component of the framework. The Basel Committee on Banking Supervision (BCBS, 2021), IOSCO (2023), and the Financial Stability Board (2024) increasingly advocate supervisory systems that align regulatory requirements with institutional risk profiles, systemic importance, complexity, and interconnectedness. Risk-based supervision rejects the notion that identical institutions should be regulated identically and instead promotes the principle that regulatory intensity should reflect actual risk generation. This perspective suggests that recapitalisation requirements should vary according to institutional functions, activities, leverage, client asset exposure, and systemic relevance.

Market Microstructure Theory contributes a fourth dimension. Kyle (1985), Glosten and Milgrom (1985), O'Hara (1995), Hasbrouck (2007), and Easley et al. (2012) demonstrate that liquidity, price discovery, transaction efficiency, and market quality depend critically on the structure and diversity of market participants. Intermediaries play central roles in transmitting information, facilitating trades, reducing transaction costs, and supporting market liquidity. Consequently, recapitalisation policies that significantly alter intermediary structures may affect market quality, liquidity provision, and price efficiency.

Systemic Stability Theory introduces a fifth dimension. Allen and Gale (2000), Acharya (2009), Brunnermeier and Pedersen (2009), Adrian and Brunnermeier (2016), and the Financial Stability Board (2024) argue that systemic stability depends on interconnectedness, concentration, leverage, liquidity conditions, and institutional substitutability. Systemic importance is therefore determined not merely by institutional size but by the role an institution performs within the broader financial system. This perspective implies that prudential requirements should be calibrated according to systemic significance rather than applied uniformly across heterogeneous institutions.

Finally, Regulatory Trade-Off Theory provides the integrating mechanism linking the preceding perspectives. Stiglitz (2000), Barth et al. (2006), Avgouleas and Goodhart (2015), and Herring and Carmassi (2016) argue that financial regulation inevitably involves balancing competing objectives. Measures designed to enhance stability may reduce competition. Policies intended to strengthen investor protection may increase compliance costs. Regulations aimed at reducing risk may unintentionally restrict innovation, market access, and financial inclusion. Effective regulation therefore requires balancing prudential objectives with developmental goals. Taken together, these theoretical perspectives suggest that recapitalisation generates multiple transmission channels. First, recapitalisation directly influences institutional resilience by strengthening capital adequacy, governance capacity, technological capability, compliance infrastructure, and operational sustainability. Second, recapitalisation influences intermediary structure by affecting entry barriers, market concentration, competitive dynamics, and institutional diversity. Third, changes in intermediary structure affect liquidity formation, transaction efficiency, market accessibility, and investor participation. Fourth, these outcomes collectively influence market confidence, financial inclusion, systemic resilience, and long-term capital market development.

The conceptual logic underlying the proposed framework is illustrated in Figure 1. The sequence in Figure 1 highlights the central proposition of the paper: recapitalisation should not be evaluated solely by reference to capital adequacy outcomes. Rather, its effectiveness should be assessed in terms of its ability to strengthen institutional resilience while simultaneously preserving intermediary diversity, market accessibility, competition, liquidity, investor participation, and systemic stability.



The integrated framework developed in this study therefore proposes that optimal recapitalisation policy emerges from the interaction of six regulatory objectives: capital adequacy, risk sensitivity, market inclusion, liquidity preservation, competition, and investor protection. These relationships may be represented conceptually as:

$$OR = f(CA, RS, MI, LQ, CP, IP) \quad (1) \text{ where:}$$

OR = Optimal Regulation;

CA = Capital Adequacy;

RS = Risk Sensitivity;

MI = Market Inclusion;

LQ = Liquidity Preservation;

CP = Competition;

IP = Investor Protection.

The framework implies that no single objective should dominate regulatory design. Excessive emphasis on capital adequacy may weaken inclusion and competition, while excessive emphasis on inclusion may undermine prudential resilience. Sustainable regulatory outcomes therefore require simultaneous consideration of all six dimensions.

Analytical Gap in Existing Literature

Despite extensive literature on recapitalisation and prudential regulation, several important gaps remain. First, the recapitalisation literature is heavily dominated by banking-sector studies. Research by Berger and Bouwman (2013), Demirgüç-Kunt et al. (2013), and numerous subsequent studies focuses primarily on banks, deposit-taking institutions, and systemic banking crises. Comparatively little attention has been devoted to recapitalisation within securities-market intermediation, particularly in emerging and frontier markets. Second, existing studies frequently assume that stronger capital requirements automatically improve financial stability. Relatively limited attention has been paid to the potential effects of recapitalisation on intermediary diversity, market accessibility, competition, and investor participation. Consequently, the broader developmental implications of recapitalisation remain insufficiently understood.

Third, the literature on capital market development and financial inclusion has generally evolved separately from the prudential regulation literature. Studies of financial inclusion typically focus on access to banking services, digital payments, microfinance, and mobile money, while prudential regulation studies concentrate on capital adequacy and supervisory frameworks. Few studies integrate these perspectives within a unified analytical framework. Fourth, existing regulatory discussions often fail to distinguish adequately among categories of capital market operators with significantly different risk profiles. Small agency brokers, proprietary traders, custodians, clearing members, market makers, and market infrastructure providers frequently perform fundamentally different functions and generate different levels of systemic risk. Yet many regulatory frameworks continue to rely heavily on uniform prudential requirements. Fifth, there remains limited scholarly work examining how recapitalisation affects market microstructure outcomes such as liquidity, transaction costs, investor access, intermediary concentration, and price discovery. This gap is particularly pronounced within African capital markets where empirical and conceptual research remains relatively limited.

The present study seeks to address these gaps by developing an integrated framework that simultaneously incorporates prudential resilience, risk sensitivity, financial inclusion, market microstructure, competition, investor protection, and systemic stability. Unlike existing studies that focus narrowly on capital adequacy, this paper conceptualises recapitalisation as a multidimensional market-structure intervention capable of influencing both prudential and developmental outcomes. Accordingly, the proposed Nigerian Risk-Based Recapitalisation Framework contributes to the literature by providing a theoretically grounded, policy-oriented, and development-sensitive approach to recapitalisation that

aligns prudential requirements with actual risk profiles while preserving intermediary diversity, financial inclusion, market efficiency, and systemic stability.

RECAPITALISATION, RETAIL PARTICIPATION AND FINANCIAL INCLUSION IN THE NIGERIAN CAPITAL MARKET

Retail investor participation constitutes one of the most important indicators of capital market development. While institutional investors contribute significantly to market liquidity and capital formation, broad-based retail participation remains essential for promoting financial inclusion, enhancing market depth, strengthening domestic savings mobilisation, improving market resilience, and supporting long-term economic development. Contemporary capital market development strategies increasingly recognise that sustainable financial systems require active participation by households, small investors, cooperatives, microenterprises, and other non-institutional market participants.

The importance of retail participation has become even more pronounced following recent global efforts to democratise finance through digital trading platforms, fintech innovations, online investment services, fractional investing mechanisms, mobile investment applications, and enhanced investor education programmes. Recent initiatives by the International Organization of Securities Commissions (IOSCO), the World Bank, the OECD, and several national regulators emphasise that inclusive capital markets contribute to economic growth, wealth creation, and financial resilience. Retail investors are increasingly recognised not merely as market participants but as important contributors to market efficiency, liquidity formation, investor diversification, and financial stability. Against this backdrop, the recapitalisation of capital market operators raises important questions regarding the future structure of intermediary participation, investor access, financial inclusion, and market development within the Nigerian capital market.

Retail Participation and Capital Market Development

The relationship between retail participation and capital market development has attracted significant scholarly attention over the past three decades. Levine (1997, 2005) argues that financial development promotes economic growth by facilitating savings mobilisation, capital allocation, risk diversification, and investment efficiency. These functions are strengthened when participation extends beyond large institutional investors to include households and small investors. Similarly, Beck et al. (2007), Demirgüç-Kunt et al. (2018), and Sahay et al. (2020) demonstrate that broad access to financial services contributes significantly to economic inclusion, poverty reduction, wealth accumulation, and economic resilience. Although much of this literature focuses on banking services, the underlying principles apply equally to capital markets because access to investment opportunities represents an important dimension of financial inclusion.

Recent evidence from the World Bank continues to emphasise that deep and resilient capital markets are critical for mobilising long-term financing required for infrastructure

development, housing, healthcare, industrialisation, and economic transformation. The World Bank further argues that diversified investor participation contributes to market resilience and sustainable economic development. Emerging-market evidence similarly highlights the developmental importance of retail participation. Recent OECD studies indicate that low retail investor participation continues to constrain market depth and liquidity across several emerging economies despite significant progress in financial sector development. Retail participation remains a key determinant of market accessibility, domestic ownership, and long-term capital market sustainability.

The experience of advanced capital markets also demonstrates the growing importance of retail investors. Following the COVID-19 pandemic, retail participation increased significantly across many global markets, driven by digital trading platforms, lower transaction costs, financial technology innovations, and increased investor awareness. IOSCO reports indicate that retail participation has become an increasingly important feature of modern capital markets, requiring regulators to balance investor protection with market accessibility. These developments suggest that capital market development should not be evaluated solely through market capitalization, trading volume, or institutional participation. Rather, sustainable development requires broad-based participation capable of supporting market depth, liquidity, and resilience over time.

Financial Inclusion and Capital Market Accessibility

Financial inclusion has traditionally been associated with access to banking services, payment systems, credit facilities, and insurance products. However, recent literature increasingly recognises capital market participation as an important dimension of inclusive finance. Ozili (2021) argues that financial inclusion should be understood as the ability of individuals and businesses to access, utilise, and benefit from formal financial services and investment opportunities. Similarly, Demirgüç-Kunt et al. (2018) maintain that true financial inclusion extends beyond account ownership to encompass meaningful participation in financial markets and wealth-building activities.

Within this broader framework, capital market inclusion refers to the ability of individuals to invest in equities, bonds, exchange-traded funds, mutual funds, pension products, infrastructure funds, and other investment instruments. Capital market participation allows households to benefit from long-term economic growth, corporate profitability, and wealth accumulation while simultaneously providing productive sectors with access to long-term finance. Recent World Economic Forum research similarly emphasises the importance of expanding retail participation in capital markets as part of broader efforts to democratise investment opportunities and promote financial inclusion. Retail investors increasingly demand accessible, transparent, affordable, and technology-enabled investment platforms capable of facilitating participation in capital markets.

The World Bank further notes that many frontier and emerging markets continue to face significant challenges relating to investor participation, market accessibility, and financial

deepening. Limited participation reduces market depth, weakens liquidity, and constrains the developmental contribution of capital markets. Consequently, regulatory reforms affecting intermediary structures must be evaluated partly in terms of their implications for financial inclusion and market accessibility.

The Strategic Role of Capital Market Intermediaries

Capital market operators perform critical functions that extend far beyond trade execution. Brokerage firms facilitate investor onboarding, investment advisory services, investor education, order execution, portfolio management, securities registration, dividend processing, and post-trade services. They also serve as important channels through which first-time investors gain access to capital markets. Diamond (1984) argues that financial intermediaries reduce information asymmetries and transaction costs by performing specialised monitoring and information-processing functions. Allen and Santomero (1997) similarly contend that intermediaries enhance financial efficiency by facilitating market participation and reducing barriers to investment.

Within the Nigerian context, many small and medium-sized brokerage firms play important roles in expanding investor access beyond major urban centres. These firms frequently maintain relationships with retail investors, cooperatives, small businesses, professional associations, and local investment clubs. Their activities contribute to investor education, financial literacy, and market penetration. Recent IOSCO assessments continue to emphasise the importance of intermediary networks in supporting retail investor participation and investor protection, particularly within increasingly digital investment environments. The rapid growth of online trading platforms has improved accessibility while simultaneously increasing the importance of effective intermediary oversight and investor education. Consequently, the structure and diversity of capital market intermediaries represent important determinants of market accessibility and financial inclusion.

Recapitalisation and Intermediary Diversity

A central issue within the recapitalisation debate concerns its potential effects on intermediary diversity. While stronger capital requirements may improve institutional resilience, excessively stringent requirements may also reduce the number of active market participants. Theoretical contributions from Barth et al. (2006), Herring and Carmassi (2016), and Avgouleas and Goodhart (2015) suggest that regulatory interventions often generate trade-offs between stability and competition. Higher capital requirements may strengthen institutional resilience while simultaneously increasing barriers to entry and accelerating market concentration. Within securities markets, intermediary diversity contributes to competition, innovation, market accessibility, and investor choice. Different categories of intermediaries serve different investor segments and perform different functions. Large integrated broker-dealers may specialise in institutional transactions and

capital raising activities, while smaller firms often focus on retail participation, local market development, and investor outreach.

If recapitalisation requirements disproportionately affect smaller intermediaries, the resulting reduction in intermediary diversity may weaken investor access, particularly among underserved investor groups. This outcome could undermine broader financial inclusion objectives even if prudential indicators improve. Recent international evidence similarly suggests that maintaining diversity within intermediary ecosystems contributes to market resilience, investor participation, and long-term market development. OECD and World Bank analyses increasingly emphasise the importance of balancing prudential objectives with market development goals.

Retail Participation, Liquidity and Market Resilience

Market microstructure literature demonstrates that retail participation contributes significantly to liquidity formation and market resilience. Kyle (1985), O'Hara (1995), and Hasbrouck (2007) show that market quality depends critically on the diversity of trading activity and the availability of liquidity providers. Recent empirical studies continue to demonstrate the growing influence of retail investors on market dynamics. Research indicates that retail investor flows contribute significantly to market liquidity, trading activity, and information incorporation. Retail participation also reduces excessive dependence on institutional investors and foreign portfolio flows. Furthermore, recent evidence suggests that domestic investor participation may enhance market resilience during periods of external shocks by providing a more stable source of demand than volatile foreign portfolio flows. Although domestic participation is not without risks, broader investor participation generally contributes to stronger market foundations and greater financial resilience. For frontier markets such as Nigeria, this issue assumes particular significance because foreign portfolio flows often exhibit substantial volatility. Strengthening domestic retail participation may therefore contribute to greater market stability and reduced vulnerability to external shocks.

Implications for the Nigerian Capital Market

The preceding analysis suggests that recapitalisation should be evaluated through both prudential and developmental lenses. From a prudential perspective, stronger capital requirements may improve operational resilience, governance quality, cybersecurity preparedness, technological capability, and investor confidence. These outcomes are important and consistent with global regulatory trends. However, from a developmental perspective, recapitalisation may also influence intermediary diversity, market accessibility, competition, investor participation, liquidity formation, and financial inclusion. Consequently, the effectiveness of recapitalisation should not be assessed solely on the basis of capital adequacy outcomes. The Nigerian capital market currently faces the dual challenge of strengthening institutional resilience while simultaneously expanding investor

participation and deepening market development. Regulatory reforms that improve prudential resilience without undermining market accessibility are therefore likely to generate the most sustainable outcomes.

This consideration provides a strong justification for adopting a proportional and risk-sensitive recapitalisation framework that aligns prudential requirements with actual risk exposures rather than applying uniform standards across heterogeneous categories of market operators. Such an approach would strengthen institutional resilience while preserving intermediary diversity, retail participation, financial inclusion, market liquidity, and long-term capital market development. Accordingly, the evidence reviewed in this section supports the central proposition of this paper: recapitalisation should be designed not merely as a prudential intervention but as a developmental policy instrument capable of simultaneously promoting investor protection, market accessibility, financial inclusion, liquidity formation, competition, and systemic stability.

PROPORTIONAL REGULATION AND SYSTEMIC STABILITY

The pursuit of systemic stability has become one of the dominant objectives of contemporary financial regulation. Since the Global Financial Crisis (GFC) of 2007–2009, regulators across the world have increasingly strengthened prudential standards, enhanced supervisory frameworks, expanded capital requirements, and intensified oversight of financial institutions. These reforms have been driven by the recognition that financial instability can generate substantial economic costs through disruptions to credit allocation, investment activity, capital formation, employment, and economic growth (Acharya, 2009; Claessens & Kose, 2013; Brunnermeier, 2016). Within securities markets, the quest for systemic stability has similarly encouraged regulators to strengthen operational resilience, governance standards, cyber-security preparedness, risk management systems, liquidity arrangements, and capital adequacy requirements. However, recent regulatory scholarship increasingly argues that systemic stability cannot be achieved solely through the application of uniform prudential requirements. Rather, stability depends on the interaction between institutional resilience, market structure, liquidity conditions, intermediary diversity, market infrastructure, investor behaviour, and regulatory architecture (Allen & Gale, 2000; Haldane, 2012; Avgouleas & Goodhart, 2015).

Consequently, an important question arises within the Nigerian recapitalisation debate: should all categories of capital market operators be subject to identical prudential requirements, or should regulatory obligations be calibrated according to institutional risk profiles and systemic significance? This question lies at the heart of proportional regulation.

Conceptualising Systemic Stability in Capital Markets

Systemic stability refers to the ability of a financial system to continue performing its essential functions despite adverse shocks, market stress, operational disruptions,

institutional failures, or periods of heightened uncertainty (Allen & Gale, 2000; Schinasi, 2004; FSB, 2024).

Unlike traditional prudential regulation, which focuses on individual institutions, systemic stability focuses on the resilience of the financial system as a whole.

According to Schinasi (2004), a financially stable system should be capable of:

- Facilitating efficient resource allocation.
- Managing and pricing risks appropriately.
- Absorbing financial shocks.
- Supporting sustainable economic activity.

Similarly, the Financial Stability Board (FSB, 2024) defines financial stability as the capacity of the financial system to withstand disruptions while continuing to provide essential financial services. Recent FSB assessments further emphasise that systemic vulnerabilities increasingly originate from both banks and non-bank financial intermediaries, including broker-dealers, investment funds, clearing institutions, and securities markets. Within capital markets, systemic stability depends upon Market liquidity; Trading continuity; Settlement efficiency; Custody integrity; Market confidence; Investor protection; Operational resilience; Cyber-security preparedness; and Institutional diversity. Therefore, stability extends far beyond capital adequacy alone.

Systemic Risk and Capital Market Operators

The literature on systemic risk suggests that not all financial institutions pose identical threats to financial stability. Allen and Gale (2000) demonstrate that systemic crises emerge primarily through interconnectedness and contagion mechanisms rather than through isolated institutional failures. Similarly, Acharya (2009) argues that systemic importance depends on the extent to which an institution contributes to aggregate financial risk rather than its individual probability of failure. Adrian and Brunnermeier (2016) further developed the concept of CoVaR, demonstrating that systemic risk should be evaluated according to the contribution of individual institutions to system-wide distress. In securities markets, institutions differ substantially in terms of Activities performed; Client asset exposure; Trading activities; Leverage; Market interconnectedness; and Operational complexity. Consequently, a small retail broker executing agency transactions may generate significantly different systemic risks from a clearing institution, securities depository, market-maker, proprietary trading firm, or central counterparty. Table 1 illustratively shows the systematic risk characteristics of capital market operators.

Table 1: Illustrative Systemic Risk Characteristics of Capital Market Operators

Operator Category	Primary Activity	Systemic Importance	Prudential Intensity
Central Securities Depository	Settlement and custody	Very High	Very High
Clearing Members	Clearing and settlement	High	High
Market Makers	Liquidity provision	High	High
Proprietary Traders	Trading risk assumption	Moderate-High	High
Broker-Dealers	Agency and proprietary activities	Moderate	Moderate
Pure Agency Brokers	Trade execution only	Low	Moderate-Low
Investment Advisers	Advisory functions	Low	Low
Registrars	Record keeping	Low	Moderate

Source: Adapted from IOSCO (2023), ESMA (2024), and FSB (2024).

Recent IOSCO and FSB policy papers increasingly acknowledge this distinction and advocate risk-sensitive supervisory frameworks that focus regulatory attention on institutions whose activities generate the greatest systemic implications.

The Emergence of Proportional Regulation

Proportional regulation has emerged as one of the most influential developments in modern financial regulation. The principle originates from the recognition that identical regulatory requirements may generate inefficient outcomes when applied to institutions with different risk profiles, business models, and systemic significance (Goodhart, 2011; Haldane, 2012). According to Avgouleas and Goodhart (2015), proportional regulation requires supervisory obligations to be aligned with size, complexity, risk profile, interconnectedness, and Systemic relevance. Similarly, Herring and Carmassi (2016) argue that systemic importance should be evaluated using multiple criteria rather than relying exclusively on institutional size. Recent international regulatory reforms have strongly embraced proportionality. The European Union’s Investment Firms Regulation (IFR) and Investment Firms Directive (IFD) classify firms according to risk exposure and systemic significance rather than imposing identical prudential requirements across all investment firms. Recent reviews by the European Banking Authority and ESMA reaffirm proportionality as a cornerstone of investment-firm supervision. Likewise, IOSCO increasingly advocates activity-based and risk-sensitive supervision as a mechanism for strengthening investor protection while preserving market efficiency and accessibility.

Figure 2: Evolution of Prudential Regulation



Source: Author's adaptation from Goodhart (2011), Haldane (2012), IOSCO (2023), and FSB (2024).

Proportional Regulation and Recapitalisation

The application of proportional regulation to recapitalisation implies that capital requirements should be linked to actual risk generation rather than institutional labels alone. This principle is consistent with the regulatory maxim:

“Same activity, same risk, same regulatory outcome.”

Recent FSB policy initiatives increasingly support this principle within non-bank financial intermediation. Under a proportional recapitalisation framework:

- Tier I Institutions, Systemically important entities, which include Clearing members; Market makers; Proprietary traders; Custodians; and Securities lenders, require the highest capital requirements, liquidity standards, stress testing and enhanced governance.
- Tier II Institutions, Moderately significant operators, which include broker-dealers; Institutional brokers; and Underwriters, require intermediate prudential requirements.
- Tier III Institutions, Low-risk entities, which include pure agency brokers; Retail-focused brokers; and Investment advisers, require lower capital requirements; strong conduct regulation; technology standards; and cybersecurity obligations.

Table 2: Proposed Risk-Based Prudential Classification Framework

Tier	Operator Type	Risk Profile	Capital Intensity
Tier I	Market Infrastructure & High-Risk Intermediaries	Very High	Very High
Tier II	Diversified Broker-Dealers	Moderate	Moderate
Tier III	Agency Brokers and Advisers	Low	Moderate-Low

Source: Author's Framework (2026).

Risk Heterogeneity and Regulatory Design

A central justification for proportional regulation is the existence of risk heterogeneity among financial institutions. Systemic Risk Theory emphasises that institutions differ substantially in their capacity to generate contagion effects, liquidity disruptions and market instability (Acharya, 2009; Adrian & Brunnermeier, 2016). Within capital markets, institutions perform a wide range of activities including: Brokerage services; Proprietary trading; Market making; Custodial services; Settlement and clearing; Fund management; Investment advisory; and Securities underwriting. Each activity generates distinct risks and therefore requires different regulatory responses. For example, the failure of a major clearing institution may disrupt settlement systems and threaten market stability, whereas the failure of a small retail-focused brokerage firm may have limited systemic consequences. Similarly, market makers generate liquidity-related risks that differ significantly from those associated with registrars or investment advisers.

Risk heterogeneity therefore implies that uniform capital requirements may not provide the most efficient approach to prudential regulation. Institutions generating higher risks should be subject to stronger requirements than those generating lower risks.

Proportional Regulation and System Stability

A common misconception is that proportional regulation weakens financial stability by imposing lower requirements on some institutions. In reality, proportional regulation seeks to strengthen stability by concentrating regulatory intensity where risks are greatest. The literature increasingly supports this perspective. Acharya (2009) argues that systemic stability depends on identifying and regulating institutions capable of generating broader market disruptions. Similarly, the Financial Stability Board (2024) emphasises that effective supervision requires differentiation according to systemic relevance.

Proportional regulation enhances stability through several mechanisms:

- Improved Risk Allocation
- Regulatory resources are directed toward higher-risk institutions and activities.
- Enhanced Compliance

- Institutions face requirements that are more closely aligned with their operational realities.
- Reduced Regulatory Distortion
- Lower-risk institutions are not subjected to excessive burdens that may discourage participation.
- Preservation of Diversity
- Intermediary diversity contributes to resilience by reducing dependence on a small number of dominant institutions.
- Consequently, proportional regulation can strengthen both stability and market development simultaneously.

International Experience with Proportional Regulation

International regulatory reforms increasingly reflect proportionality principles.

United Kingdom: The Financial Conduct Authority (FCA) and Prudential Regulation Authority employ risk-based supervisory approaches that differentiate institutions according to complexity, size and systemic relevance (FCA, 2024).

European Union: The Investment Firms Regulation (IFR) and Investment Firms Directive (IFD) represent one of the most advanced examples of proportional regulation. Capital requirements are linked to risk-generating activities rather than institutional labels (ESMA, 2024; Ferran, 2021).

Singapore: The Monetary Authority of Singapore integrates proportionality into technology governance, operational resilience and prudential supervision (MAS, 2024).

India: The Securities and Exchange Board of India adopts differentiated requirements for institutions with varying market functions and risk profiles (Narayan & Sharma, 2023). These experiences demonstrate that proportional regulation has become an important feature of contemporary financial regulation.

Proportional Regulation, Competition and Financial Inclusion

The relationship between proportional regulation and financial inclusion is particularly important for emerging markets. Financial inclusion literature emphasises the importance of preserving diverse access channels within financial systems (Beck et al., 2007; Demirgüç-Kunt et al., 2018; Ozili, 2021). Uniform regulatory escalation may unintentionally eliminate smaller intermediaries that play important roles in:

- Retail investor mobilisation;
- Regional market penetration;
- Investor education;
- SME financing;
- Relationship-based financial services.

Proportional regulation mitigates these risks by allowing institutions to remain viable while maintaining appropriate prudential standards. The approach therefore supports both financial inclusion and market accessibility without compromising investor protection.

Relevance for the Nigerian Capital Market

The Nigerian capital market provides a compelling case for proportional regulation. Capital market operators differ substantially in terms of operational complexity, systemic importance, technological capacity and market functions. The SEC recapitalisation framework seeks to strengthen resilience and investor confidence. However, the analysis in Section 3 suggests that uniform capital escalation may also influence intermediary diversity, competition and financial inclusion. Proportional regulation provides a mechanism for reconciling these objectives. By aligning prudential requirements with institutional risk profiles, regulators can strengthen resilience while preserving competition, accessibility and market development. The approach is therefore particularly relevant for Nigeria as it seeks to modernise its capital market while promoting broader participation and sustainable growth.

Synthesis

This section has examined the evolution of prudential regulation and the growing importance of proportional supervisory frameworks. The evidence reviewed in the section suggests that systemic stability is a multidimensional concept that extends beyond capital adequacy to encompass liquidity, operational resilience, market integrity, investor protection, and financial confidence. The literature further demonstrates that financial institutions generate heterogeneous risks and, as such, systemic importance varies significantly across categories of capital market operators. Consequently, identical prudential requirements may not always generate optimal regulatory outcomes. The analysis demonstrates that and therefore require differentiated regulatory treatment. Proportional regulation offers a practical solution by aligning regulatory obligations with actual risk profiles, institutional complexity, and systemic significance. Such an approach strengthens prudential resilience while preserving intermediary diversity, competition, market accessibility, financial inclusion, and long-term capital market development. International experience increasingly supports proportional and risk-based approaches as mechanisms for balancing stability, competition, innovation and financial inclusion.

For Nigeria, proportional regulation offers a practical pathway for strengthening institutional resilience without undermining intermediary diversity and market accessibility. These insights provide the conceptual bridge to the detailed analysis of the SEC recapitalisation framework presented in the next section and ultimately underpin the proposed Nigerian Risk-Based Recapitalisation Framework developed later in the paper.

RECAPITALISATION, CAPITAL REQUIREMENTS AND MARKET

STRUCTURE DYNAMICS IN THE NIGERIAN CAPITAL MARKET

Overview of the SEC Recapitalisation Framework

Recapitalisation represents one of the most important prudential instruments available to financial regulators for strengthening institutional resilience, protecting investors and preserving financial stability. Across financial systems, recapitalisation exercises are typically introduced to improve operational capacity, enhance governance standards, support technological modernisation, strengthen market confidence and reduce the probability of institutional failure (Berger et al., 1995; Basel Committee on Banking Supervision, 2011; IOSCO, 2024). Within the Nigerian capital market, the Securities and Exchange Commission (SEC) introduced revised minimum capital requirements for capital market operators as part of a broader strategy aimed at repositioning the market for greater resilience, competitiveness and long-term sustainability. The initiative reflects growing concerns regarding the adequacy of historical capital thresholds in an environment characterised by inflationary pressures, exchange-rate depreciation, rising compliance costs, technological transformation, cyber-security risks and increasing operational complexity.

The prudential rationale underlying the SEC framework is broadly consistent with international regulatory trends. IOSCO (2018, 2024), the Financial Stability Board (FSB, 2024), the Monetary Authority of Singapore (MAS, 2024) and the Financial Conduct Authority (FCA, 2024) increasingly emphasise the importance of institutional resilience, operational continuity, technology governance and investor protection. Consequently, recapitalisation is no longer viewed solely as a mechanism for strengthening solvency but as part of a broader prudential architecture designed to support sustainable market development. However, recapitalisation also generates broader structural consequences. Beyond strengthening institutional balance sheets, capital requirements influence intermediary diversity, competition, market accessibility, liquidity provision and long-term market structure. As discussed in Section 3, these effects are particularly important for retail participation and financial inclusion. Similarly, Section 4 demonstrated that proportional regulation has emerged internationally as a mechanism for balancing resilience with market development. The SEC recapitalisation framework must therefore be evaluated not only from a prudential perspective but also in terms of its implications for market structure and financial development.

Capital Requirements of Regulated Entities

The Nigerian capital market comprises a wide range of regulated entities performing diverse operational, transactional, fiduciary, advisory, custodial, underwriting, and market-making functions. These entities differ substantially in operational complexity, proprietary exposure, liquidity obligations, settlement responsibilities, client asset concentration, technological dependence, and systemic relevance. Consequently, capital requirements imposed on these

entities should ideally reflect the nature and scale of the risks they generate within the broader financial system. The Securities and Exchange Commission (SEC), as the apex regulatory authority of the Nigerian capital market, periodically reviews minimum capital requirements for regulated entities in response to inflationary pressures, exchange-rate depreciation, technological modernisation, cyber-security demands, operational risks, governance concerns, and international regulatory developments. The revised 2026 capital requirements therefore represent an important attempt to reposition the Nigerian capital market toward stronger prudential resilience and operational capacity.

The revised capital requirements presented in Table 3 demonstrate a significant upward adjustment across virtually all categories of regulated entities. The increases reflect regulators' concerns regarding the adequacy of existing capital structures in an increasingly complex and technologically driven financial environment. A major observation from Table 3 is that the revised framework appears to place stronger emphasis on operational resilience, investor protection, technology capacity, and systemic stability. First, institutions performing functions with broader systemic implications attract significantly higher capital requirements. Custodians, market makers and broker-dealers face some of the largest increases because their activities affect liquidity provision, settlement processes, asset safekeeping and market continuity. Second, the revised framework reflects increasing recognition of technology-related risks. Modern capital market operations require substantial investments in cybersecurity systems, digital trading infrastructure, cloud-based platforms, artificial intelligence applications, data management systems and operational resilience mechanisms (Arner et al., 2023; MAS, 2024; OECD, 2024).

Third, the revised requirements may generate different effects across categories of operators. Larger institutions may possess greater capacity to raise additional capital, whereas smaller firms may experience stronger compliance pressures. This raises important questions regarding competition, concentration and intermediary diversity. These observations underscore the need to evaluate recapitalisation not only in terms of institutional resilience but also in terms of broader market-structure implications.

Table 3: 2026 SEC Revised Minimum Capital Requirements for Regulated Entities in the Nigerian Capital Market

S/N	Regulated Entity	Previous Minimum Capital	Revised 2026 Requirement	Primary Regulatory Rationale
1	Broker/Dealer	₦300 Million	₦2 Billion	Combined agency and proprietary market risks
2	Broker	₦200 Million	₦1 Billion	Operational resilience and investor protection
3	Dealer	₦100 Million	₦500 Million	Proprietary trading and market exposure
4	Issuing House	₦150 Million	₦1 Billion	Underwriting and issuance risk
5	Underwriter	₦100 Million	₦1 Billion	Risk absorption capacity
6	Registrar	₦150 Million	₦500 Million	Data management and operational continuity
7	Custodian	₦300 Million	₦3 Billion	Safekeeping of client assets
8	Fund/Portfolio Manager	₦150 Million	₦500 Million	Fiduciary and operational risk
9	Trustee	₦40 Million	₦300 Million	Fiduciary obligations
10	Rating Agency	₦20 Million	₦500 Million	Analytical credibility and governance
11	Market Maker	₦40 Million	₦2 Billion	Liquidity provision and systemic importance
12	Clearing/Settlement Institution	Regulatory Determination	Higher Risk Based Threshold	Systemic settlement obligations

Source: Adapted from SEC Recapitalisation Framework (2026)

Broker-dealers also face significant increases owing to the combination of agency functions and proprietary market exposures. Unlike pure agency brokers, broker-dealers may assume direct market positions and are therefore exposed to market, liquidity, and operational risks capable of generating broader market consequences. Underwriters, issuing houses, and fund managers similarly perform functions involving risk absorption, fiduciary responsibility, and market confidence, thereby justifying stronger prudential expectations. While the prudential rationale underlying these revisions is understandable, the revised framework also raises important policy questions concerning competition, intermediary diversity, financial inclusion, and market accessibility. The magnitude of the increases may create substantial capital-raising pressures for smaller operators, particularly retail-focused brokerage firms with limited proprietary exposure. Such institutions often play important roles in investor mobilisation, regional market penetration, financial literacy development, and retail market participation. Excessively stringent capital requirements may therefore encourage mergers, acquisitions, market exits, or industry consolidation, potentially reducing intermediary diversity within the market.

This concern highlights the broader regulatory challenge of balancing prudential resilience with competitive market development. Although stronger capitalisation may improve institutional strength and investor confidence, excessive concentration may increase systemic importance among a smaller number of dominant institutions. The resulting trade-off between resilience and diversity has become a central theme within contemporary regulatory debates (Acharya, 2009; Brunnermeier & Pedersen, 2009; IOSCO, 2024).

The SEC framework therefore raises a fundamental question: should all capital market operators be subject to similar prudential escalation regardless of differences in risk exposure, business model, systemic importance, and operational complexity? Increasingly, international regulatory practice suggests that effective prudential regulation requires differentiation based on risk characteristics rather than uniform application of capital standards. This issue provides the foundation for the subsequent discussion of risk heterogeneity and the case for risk-based recapitalisation within the Nigerian capital market.

Prudential Rationale for Recapitalisation

Recapitalisation is fundamentally a prudential regulatory intervention designed to strengthen the capacity of financial institutions to absorb shocks, maintain operational continuity, and protect investors under conditions of uncertainty. Prudential theory suggests that adequately capitalised institutions are less vulnerable to financial distress and therefore better positioned to withstand market volatility, operational disruptions, technological failures, liquidity pressures, and governance weaknesses (Berger et al., 1995; Acharya, 2009). Within capital markets, capital serves not only as a financial buffer but also as a signal of institutional strength, credibility, and resilience. The traditional justification for recapitalisation derives from the capital adequacy principle, which argues that institutions should maintain sufficient financial resources to absorb unexpected losses without compromising their obligations to clients, counterparties, and the broader financial system. Capital therefore performs both a loss-absorption function and a confidence-building function. As Diamond and Dybvig (1983) and Allen and Santomero (1997) observe, confidence in financial institutions is essential for maintaining market participation and preserving the stability of financial intermediation.

In contemporary financial markets, however, the prudential rationale for recapitalisation has expanded considerably beyond solvency considerations. Financial institutions are increasingly expected to maintain sophisticated technology infrastructure, cyber-security capabilities, operational resilience frameworks, data governance systems, business continuity arrangements, and regulatory compliance mechanisms. The growing digitalisation of securities trading and post-trade operations means that institutional failures may arise not only from financial weaknesses but also from operational and technological vulnerabilities (IOSCO, 2024; OECD, 2024). Consequently, modern prudential regulation increasingly links recapitalisation to operational resilience. Stronger capital bases enable institutions to invest in cybersecurity architecture, artificial intelligence monitoring systems,

cloud-based infrastructure, disaster recovery capabilities, and technology governance frameworks. These investments are particularly important given the increasing prevalence of cyber threats, operational disruptions, and technology-related risks within global financial markets (MAS, 2024; FSB, 2024).

Recapitalisation is also closely associated with governance strengthening. Well capitalised institutions generally possess greater capacity to attract skilled personnel, implement effective internal controls, maintain robust compliance systems, and develop comprehensive enterprise risk management frameworks. Good governance and adequate capital are therefore complementary components of prudential resilience rather than independent regulatory objectives (Barth et al., 2006). Nevertheless, prudential strengthening should not be viewed exclusively through the lens of capital accumulation. International experience demonstrates that increasing capital requirements alone does not automatically produce safer or more efficient financial systems. Excessive reliance on capital-based regulation may generate unintended consequences, including reduced competition, diminished intermediary diversity, higher barriers to entry, and increased market concentration (Goodhart, 2011; Haldane, 2012). Effective recapitalisation therefore requires an appropriate balance between resilience, competition, inclusion, and market development.

The central policy challenge is consequently not whether stronger capitalisation is desirable—it clearly is—but whether capital requirements are appropriately calibrated to the actual risks generated by different market participants. This issue leads directly to the question of risk heterogeneity among capital market operators.

Risk Heterogeneity Among Capital Market Operators

One of the most significant limitations of uniform recapitalisation frameworks is the implicit assumption that all regulated institutions generate similar risks and therefore require identical prudential treatment. In reality, capital market operators differ substantially in terms of their business models, operational structures, risk exposures, market functions, technological dependence, interconnectedness, and systemic relevance. These differences imply that institutions contribute unequally to systemic risk and should not necessarily be subject to identical prudential expectations. The Nigerian capital market comprises a diverse ecosystem of intermediaries performing specialised roles within the financial system. Some institutions primarily facilitate transactions on behalf of clients, while others assume proprietary market positions, provide liquidity, safeguard assets, manage investment portfolios, coordinate settlement processes, or underwrite securities offerings. These activities generate different forms of risk and varying degrees of potential contagion.

For example, a small retail-focused agency broker operating under segregated custodial arrangements typically generates limited systemic exposure. Such institutions facilitate transactions but generally do not maintain substantial proprietary positions or assume significant balance-sheet risks. Although operational failures may adversely affect individual clients, the broader implications for market-wide stability are usually limited.

By contrast, institutions engaged in proprietary trading, underwriting, market making, securities financing, custodial services, and clearing operations often occupy strategically important positions within market infrastructure. Their activities create multiple transmission channels through which disruptions can affect liquidity conditions, settlement systems, investor confidence, and overall market functioning. The failure of such institutions may therefore generate wider systemic consequences extending beyond direct counterparties.

Market makers provide a useful illustration of risk heterogeneity. Because market makers are responsible for maintaining two-way quotations and supporting continuous market liquidity, disruptions to their operations may adversely affect trading activity, price discovery, and market depth. Similarly, custodians play critical roles in safeguarding client assets and facilitating settlement processes. Weaknesses within these institutions can undermine confidence in the integrity of the entire market infrastructure. Clearing and settlement institutions represent perhaps the clearest example of systemic importance. These entities operate at the centre of market infrastructure and facilitate the completion of securities transactions. Their interconnected nature means that operational or financial distress can rapidly transmit disruptions across multiple market participants. Consequently, international regulatory frameworks typically subject clearing institutions to more stringent prudential requirements than ordinary intermediaries (IOSCO, 2015; CPMI-IOSCO, 2012).

Such risk heterogeneity has important implications for prudential regulation. Uniform capital requirements may produce either under-regulation or over-regulation depending on the institution involved. Where capital requirements are set too low for systemically important institutions, financial stability may be compromised. Conversely, where requirements are excessively burdensome for lower-risk intermediaries, competition, innovation, and market accessibility may be unnecessarily constrained. Recognising these challenges, regulators across major jurisdictions have increasingly adopted risk-based and proportional regulatory approaches. These frameworks seek to align prudential requirements with institutional characteristics, including size, complexity, interconnectedness, market function, operational profile, and systemic importance. Rather than treating all institutions identically, risk-based regulation differentiates supervisory expectations according to the actual risks generated by individual market participants (FCA, 2024; ESMA, 2024; IOSCO, 2024). For Nigeria, recognising risk heterogeneity provides a compelling rationale for moving beyond uniform recapitalisation requirements towards a more sophisticated risk-based architecture. Such an approach would enable regulators to strengthen prudential oversight of systemically important institutions while preserving competition, intermediary diversity, financial inclusion, and market accessibility. The broader implications of recapitalisation for market structure are examined in the next section.

Recapitalisation and Market Structure Dynamics

The effects of recapitalisation extend beyond prudential resilience and institutional solvency. Recapitalisation constitutes a market-structure intervention capable of reshaping the composition, behaviour, competitiveness, and developmental trajectory of financial

markets. While capital adequacy requirements are generally introduced to strengthen institutional stability, their implementation frequently influences entry conditions, market concentration, competitive dynamics, liquidity formation, innovation, investor access, and intermediary diversity. Consequently, recapitalisation policies should be evaluated not only through prudential indicators but also through their effects on market structure and long-term market development. The relationship between recapitalisation and market structure has attracted increasing scholarly attention following major regulatory reforms implemented after the Global Financial Crisis. Regulators worldwide have strengthened capital requirements in banking, insurance, and securities sectors in response to concerns regarding systemic risk, operational resilience, technological vulnerability, and investor protection. However, a growing body of literature argues that recapitalisation may generate both intended and unintended structural consequences (Goodhart, 2011; Haldane, 2012; Avgouleas & Goodhart, 2015).

Within the Nigerian capital market, these issues are particularly important because the market remains in a developmental phase characterised by evolving institutional structures, increasing digitalisation, growing retail participation, and efforts to deepen domestic capital mobilisation. Accordingly, understanding how recapitalisation influences market structure is critical for designing regulatory policies that simultaneously strengthen institutional resilience and promote sustainable market development.

Conceptualising Market Structure in Capital Markets

Market structure refers to the configuration of participants, institutions, competitive relationships, and operational arrangements through which market activities are conducted. In capital markets, market structure encompasses the number and diversity of intermediaries, concentration levels, entry barriers, market infrastructure, liquidity providers, investor composition, and competitive dynamics (O'Hara, 1995; Hasbrouck, 2007). Industrial organisation theory suggests that market structure significantly influences market performance. Bain (1956) and Scherer and Ross (1990) argue that concentrated markets may generate efficiencies through economies of scale while simultaneously reducing competition and innovation. Conversely, highly fragmented markets may promote competition but may also create challenges relating to supervision, coordination, and operational efficiency. Within securities markets, optimal market structure requires balancing efficiency, competition, innovation, accessibility, and stability. Market structure therefore represents an important transmission channel through which regulatory reforms influence market outcomes.

Figure 3: Components of Capital Market Structure



Recapitalisation and Market Concentration

One of the most frequently observed consequences of recapitalisation is market consolidation. Economic theory suggests that higher capital requirements increase fixed operating costs and entry barriers, thereby encouraging mergers, acquisitions, strategic alliances, and market exits. Berger, Demsetz and Strahan (1999) argue that consolidation often emerges when regulatory reforms increase the minimum scale necessary for efficient operation. Similarly, De Nicoló, Bartholomew, Zaman and Zephirin (2004) demonstrate that stricter prudential requirements frequently accelerate concentration within financial systems. Empirical evidence from banking reforms across several jurisdictions suggests that recapitalisation may reduce the number of institutions while increasing average institutional size. Although larger institutions often possess stronger balance sheets and enhanced operational capabilities, concentration may also reduce competition and increase systemic interconnectedness. Recent OECD studies similarly indicate that excessive concentration may reduce market contestability, discourage innovation, and weaken investor choice, particularly within emerging markets where intermediary ecosystems remain relatively fragile.

Table 4: Potential Effects of Recapitalisation on Market Concentration

Positive Effects	Negative Effects
Stronger institutions	Reduced competition
Better governance	Increased concentration
Improved technology investment	Higher barriers to entry
Enhanced resilience	Reduced intermediary diversity
Greater investor confidence	Potential systemic concentration

Source: Author's Synthesis from Berger et al. (1999), Goodhart (2011), OECD (2024).

Market Concentration and Systemic Risk

Conventional regulatory thinking often assumes that larger institutions are inherently more stable. However, modern systemic risk literature suggests that concentration itself may become a source of systemic vulnerability. Allen and Gale (2000), Acharya (2009), and Adrian and Brunnermeier (2016) demonstrate that systemic risk increases when market activities become concentrated among a limited number of highly interconnected institutions. Failures within concentrated systems may generate larger contagion effects than failures within more diversified systems. The Financial Stability Board (2024) similarly highlights the growing systemic importance of non-bank financial intermediaries and emphasises the need to monitor concentration risks within financial markets. Consequently, recapitalisation policies that significantly increase concentration may unintentionally create new forms of systemic risk even while strengthening individual institutions.

Figure 4: Concentration-Stability Trade-off



Source: Author's Adaptation from Acharya (2009) and Adrian & Brunnermeier (2016).

Intermediary Diversity and Market Development

Intermediary diversity constitutes an important determinant of market resilience and development. Allen and Santomero (1997), Levine (2005), and Beck et al. (2007) argue that diverse financial systems are better able to serve heterogeneous investor needs, facilitate innovation, and support economic development. Within securities markets, different categories of intermediaries perform complementary functions. Large broker-dealers facilitate institutional transactions and capital raising activities, while smaller firms often specialise in retail participation, investor education, regional market development, and niche market segments. Recent World Bank research emphasises that diverse intermediary ecosystems contribute to market depth, financial inclusion, and capital mobilisation. Emerging markets characterised by broader intermediary participation often exhibit stronger long-term market development outcomes.

Table 5: Contributions of Intermediary Diversity to Market Development

Dimension	Developmental Contribution
Competition	Lower transaction costs
Innovation	New products and services
Accessibility	Wider investor reach
Inclusion	Broader participation
Liquidity	Enhanced trading activity
Resilience	Reduced dependence on few firms

Source: Adapted from Levine (2005), Beck et al. (2007), World Bank (2024).

Digital Transformation and Market Structure

The rapid digitalisation of capital markets introduces an additional dimension to the recapitalisation debate. Fintech platforms, robo-advisory services, digital brokers, mobile investment applications, artificial intelligence, blockchain infrastructure, and automated compliance systems are transforming intermediary business models. Recent IOSCO (2024), OECD (2025), and World Economic Forum studies suggest that technology may reduce traditional scale advantages by lowering transaction costs and expanding investor access. Consequently, market structure increasingly depends on technological capability rather than institutional size alone. This development strengthens the case for risk-sensitive recapitalisation frameworks that recognise operational and technological capacity in addition to traditional capital adequacy measures.

Market Structure Scenarios Under Alternative Recapitalisation Frameworks

The structure of capital markets is highly sensitive to the design of recapitalisation and prudential regulatory frameworks. Different regulatory approaches generate varying outcomes in terms of market concentration, intermediary diversity, liquidity provision, competition, innovation, and systemic resilience. As illustrated in Table 4, a uniform application of high capital requirements across all market participants may strengthen institutional resilience but can simultaneously accelerate market consolidation by raising barriers to entry and limiting the participation of smaller intermediaries. Such an outcome may reduce competitive pressures and increase concentration within the financial system.

Table 6: Alternative Regulatory Outcomes

Regulatory Approach			Likely Market Outcome
Uniform Requirements	High	Capital	High concentration
Uniform Moderate Requirements			Moderate diversity
Risk-Based Recapitalisation			Balanced structure
Proportional Regulation			Diversity with resilience
Activity-Based Regulation			Risk-sensitive market development

Source: Author's Framework (2026).

Conversely, a uniform moderate capital framework may preserve a greater degree of intermediary diversity but could prove insufficient to address systemic vulnerabilities associated with large, complex, and interconnected market participants. This regulatory approach may therefore improve inclusiveness while potentially weakening the overall resilience of the market ecosystem during periods of financial stress. The contemporary regulatory literature increasingly supports risk-based and proportional approaches to prudential regulation as mechanisms for balancing resilience with competition (Goodhart, 2011; Haldane, 2012; IOSCO, 2023; FSB, 2024). Under a risk-based recapitalisation framework, capital requirements are aligned with the risk profile, systemic importance, complexity, and interconnectedness of market operators. Such an approach enables regulators to impose more stringent requirements on systemically significant institutions while preserving market access for smaller and less risky intermediaries. The resulting market structure is typically characterised by greater stability, improved liquidity, and a more balanced distribution of market participants.

Proportional regulation extends this logic by recognising that market operators perform different functions and pose varying levels of systemic risk. Rather than imposing a one-size-fits-all regulatory burden, proportional regulation calibrates supervisory expectations, governance standards, operational requirements, and capital thresholds according to institutional characteristics. This approach has been increasingly adopted in several jurisdictions, including the United Kingdom, the European Union, Singapore, India, and South Africa, where regulators seek to promote competition, innovation, and financial inclusion while maintaining robust prudential safeguards (IOSCO, 2023; OECD, 2023). The most advanced stage of prudential regulation is represented by activity-based regulation, where supervisory requirements are linked primarily to the nature of activities undertaken rather than legal form or institutional classification. Activity-based frameworks are particularly relevant in modern financial systems characterised by fintech innovation, digital platforms, algorithmic trading, and increasingly blurred boundaries between traditional and non-traditional financial institutions. By focusing on the underlying risks generated by specific activities, regulators can respond more effectively to emerging sources of systemic risk while avoiding regulatory arbitrage. For Nigeria, the evidence suggests that a risk-based and proportionate recapitalisation framework offers the most appropriate balance between market resilience and market development. Such a framework would enable the Securities and Exchange Commission (SEC) to strengthen prudential oversight of systemically important capital market operators while preserving intermediary diversity, promoting retail participation, encouraging innovation, and supporting broader capital market development objectives. The challenge for policymakers is therefore not merely to increase capital thresholds but to ensure that recapitalisation policies are aligned with institutional risk profiles and the broader strategic objectives of market efficiency, financial inclusion, investor protection, and sustainable economic development.

Synthesis

This section has examined the SEC recapitalisation framework and its implications for institutional resilience, market structure and financial development. The analysis demonstrates that recapitalisation serves important prudential objectives by strengthening capital adequacy, operational capacity and investor protection. However, recapitalisation also influences competition, intermediary diversity, liquidity provision and market accessibility. A key finding is that capital market operators generate heterogeneous risks and therefore may require differentiated regulatory treatment. The evidence further suggests that risk-based and proportional regulatory approaches offer greater potential for balancing resilience, competition and sustainable market development than uniform recapitalisation frameworks. The evidence reviewed in this section demonstrates that recapitalisation is fundamentally a market-structure policy as well as a prudential policy. While stronger capital requirements may improve institutional resilience, they may also influence concentration, competition, intermediary diversity, innovation, investor access, and systemic risk. The literature further suggests that sustainable market development requires balancing institutional strength with market diversity. Excessive fragmentation may undermine resilience, while excessive concentration may reduce competition and increase systemic vulnerability. These findings provide the foundation for the international comparative analysis presented in the next section and ultimately support the development of the proposed Nigerian Risk-Based Recapitalisation Framework.

INTERNATIONAL REGULATORY EXPERIENCE AND LESSONS FOR NIGERIA

Financial regulation has undergone significant transformation over the past three decades as regulators seek to balance prudential resilience, investor protection, market efficiency, innovation, competition, and systemic stability. While recapitalisation remains an important prudential instrument, international experience increasingly demonstrates that effective regulation requires more than simply imposing higher capital requirements. Contemporary regulatory frameworks increasingly incorporate proportional regulation, risk-based supervision, activity-based oversight, and differentiated prudential standards designed to reflect institutional complexity, risk profiles, and systemic significance. Following the Global Financial Crisis (GFC) of 2007–2009, regulatory authorities across the world reassessed the adequacy of existing supervisory frameworks. The crisis exposed weaknesses in regulatory approaches that relied heavily on institution-based supervision while paying insufficient attention to interconnectedness, leverage, liquidity risks, operational vulnerabilities, and systemic contagion (Acharya, 2009; Claessens & Kose, 2013; Brunnermeier, 2016). Consequently, international regulatory reforms increasingly emphasised risk-sensitive supervision, proportional regulation, stress testing, operational resilience, market integrity, and systemic risk management.

These developments are particularly relevant to emerging and frontier capital markets. As regulators seek to strengthen capital market institutions, important lessons can be drawn

from the experiences of the United States, the United Kingdom, the European Union, South Africa, India, Singapore, and other jurisdictions that have implemented differentiated prudential frameworks. This section examines international regulatory experiences with recapitalisation and prudential regulation and identifies lessons applicable to the Nigerian capital market.

The United States: Activity-Based Prudential Regulation

The United States possesses one of the most sophisticated securities regulatory systems in the world. Regulatory oversight is shared among the Securities and Exchange Commission (SEC), the Financial Industry Regulatory Authority (FINRA), the Commodity Futures Trading Commission (CFTC) and other supervisory bodies. Unlike many jurisdictions that rely primarily on uniform capital requirements, the United States employs an activity-based approach to prudential regulation. Broker-dealers are subject to the SEC Net Capital Rule (Rule 15c3-1), which links capital requirements to business activities, risk exposures, proprietary positions, customer asset holdings, and operational complexity (SEC, 2024). This framework recognises that securities intermediaries differ significantly in terms of risk generation. Firms that hold customer assets, engage in proprietary trading, maintain inventory positions, provide clearing services, or undertake market-making activities are subject to more stringent prudential requirements than firms performing limited agency functions. O'Hara (1995), Hasbrouck (2007), and Stulz (2019) argue that activity-based supervision improves regulatory efficiency because supervisory intensity is aligned with actual risk exposures rather than institutional labels alone. Recent SEC reforms relating to market resilience, cyber-security governance, operational risk management, and clearing arrangements further reinforce this risk-sensitive philosophy.

Key Lesson for Nigeria

The U.S. model demonstrates that capital requirements can be calibrated according to institutional activities and risk generation rather than imposed uniformly across heterogeneous market participants.

The United Kingdom: Proportional Supervision and Institutional Differentiation

The United Kingdom has become one of the leading proponents of proportional regulation within financial markets. Prudential oversight of investment firms is undertaken primarily by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA). Following post-crisis reforms, the United Kingdom adopted increasingly differentiated supervisory approaches based on institutional size, complexity, business models, and systemic relevance. Goodhart (2011), Haldane (2012), and Avgouleas and Goodhart (2015) argue that proportional regulation improves regulatory effectiveness by allowing regulators to focus supervisory resources on institutions that generate the greatest systemic risks. Recent FCA policy statements continue to emphasise proportionality as a guiding principle

for investment-firm supervision. Firms are categorised according to risk characteristics, governance structures, operational complexity, and client exposures, with supervisory expectations adjusted accordingly. The United Kingdom also places significant emphasis on operational resilience, cybersecurity preparedness, governance effectiveness, and consumer protection rather than relying solely on capital adequacy requirements.

Key Lesson for Nigeria

Prudential resilience should be assessed through a combination of capital strength, governance quality, operational resilience, technology capability, and conduct supervision rather than capital adequacy alone.

The European Union: The Investment Firms Regulation and Investment Firms Directive Framework

The European Union's Investment Firms Regulation (IFR) and Investment Firms Directive (IFD) represent one of the most significant contemporary innovations in securities-market regulation. Prior to IFR/IFD reforms, many investment firms were regulated under frameworks originally designed for banks. However, policymakers increasingly recognised that investment firms and banking institutions generate fundamentally different risks (ESMA, 2024; EBA, 2024). Consequently, the IFR/IFD framework introduced a differentiated prudential system based on: Assets under management; Client assets held; Trading activities; Operational complexity; Market exposures; and Systemic significance.

Investment firms are classified into different categories, with prudential requirements varying according to risk profiles rather than organisational form alone. Recent reviews by the European Securities and Markets Authority (ESMA) and the European Banking Authority (EBA) indicate that the framework has improved proportionality while maintaining prudential effectiveness.

Table 7: Key Features of the European IFR/IFD Framework

Regulatory Feature	Description	Regulatory Objective
Risk-Based Classification	Firms classified by activities and exposures	Proportionality
K-Factor Methodology	Capital linked to risk generation	Risk Sensitivity
Differentiated Supervision	Variable supervisory intensity	Regulatory Efficiency
Governance Standards	Enhanced governance obligations	Investor Protection
Operational Resilience	Technology and continuity requirements	Stability

Source: Adapted from ESMA (2024) and EBA (2024).

Key Lesson for Nigeria

The European model demonstrates that proportional regulation can strengthen prudential resilience while preserving competition, innovation, and market diversity.

South Africa: Risk-Sensitive Regulation in an Emerging Market Environment

South Africa provides one of the most relevant comparative cases for Nigeria because both countries operate within emerging-market environments characterised by developmental objectives, financial inclusion challenges, institutional diversity, and evolving capital market structures. The Financial Sector Conduct Authority (FSCA) has increasingly adopted risk based supervisory approaches that combine prudential regulation with market development objectives. Recent South African reforms place significant emphasis on: Market conduct; Investor protection; Operational resilience; Technology governance; Financial inclusion; and Risk-sensitive supervision. Research by Coetzee (2022), Moyo and Firer (2023), and FSCA policy papers suggests that effective regulation within emerging markets requires balancing prudential objectives with developmental goals.

Key Lesson for Nigeria

Emerging markets require regulatory frameworks that simultaneously promote resilience, inclusion, competition, and capital market deepening.

India: Balancing Investor Inclusion and Prudential Regulation

India's experience provides particularly important lessons regarding financial inclusion and market accessibility. The Securities and Exchange Board of India (SEBI) has implemented extensive reforms aimed at expanding retail participation while strengthening prudential oversight. These reforms include: Digital account opening; Reduced transaction costs; Risk-based supervision; Enhanced investor protection; Fintech integration; and Simplified market access. Recent SEBI reports indicate significant growth in retail participation, demat accounts, mutual fund ownership, and capital market inclusion. Research by Shah and Thomas (2020), Roy (2022), and recent SEBI publications suggests that inclusive regulatory frameworks contribute significantly to capital market development and domestic savings mobilisation.

Key Lesson for Nigeria

Prudential regulation should be designed in ways that encourage rather than discourage retail participation and financial inclusion.

Singapore: Technology, Operational Resilience and Future-Ready Regulation

Singapore represents one of the world's leading examples of technology-driven financial regulation. The Monetary Authority of Singapore (MAS) adopts a highly risk sensitive

approach that combines prudential supervision with innovation, digitalisation, and operational resilience. Recent MAS initiatives place substantial emphasis on: Cyber-security; Artificial intelligence governance; Operational resilience; Digital infrastructure; Technology risk management; and Regulatory technology (RegTech). Recent studies by Arner, Buckley and Zetzsche (2023), OECD (2024), and MAS policy reports suggest that future financial stability will increasingly depend on technology governance as much as capital adequacy.

Key Lesson for Nigeria

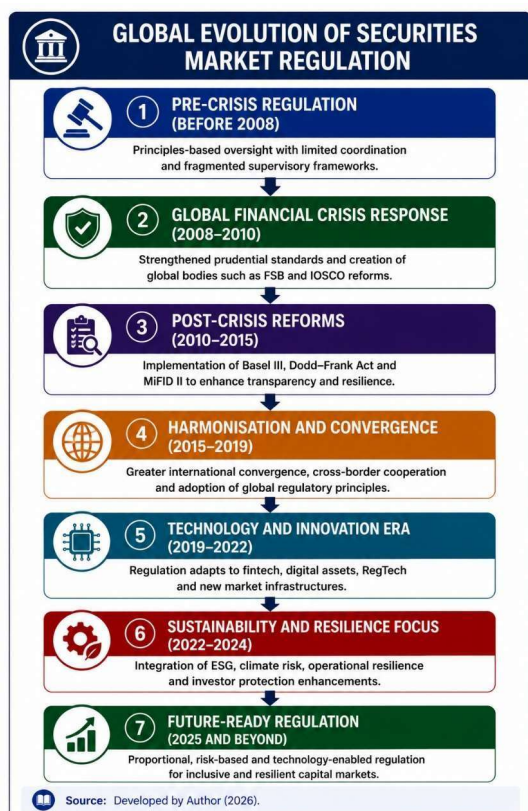
Future recapitalisation frameworks should incorporate technology capability and operational resilience alongside traditional capital measures.

Integrating International Regulatory Lessons: Towards a New Prudential Paradigm

The comparative experiences of the United States, the United Kingdom, the European Union, South Africa, India, and Singapore reveal a clear evolutionary pattern in the design of prudential regulation. Regulatory frameworks have progressively moved away from traditional capital-based approaches toward more sophisticated systems that incorporate risk sensitivity, proportionality, operational resilience, technological readiness, and activity-based supervision. This evolution reflects the growing recognition that financial stability cannot be achieved solely through capital adequacy requirements but requires a broader framework that addresses governance, market conduct, technological risks, operational vulnerabilities, and systemic interconnectedness. The progression of global regulatory thinking has been shaped by successive financial crises, technological transformations, and structural changes in financial markets. The global financial crisis of 2007–2009 exposed the limitations of purely compliance-based and capital-focused regulatory frameworks, leading regulators to adopt risk-based supervisory approaches and macroprudential oversight mechanisms (Goodhart, 2011; Haldane, 2012; FSB, 2024). Subsequently, the rapid emergence of fintech innovations, digital platforms, artificial intelligence, algorithmic trading, and cyber-security threats has expanded the scope of prudential regulation beyond traditional financial risks to include operational and technology-related vulnerabilities (Arner et al., 2023; OECD, 2024).

The international evidence reviewed in this section suggests that the most effective contemporary regulatory frameworks combine five core elements: risk-based supervision, proportional regulation, activity-based oversight, operational resilience, and technology governance. These principles are increasingly reflected in IOSCO standards, Financial Stability Board recommendations, European Securities and Markets Authority (ESMA) guidelines, Financial Conduct Authority (FCA) regulatory reforms, and Monetary Authority of Singapore (MAS) supervisory frameworks. Collectively, these developments provide an important foundation for designing a modern recapitalisation framework for the Nigerian capital market.

Figure 5: Global Evolution of Securities Market Regulation



Source: Synthesised from IOSCO (2024), FSB (2024), ESMA (2024), FCA (2024), and MAS (2024).

Figure 5 synthesises this global regulatory evolution and illustrates how international prudential regulation has progressed from traditional capital rules towards integrated risk-based recapitalisation frameworks that simultaneously promote systemic stability, investor protection, financial inclusion, technological resilience, and sustainable market development. Figure 5 illustrates the historical progression of prudential regulatory philosophy from simple capital adequacy requirements towards comprehensive and integrated regulatory architectures. The framework demonstrates that modern financial regulation increasingly relies on multiple complementary dimensions of oversight rather than a singular focus on capital thresholds. Each successive stage expands the regulatory toolkit by incorporating additional mechanisms designed to address emerging sources of risk within increasingly complex financial systems.

Figure 5 also highlights the convergence of international regulatory practice around integrated risk-based frameworks that combine prudential resilience, operational resilience, investor protection, market integrity, financial inclusion, and technology governance. This convergence is particularly evident in the regulatory approaches adopted by leading jurisdictions such as Singapore, the United Kingdom, and the European Union, where

proportional and risk-sensitive regulation has become a central feature of supervisory policy. For Nigeria, the implication is that recapitalisation should not be viewed solely as an exercise in increasing minimum capital thresholds. Rather, recapitalisation should form part of a broader regulatory architecture that differentiates institutions according to their risk profiles, systemic importance, business models, technological capabilities, and market functions. Such an approach would align Nigeria with emerging global best practices while supporting the dual objectives of financial stability and sustainable capital market development.

The lessons derived from international regulatory evolution therefore provide the conceptual foundation for the proposed Nigerian Risk-Based Recapitalisation Architecture presented in Section 8. The proposed framework extends global best practice by integrating capital adequacy, proportional regulation, operational resilience, technology governance, investor protection, and financial inclusion within a unified prudential framework tailored to the specific characteristics of the Nigerian capital market.

Table 8: Comparative Regulatory Lessons for Nigeria

Jurisdiction	Regulatory Innovation	Key Lesson for Nigeria
United States	Risk-based supervision and systemic oversight	Strengthen market surveillance and systemic risk monitoring
United Kingdom	Proportional regulation	Differentiate requirements by size and complexity
European Union	IFR/IFD framework	Align capital requirements with risk profiles
South Africa	Market inclusion and transformation	Promote competition and financial inclusion
India	Tiered intermediary regulation	Support growth of smaller intermediaries
Singapore	Technology governance and operational resilience	Incorporate cyber-security and digital resilience into prudential regulation

Source: Compiled from IOSCO (2024), FCA (2024), ESMA (2024), MAS (2024), FSB (2024), and OECD (2024).

Table 8 demonstrates that contemporary financial regulation increasingly incorporates five core principles: Risk sensitivity; Proportionality; Activity-based supervision; Operational resilience; and Systemic-risk management. These principles appear consistently across the United States, United Kingdom, European Union, South Africa, India and Singapore. The evidence suggests that effective regulation no longer depends solely on increasing capital requirements. Rather, regulatory effectiveness depends on aligning prudential requirements with institutional risk characteristics while preserving competition, innovation and financial inclusion

Synthesis and Implications for Nigeria

The comparative review of major regulatory jurisdictions reveals a remarkable convergence in the evolution of prudential regulation. Although regulatory systems differ across countries, contemporary reforms increasingly share common principles centred on risk sensitivity, proportionality, operational resilience, investor protection, technological readiness, and financial inclusion. These principles have emerged in response to growing financial complexity, rapid technological change, and lessons learned from successive episodes of financial instability. The evidence reviewed in this Section demonstrates that modern prudential regulation has evolved beyond traditional capital adequacy frameworks towards integrated supervisory architectures that recognise differences in institutional size, complexity, interconnectedness, and systemic importance. The experiences of the United States, the United Kingdom, the European Union, South Africa, India, and Singapore collectively suggest that effective regulation requires a balance between resilience and market development. Excessively stringent capital requirements may improve institutional strength but can also reduce competition and intermediary diversity, while excessively lenient requirements may undermine financial stability.

A common theme across the jurisdictions examined is the increasing adoption of proportional and risk-based regulation. Rather than imposing uniform requirements on all market participants, regulators increasingly calibrate supervisory expectations according to institutional characteristics and risk profiles. Such approaches promote competition, innovation, and financial inclusion while preserving prudential soundness. Another major lesson emerging from international experience is the growing importance of operational resilience and technology governance. Financial stability is increasingly influenced not only by capital adequacy but also by cyber-security preparedness, digital infrastructure resilience, data governance, artificial intelligence oversight, and technology risk management. These considerations are particularly relevant for emerging markets where financial innovation is expanding rapidly. For Nigeria, the synthesis of international experience supports the adoption of an integrated risk-based recapitalisation framework that combines capital adequacy, proportional regulation, operational resilience, technology governance, investor protection, and financial inclusion within a unified supervisory architecture. Such a framework would align Nigeria with evolving global regulatory standards while addressing the specific characteristics and developmental objectives of the Nigerian capital market. The insights derived from this comparative review form the foundation for the proposed Nigerian Risk-Based Recapitalisation Architecture developed in Section 7.

PROPOSED NIGERIAN RISK-BASED RECAPITALISATION

The preceding analysis demonstrates that recapitalisation is a multidimensional regulatory intervention whose effects extend beyond capital adequacy to encompass market structure, financial inclusion, investor protection, operational resilience, competition and systemic stability. Sections 3 and 4 established that retail participation, financial inclusion and

proportional regulation constitute critical considerations in contemporary financial regulation. Section 5 showed that the SEC recapitalisation framework, while prudentially justified, may generate broader market-structure consequences. Section 6 further revealed that leading jurisdictions increasingly employ risk-sensitive, proportional and activity-based supervisory frameworks rather than uniform prudential requirements. Collectively, these findings suggest that future recapitalisation policy in Nigeria should move beyond traditional minimum-capital frameworks towards a more sophisticated regulatory architecture capable of simultaneously promoting resilience, inclusion, competition and market development.

Accordingly, this section proposes a Nigerian Risk-Based Recapitalisation Framework designed to align prudential requirements with institutional risk characteristics, market functions and systemic relevance. The framework integrates insights from Financial Intermediation Theory (Gurley & Shaw, 1960; Allen & Santomero, 1997), Delegated Monitoring Theory (Diamond, 1984), Market Microstructure Theory (Kyle, 1985; O'Hara, 1995), Financial Development Theory (Levine, 1997, 2005) and Systemic Risk Theory (Acharya, 2009; Adrian & Brunnermeier, 2016). The proposed framework seeks to balance six regulatory objectives: Capital Adequacy; Investor Protection; Financial Inclusion; Market Development; Operational Resilience; and Systemic Stability. These objectives form the foundation of the proposed regulatory architecture.

Figure 6 illustrates the six mutually reinforcing objectives that underpin the proposed framework. Unlike traditional recapitalisation models that focus primarily on solvency, the proposed framework recognises that effective regulation must simultaneously strengthen institutional resilience, protect investors, support inclusion, promote market development, enhance operational resilience and preserve systemic stability. The figure therefore represents a significant departure from conventional capital adequacy approaches by incorporating broader developmental and prudential objectives.

Figure 6: Core Objectives of the Nigerian Risk-Based Recapitalisation



Source: developed by the author (2026)

Conceptual Foundations of the Framework

The proposed framework is founded on three central propositions.

Proposition One: Institutions Generate Heterogeneous Risks

Capital market operators differ significantly in terms of operational complexity, proprietary exposure, liquidity obligations, technological dependence, client asset concentration and systemic interconnectedness. Consequently, identical capital requirements may not produce optimal regulatory outcomes. This proposition is supported by Systemic Risk Theory, which demonstrates that institutions contribute differently to systemic vulnerability (Acharya, 2009; Adrian & Brunnermeier, 2016).

Proposition Two: Capital Adequacy Alone Is Insufficient

Contemporary financial stability depends not only on financial resources but also on operational resilience, governance quality, cyber-security preparedness, technology governance and business continuity (Arner et al., 2023; IOSCO, 2024; MAS, 2024). Accordingly, prudential regulation should incorporate non-financial dimensions of resilience alongside traditional capital measures.

Proposition Three: Stability and Inclusion Are Complementary

The analysis in Section 3 demonstrated that retail participation and financial inclusion contribute to sustainable capital market development. Consequently, prudential regulation should seek to strengthen resilience without unnecessarily reducing intermediary diversity or market accessibility (Beck et al., 2007; Demirgüç-Kunt et al., 2018; Ozili, 2021).

Guiding Principles of the Framework

The proposed framework is built around five regulatory principles.

Risk Sensitivity: Prudential requirements should reflect actual risk exposure rather than institutional labels.

Proportionality: Regulatory intensity should vary according to size, complexity, interconnectedness and systemic importance (Goodhart, 2011; Haldane, 2012; FCA, 2024).

Activity-Based Supervision: Institutions performing similar risk-generating activities should be subject to similar regulatory treatment irrespective of legal classification (ESMA, 2024; IOSCO, 2024).

Operational Resilience: Cyber-security, technology governance, artificial intelligence governance and business continuity should form integral components of prudential regulation (MAS, 2024; OECD, 2024).

Developmental Balance: Regulation should strengthen resilience while preserving competition, innovation, financial inclusion and market accessibility.

Tiered Classification of Capital Market Operators

A key innovation of the framework is the classification of institutions according to systemic importance and risk characteristics.

Tier I: Systemically Significant Institutions

This category includes: Clearing and settlement institutions; Central counterparties; Custodians; Large broker-dealers; Market makers; and Major underwriters.

These institutions possess the greatest capacity to generate systemic disruption and therefore require the highest prudential standards.

Tier II: Moderate-Risk Institutions

This category includes: Issuing houses; Institutional brokers; Portfolio managers; Fund managers; and Medium-sized broker-dealers.

These institutions generate moderate levels of systemic exposure and should be subject to intermediate prudential requirements.

Tier III: Lower-Risk Intermediaries

This category includes: Agency brokers; Retail-focused intermediaries; Investment advisers; and Smaller specialist operators. These institutions should remain subject to strong conduct regulation and investor-protection requirements but proportionate capital obligations.

Risk-Based Capital Determination Framework

The proposed framework separates capital requirements into two components:

Base Capital Requirement

A minimum prudential threshold applicable to all operators within a category.

Risk-Sensitive Capital Adjustment

Additional capital requirements linked to specific risk exposures.

The proposed model is:

$$\text{Required Regulatory Capital} = \text{Base Capital} + \text{Risk Adjustment Factors} \quad (2)$$

Risk adjustment factors should include: Market risk; Proprietary trading risk; Custody risk; Settlement risk; Liquidity support obligations; Operational risk; Cyber-security risk; Technology risk; and Systemic interconnectedness.

This approach aligns with emerging international practice under the EU

IFR/IFD framework and modern IOSCO supervisory principles (Ferran, 2021; IOSCO, 2024).

Operational Resilience and Technology Governance Framework

One of the most important innovations within the proposed framework is the formal integration of operational resilience into recapitalisation policy. Contemporary capital markets increasingly depend on: Electronic trading systems; Cloud computing infrastructure; Artificial intelligence applications; Digital onboarding platforms; Cyber-security architecture; and Real-time settlement systems. Consequently, future prudential regulation should require operators to maintain minimum standards relating to: Technology governance; Cyber-security; Disaster recovery; Business continuity; Third-party technology risk; and Artificial intelligence governance. This recommendation is consistent with emerging international practice in Singapore, the United Kingdom and the European Union (MAS, 2024; FCA, 2024; OECD, 2024).

Investor Protection and Financial Inclusion Safeguards

A major objective of the proposed framework is to avoid unintended exclusionary effects arising from recapitalisation. The framework therefore recommends:

- Transitional implementation periods;
- Graduated compliance schedules;
- Shared technology infrastructure;
- Regulatory sandboxes;
- Capacity-building programmes;
- Proportionate reporting requirements.

These measures allow lower-risk institutions to remain viable while maintaining investor protection standards. This approach aligns with evidence showing that financial inclusion contributes significantly to financial development and economic growth (Levine, 2005; Beck et al., 2007; World Bank, 2022).

Proposed Nigerian Risk-Based Recapitalisation Architecture

The overall architecture of the proposed framework is presented in Figure 8. Figure 7 integrates the principal components of the framework. The architecture links institutional classification, risk assessment, capital determination, operational resilience requirements, investor protection mechanisms and regulatory outcomes within a unified supervisory structure. Figure 7 demonstrates that recapitalisation should not be viewed as an isolated capital exercise but as part of a broader risk-management and market-development framework.

Figure 7: Proposed Nigerian Risk-Based Recapitalisation Architecture



Source: Developed by the Author (2026)

Expected Regulatory Outcomes

Implementation of the proposed framework is expected to generate several outcomes.

Prudential Outcomes

- Stronger institutional resilience;
- Improved investor protection;
- Reduced probability of institutional failure.

Market Outcomes

- Enhanced competition;
- Greater intermediary diversity;
- Improved liquidity conditions.

Developmental Outcomes

- Stronger financial inclusion;
- Increased retail participation;
- Enhanced capital mobilisation.

Systemic Outcomes

- Improved systemic resilience;
- Better risk monitoring;
- Greater market confidence.

These outcomes collectively support sustainable capital market development.

Theoretical and Policy Contribution of the Framework

The proposed framework contributes to the literature in several respects.

First, it extends recapitalisation analysis beyond traditional capital adequacy considerations by integrating market structure, financial inclusion and operational resilience. Second, it provides one of the first comprehensive frameworks specifically designed for recapitalisation within an emerging capital market context. Third, it integrates proportional regulation, risk-based supervision and financial inclusion into a unified prudential architecture. Fourth, it provides regulators with a practical blueprint for implementing recapitalisation while preserving competition, accessibility and innovation. The framework therefore contributes simultaneously to theory, policy and regulatory practice.

Synthesis

This section has developed a Nigerian Risk-Based Recapitalisation Framework that responds directly to the limitations of uniform capital requirements identified throughout the study. The framework recognises institutional heterogeneity, incorporates proportional regulation, integrates operational resilience and preserves financial inclusion while strengthening prudential resilience. By aligning capital requirements with actual risk exposures and market functions, the framework provides a balanced regulatory approach capable of simultaneously promoting financial stability, investor protection, competition and sustainable capital market development. The policy implications of implementing this framework are examined in the next section.

POLICY IMPLICATIONS FOR THE NIGERIAN CAPITAL MARKET

The proposed Nigerian Risk-Based Recapitalisation Framework developed in Section 7 carries important policy implications for the Securities and Exchange Commission (SEC), capital market operators, investors, policymakers and the broader Nigerian financial system. The central argument of the study is that recapitalisation should not be treated merely as

an increase in minimum capital requirements. Rather, it should be understood as a strategic prudential and market-development instrument capable of shaping institutional resilience, competition, intermediary diversity, financial inclusion, operational resilience and systemic stability. The preceding sections demonstrate that uniform capital requirements may strengthen institutional solvency but may also generate unintended consequences where institutions differ significantly in business model, risk exposure, systemic importance and market function. This finding is consistent with the literature on systemic risk and prudential regulation, which emphasises that financial institutions contribute differently to systemic vulnerability and therefore require differentiated supervisory treatment (Acharya, 2009; Adrian & Brunnermeier, 2016; Brunnermeier & Pedersen, 2009). It is also consistent with international regulatory developments that increasingly favour proportional regulation, risk-based supervision and activity-based oversight (Goodhart, 2011; Haldane, 2012; IOSCO, 2024; FSB, 2024; ESMA, 2024; FCA, 2024; MAS, 2024). Against this background, this section identifies the major policy implications of adopting a risk-based recapitalisation approach within the Nigerian capital market.

Implications for SEC and Regulatory Supervision

The first implication is that SEC should progressively move from a predominantly uniform capital-threshold model toward a risk-based supervisory architecture. This does not imply weakening prudential standards. Rather, it means aligning regulatory intensity with the actual risks generated by different institutions and activities. Under such an approach, higher supervisory intensity would apply to institutions that perform systemically significant functions, such as custody, clearing, settlement, market making, proprietary trading and large-scale broker-dealer activities. Lower-risk institutions, particularly retail-focused agency brokers and advisory firms, would remain subject to strong conduct and investor-protection standards but proportionate capital requirements.

This approach would improve regulatory efficiency by focusing supervisory resources on entities whose failure could generate wider market disruption. It would also reduce the risk of imposing excessive compliance burdens on lower-risk firms whose main contribution lies in retail mobilisation and financial inclusion. Such differentiation is consistent with the regulatory logic advanced by IOSCO (2018, 2024), FCA (2024) and ESMA (2024). For SEC, the practical implication is that future recapitalisation policy should be accompanied by a formal institutional risk-classification methodology, periodic risk assessment, risk-based reporting requirements and tiered supervisory intensity.

Implications for Prudential Resilience and Systemic Stability

The proposed framework reinforces the importance of prudential resilience but broadens its meaning beyond capital adequacy. Stronger capitalisation remains necessary because capital provides a buffer against losses and enhances confidence in financial institutions (Berger, Herring, & Szegö, 1995; Basel Committee on Banking Supervision, 2011). However,

the study shows that capital adequacy alone is insufficient in increasingly complex and technology-dependent capital markets. Systemic stability also depends on liquidity management, governance quality, operational continuity, cyber-security preparedness, technology resilience and institutional interconnectedness. Acharya (2009) and Adrian and Brunnermeier (2016) show that systemic risk arises when individual institutional weaknesses interact with broader market vulnerabilities. Similarly, Brunnermeier and Pedersen (2009) demonstrate that liquidity pressures can amplify systemic instability. For Nigeria, the implication is that recapitalisation should be embedded within a wider prudential architecture incorporating stress testing, business continuity planning, technology-risk assessment, governance evaluation, cyber-resilience standards and systemic-risk monitoring.

Implications for Market Structure, Competition and Intermediary Diversity

The study demonstrates that recapitalisation can alter market structure by influencing entry, survival, consolidation and exit among capital market operators. While higher capital requirements may strengthen institutional capacity, they may also encourage mergers, increase concentration and reduce intermediary diversity. The literature on financial development and market structure suggests that competition and diversity are important for market efficiency, innovation and investor choice (Allen & Gale, 2000; Levine, 2005; O'Hara, 1995). Excessive concentration may create new vulnerabilities by increasing dependence on a small number of dominant institutions. This concern is consistent with systemic-risk literature, which warns that concentration may increase the systemic importance of individual firms (Acharya, 2009; FSB, 2024). For SEC and market policymakers, the implication is that recapitalisation should be monitored not only in terms of capital compliance but also in terms of industry concentration, market share distribution, investor access, transaction costs and liquidity outcomes. Regulatory success should not be measured solely by the number of institutions meeting capital thresholds but by the quality, diversity and resilience of the market ecosystem.

Implications for Retail Participation and Financial Inclusion

As demonstrated in Section 3, recapitalisation has important implications for retail participation and financial inclusion. Smaller and retail-focused intermediaries frequently provide essential access channels for individual investors, regional investors and underserved market segments. They also contribute to investor education, financial literacy and relationship-based market access. Financial inclusion research demonstrates that broad access to financial services contributes to savings mobilisation, investment participation and economic development (Beck et al., 2007; Demirgüç-Kunt et al., 2018; Ozili, 2021; World Bank, 2022). Within capital markets, inclusion requires access not only to trading platforms but also to advisory services, brokerage networks, collective investment schemes and investor education. The policy implication is that recapitalisation should not unintentionally exclude smaller intermediaries that serve important inclusion functions. The proportional

regulation principles discussed in Section 4 provide a mechanism through which inclusion and stability can be pursued simultaneously. Lower-risk intermediaries can remain active under proportionate capital requirements while being subject to strong conduct, disclosure and investor-protection standards.

Implications for Operational Resilience and Technology Governance

The increasing digitalisation of capital markets has elevated operational resilience and technology governance to core prudential concerns. Modern securities markets depend on electronic trading systems, digital onboarding platforms, cloud infrastructure, cybersecurity architecture, algorithmic trading tools, real-time settlement systems and data processing technologies. Recent regulatory literature shows that operational failures, cyber incidents and technology disruptions can generate market-wide consequences (Arner et al., 2023; IOSCO, 2024; MAS, 2024; OECD, 2024). Consequently, recapitalisation should support the technological and operational capacity required for safe and efficient market participation. For Nigeria, this implies that capital requirements should be linked not only to financial strength but also to operational capability. Regulators should require operators, particularly systemically significant institutions, to demonstrate cybersecurity readiness, business continuity arrangements, disaster recovery capability, data governance systems, artificial-intelligence governance and third-party technology-risk management. This would align the Nigerian capital market with emerging international expectations regarding future-ready financial regulation.

Implications for Capital Market Operators

For capital market operators, the proposed framework implies that recapitalisation should be understood as an institutional transformation agenda rather than simply a capital-raising obligation. Operators will need to strengthen governance, internal controls, compliance functions, risk management, technology infrastructure and investor-protection systems. Firms that treat recapitalisation purely as a funding exercise may fail to achieve the operational and strategic benefits intended by the reform. Conversely, firms that use recapitalisation as an opportunity to modernise systems, improve governance and strengthen digital capacity are likely to become more competitive and resilient. Operators should therefore align recapitalisation strategies with broader institutional development plans, including technology upgrades, human-capital development, cyber-security investment, risk-management enhancement and customer-service improvement.

Implications for Investors and Market Confidence

Investor confidence is central to capital market development. Investors are more likely to participate in markets where intermediaries are financially stable, operationally reliable, well-governed and effectively supervised. Recapitalisation can therefore improve confidence by reducing the perceived probability of institutional failure and strengthening investor

protection. However, confidence also depends on accessibility, fairness, transparency and competition. If recapitalisation leads to excessive concentration or reduced access, its confidence-enhancing effects may be weakened. The proposed risk-based framework addresses this concern by combining stronger prudential safeguards with proportional treatment for lower-risk institutions. This approach is likely to improve investor confidence while preserving market accessibility and choice.

Implications for Economic Development

Capital markets contribute to economic development by mobilising long-term finance, supporting infrastructure development, expanding corporate funding options and facilitating wealth creation. Financial Development Theory emphasises that efficient financial systems promote economic growth by improving capital allocation, risk management and savings mobilisation (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973; Levine, 1997, 2005). The policy implication is that recapitalisation should be evaluated in relation to its contribution to broader economic development. A resilient and inclusive capital market can support private-sector growth, infrastructure financing, SME development, employment creation and economic diversification. The proposed framework supports these objectives by seeking to strengthen market resilience while preserving competition, access and innovation.

Implications for Future Regulatory Reforms

The findings of this study suggest that future regulatory reforms in Nigeria should increasingly adopt integrated supervisory approaches combining: Risk-based supervision; Proportional regulation; Activity-based oversight; Operational-resilience requirements; Technology governance; Investor-protection standards; Financial inclusion safeguards; and Systemic-risk monitoring. Such an approach is consistent with emerging global regulatory practice and provides a more sustainable basis for capital market development than uniform capital escalation alone. Future reforms should also incorporate periodic review mechanisms to account for inflation, currency depreciation, technological change, market innovation and evolving systemic risks. This is particularly important in Nigeria, where macroeconomic volatility can rapidly erode the real value of capital thresholds.

Synthesis

The policy implications arising from this study reinforce the central argument that recapitalisation should be implemented as part of a broader risk-based and proportionate regulatory architecture. Stronger capital requirements are necessary, but they should be calibrated to institutional risk profiles, market functions and systemic relevance. For Nigeria, the challenge is not whether recapitalisation is necessary; it clearly is. The real challenge is how recapitalisation can be designed to strengthen institutional resilience without undermining intermediary diversity, competition, retail participation and financial inclusion. The proposed Nigerian Risk-Based Recapitalisation Framework provides a practical pathway

for achieving this balance. By integrating prudential resilience, investor protection, operational resilience, market accessibility and systemic stability, the framework offers a forward-looking regulatory approach capable of supporting the sustainable development of the Nigerian capital market.

CONCLUSION

The Securities and Exchange Commission's recapitalisation initiative represents one of the most significant prudential reforms undertaken within the Nigerian capital market in recent years. While recapitalisation is traditionally justified as a mechanism for strengthening institutional solvency and protecting investors, the analysis presented in this study demonstrates that its implications extend far beyond capital adequacy. Recapitalisation influences market structure, competition, intermediary diversity, retail participation, financial inclusion, operational resilience and systemic stability. Consequently, it should be viewed not merely as a capital-enhancement exercise but as a strategic regulatory intervention capable of reshaping the architecture of financial intermediation within the Nigerian capital market.

Drawing on Financial Intermediation Theory (Gurley & Shaw, 1960; Allen & Santomero, 1997), Delegated Monitoring Theory (Diamond, 1984), Market Microstructure Theory (Kyle, 1985; O'Hara, 1995), Financial Development Theory (Levine, 1997, 2005) and Systemic Risk Theory (Acharya, 2009; Adrian & Brunnermeier, 2016), the study developed an integrated analytical framework linking recapitalisation, market structure, financial inclusion and systemic stability. The analysis demonstrated that capital market operators are inherently heterogeneous institutions that differ substantially in operational complexity, proprietary exposure, liquidity obligations, custody responsibilities, technological dependence and systemic relevance. Consequently, the application of identical capital requirements across institutions with fundamentally different risk characteristics may not always generate optimal prudential outcomes.

A major finding of the study is that recapitalisation generates both prudential benefits and market-structure consequences. On the one hand, stronger capitalisation enhances institutional resilience, improves investor confidence, strengthens governance standards, supports technology investment and reduces vulnerability to financial distress (Berger et al., 1995; Basel Committee on Banking Supervision, 2011; IOSCO, 2024). On the other hand, uniform recapitalisation requirements may encourage consolidation, increase concentration and reduce intermediary diversity. These effects become particularly important in emerging capital markets where smaller intermediaries frequently perform critical functions relating to retail participation, investor education, regional market penetration and financial inclusion (Beck et al., 2007; Demirgüç-Kunt et al., 2018; Ozili, 2021).

The study further demonstrates that recapitalisation has important implications for retail participation and financial inclusion. Capital markets contribute most effectively to economic

development when participation is broad, inclusive and accessible. Smaller intermediaries often serve as important channels through which individual investors, SMEs and underserved segments of society gain access to investment opportunities. Consequently, prudential reforms should be designed in ways that preserve market accessibility while strengthening resilience. The analysis suggests that proportional regulation provides the most effective mechanism for reconciling these potentially competing objectives.

The review of international regulatory experiences reveals a clear evolution in global regulatory philosophy. Across the United States, United Kingdom, European Union, South Africa, India and Singapore, regulators increasingly employ risk-based supervision, proportional regulation, activity-based oversight, operational resilience frameworks and technology governance mechanisms rather than relying solely on uniform capital requirements (Goodhart, 2011; Haldane, 2012; FCA, 2024; ESMA, 2024; IOSCO, 2024; FSB, 2024; MAS, 2024; OECD, 2024). Contemporary regulation therefore recognises that effective supervision depends not merely on increasing capital thresholds but on aligning regulatory requirements with institutional risk characteristics and systemic relevance. Against this background, the study proposed a Nigerian Risk-Based Recapitalisation Framework that integrates six interrelated objectives: capital adequacy, investor protection, financial inclusion, market development, operational resilience and systemic stability. The framework is grounded in the principles of risk sensitivity, proportionality, activity-based supervision, operational resilience and developmental balance. Unlike traditional recapitalisation models, the proposed framework recognises that institutions generate heterogeneous risks and therefore require differentiated prudential treatment. By linking capital requirements to actual risk exposures and market functions, the framework provides a more balanced approach to regulation while preserving competition, accessibility and innovation.

The study makes several contributions to knowledge. First, it extends the recapitalisation literature beyond traditional capital adequacy considerations by integrating financial inclusion, market structure and operational resilience into a unified analytical framework. Second, it contributes to the growing literature on proportional regulation by demonstrating its relevance within capital market recapitalisation. Third, it provides one of the first comprehensive conceptual frameworks specifically designed for risk-based recapitalisation within an emerging-market capital market environment. Fourth, it contributes to policy discourse by proposing a practical regulatory architecture capable of supporting both prudential resilience and market development. From a policy perspective, the findings suggest that the future of capital market regulation in Nigeria lies not in indiscriminate escalation of minimum capital requirements but in the adoption of intelligent, risk-sensitive and proportionate supervisory frameworks. Stronger capitalisation remains necessary and desirable; however, capital requirements should be calibrated according to institutional risk profiles, operational complexity, technological dependence and systemic relevance. Such an approach would allow regulators to strengthen resilience without undermining intermediary diversity, competition, retail participation and financial inclusion.

The study also highlights the growing importance of operational resilience and technology governance within contemporary financial regulation. Increasing reliance on digital trading platforms, cyber infrastructure, cloud computing, artificial intelligence applications and real-time settlement systems means that future financial stability will depend not only on financial resources but also on technological capability and operational preparedness (Arner et al., 2023; MAS, 2024; OECD, 2024). Future recapitalisation frameworks should therefore incorporate operational resilience requirements alongside traditional capital measures. Notwithstanding its contributions, the study remains conceptual and policy oriented in nature. Future research may extend the analysis through empirical investigation of the relationship between recapitalisation, market concentration, liquidity, financial inclusion and capital market performance within Nigeria and other emerging economies. Comparative empirical studies examining the effectiveness of proportional regulation and risk-based supervision across different jurisdictions would also contribute significantly to the literature. Additionally, future research may explore the interaction between recapitalisation, fintech innovation, artificial intelligence governance, cyber-security resilience and capital market development in increasingly digital financial environments.

In conclusion, the central message emerging from this study is that recapitalisation should not be viewed solely as a solvency-enhancement mechanism. Rather, it should be understood as part of a broader regulatory architecture aimed at promoting resilience, investor protection, financial inclusion, operational resilience and sustainable market development. The proposed Nigerian Risk-Based Recapitalisation Framework provides a practical pathway through which these objectives can be pursued simultaneously. By aligning prudential requirements with institutional risk characteristics and market functions, the framework offers a forward-looking approach capable of strengthening the resilience, competitiveness and long-term sustainability of the Nigerian capital market in an increasingly complex and interconnected global financial system.

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Bojuwon M. & AkandeBojuwon A. L. – *Impact of Information Quality and Market Efficiency on Corporate Value Creation: A Rasch Model and PLS-SEM Analysis*
**IMPACT OF INFORMATION QUALITY AND MARKET EFFICIENCY ON CORPORATE
VALUE CREATION: A RASCH MODEL AND PLS-SEM ANALYSIS**

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Abstract

This study examines the relationships among information quality (IQ), perceived market informational efficiency (PMIE), and perceived corporate value creation capability (PCVC) among publicly listed corporations on the Nigerian Exchange Group (NGX). Drawing on a sample of 100 NGX-listed firms across six industrial sectors, this study employs a cross-sectional quantitative survey design. All three constructs are operationalised as perceptual latent variables measured through validated multi-item reflective scales. Hypotheses are tested using the Rating Scale Model (RSM) variant of the Rasch model (Andrich, 1978) for measurement validation, followed by Partial Least Squares Structural Equation Modelling (PLS-SEM) for structural analysis. The Rasch analysis confirms adequate psychometric properties, with item infit and outfit MNSQ values between 0.86 and 1.15 and person separation reliability ranging from 0.82 to 0.87. PLS-SEM results indicate that information quality is positively associated with perceived market informational efficiency ($\beta = 0.716$, $p < 0.001$) and perceived corporate value creation ($\beta = 0.345$, $p < 0.001$), while perceived market informational efficiency also positively predicts corporate value creation ($\beta = 0.423$, $p < 0.001$), supporting the hypothesised relationships. The structural model explains 51.2% and 64.7% of variance in market efficiency and corporate value creation respectively (SRMR = 0.061). Complementary mediation is confirmed, with market efficiency transmitting 46.8% of the total information quality–value creation effect (IE = 0.303; TE = 0.648). Robustness checks incorporating firm-level controls (size, age, leverage, profitability, sector) confirm the stability of these findings. The study contributes the first integrated Rasch–PLS-SEM test of this framework in the Nigerian capital market and offers specific implications for corporate governance, financial reporting regulation, and investment decision-making.

Keywords: Information quality, Market efficiency, Corporate value creation, Rasch model, PLS-SEM, Nigerian Exchange Group, Emerging markets

INTRODUCTION

The interplay among information quality, market efficiency, and corporate value creation has become increasingly central to scholarship in accounting, finance, and corporate governance. Financial markets, according to the Efficient Market Hypothesis (EMH), incorporate all available information into security prices (Fama, 1970; Dinga et al., 2022), yet empirical evidence consistently shows that the quality and accessibility of disclosed information moderate this relationship substantially (Lawal et al., 2025; Vasileiou, 2022). As corporations face mounting regulatory requirements and stakeholder demands for

transparency, the question of how information quality shapes market perceptions and, through them, corporate valuation has moved to the forefront of academic and practitioner interest. Information quality encompasses accuracy, completeness, timeliness, consistency, and relevance of corporate disclosures and financial reports (Bond & Fox, 2013).

High-quality information reduces information asymmetry between corporate insiders and external market participants, facilitates more efficient capital allocation, and lowers the cost of capital (Adeyemi & Yahaya, 2024; Kang et al., 2022). Market efficiency, conceptualised as informational efficiency, reflects the speed and precision with which markets incorporate new information into security prices (Vasileiou, 2022). Corporate value creation, the study's dependent construct, represents the capacity of firms to generate sustainable competitive advantage and deliver superior returns to stakeholders (Oyewobi, 2024). Despite considerable theoretical and empirical development, significant gaps remain: most prior research has examined bivariate associations in isolation, neglecting the mediating role of market efficiency; methodological limitations including classical test theory assumptions have inflated measurement error; and the psychometric properties of measurement instruments have received insufficient attention (Hair Jr et al., 2017; Odunayo et al., 2023).

This study addresses these gaps through an integrated analytical strategy combining Rasch model measurement validation with PLS-SEM structural analysis, applied to a sample of 100 NGX-listed firms in Nigeria. The study pursues three objectives: (1) to evaluate the psychometric properties of scales measuring information quality, perceived market informational efficiency, and perceived corporate value creation capability using the Rasch RSM; (2) to test the direct and indirect relationships among these constructs via PLS-SEM path analysis; and (3) to generate empirical evidence informing theory and practice in corporate governance, financial reporting, and investment management in the Nigerian emerging market context.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Framework

The theoretical framework of this study integrates four complementary bodies of theory: Agency Theory, Signalling Theory, Information Asymmetry Theory, and the Efficient Market Hypothesis (EMH). Under Agency Theory (Jensen & Meckling, 1976), information quality reduces agency costs by mitigating informational gaps between principals (shareholders) and agents (managers), thereby lowering the cost of capital and enhancing value creation. Signalling Theory (Spence, 1973) posits that high-quality voluntary and mandatory disclosures function as credible signals of managerial competence and firm quality, reducing investor uncertainty and improving market pricing accuracy. Information Asymmetry Theory (Akerlof, 1970) explains that superior disclosure quality narrows the information gap between insiders and external participants, improving price discovery and market efficiency. The EMH (Fama, 1970) provides the market-level mechanism: in informationally efficient markets, security prices rapidly reflect all available information, directing capital to value-

maximising uses and disciplining managerial behaviour through the market for corporate control.

These four theories generate two coherent causal chains. The first is a market level channel: IQ → reduced information asymmetry → improved market informational efficiency → enhanced corporate value creation, with market efficiency serving as a partial mediator. The second is a firm-level channel: IQ → lower cost of capital / better governance / improved internal decisions → corporate value creation. The Resource-Based View (Barney, 1991) further suggests that sustained value creation requires firm-specific capabilities that extend beyond information transparency, explaining why the direct IQ→CVC effect is expected to be smaller than the total effect. Together these theories predict that both paths operate simultaneously and that market efficiency will exhibit complementary mediation between information quality and corporate value creation.

Information Quality and Market Efficiency

The relationship between information quality and market efficiency has attracted substantial scholarly attention across accounting and finance disciplines. The foundational proposition of the EMH — that asset prices rapidly incorporate all available information (Fama, 1970) — implies that the quality and accessibility of disclosed information are critical determinants of pricing efficiency (Li & Yu, 2023). Empirical evidence consistently supports this view: higher-quality financial reporting reduces information asymmetry, facilitating more accurate price discovery and enhancing market liquidity (Ehiedu & Obi, 2022; Igbekoyi et al., 2023). Ehiedu and Obi (2022) specifically document that accounting quality improvements are associated with tighter bid-ask spreads and greater price informativeness on the Nigerian Stock Exchange, providing contextually relevant evidence that disclosure quality effects are empirically detectable even in emerging markets characterised by structural trading frictions. Nwosu et al. (2024) provide complementary evidence that enhanced disclosure requirements and audit quality are associated with accelerated price discovery. Management forecasts and voluntary disclosures further sharpen market valuations by conveying incremental information beyond mandatory financial statements (Owonifari et al., 2023; Benjamin, 2024). On this basis:

H1: Information quality has a significant positive effect on market efficiency.

Information Quality and Corporate Value Creation

The direct relationship between information quality and corporate value creation operationalised in this study as Perceived Corporate Value Creation Capability (PCVC) operates through multiple channels grounded in Agency Theory and Signaling Theory. First, high-quality financial reporting mitigates agency problems and information risk, reducing the cost of capital and enabling firms to pursue positive-NPV projects that would otherwise be abandoned (Carvalho & Alves, 2023; Tapaninaho & Heikkinen, 2022). Second, access to timely and accurate information enables managers to identify operational inefficiencies,

optimise capital budgeting, and respond effectively to market conditions (Amin et al., 2023; Yin & Zhao, 2024). Third, credible disclosure practices improve stakeholder trust, building intangible reputational capital that sustains competitive advantage over time (Lawal et al., 2024a; Oladapo et al., 2025). Empirically, Lawal et al. (2024a) find that earnings quality metrics are positively correlated with Tobin's Q and market-to-book ratios among Nigerian listed firms. Although contingent effects have been noted the value relevance of disclosure quality is moderated by industry, institutional context, and firm-specific factors with the weight of evidence that supports a positive direct relationship:

H2: Information quality has a significant positive effect on corporate value creation.

Market Efficiency and Corporate Value Creation

Market efficiency — operationalised in this study as Perceived Market Informational Efficiency (PMIE), reflecting executive perceptions of pricing responsiveness rather than objective market microstructure — influences corporate value creation through both direct and indirect channels. In efficiently priced markets, security prices accurately reflect fundamental values, enabling optimal capital allocation across firms and industries (Ramos, 2024; Sofiyan, 2024). When prices credibly signal investment quality, managers receive informative feedback for strategic decisions, and investors can distinguish value-creating from value-destroying activities (Olohunlana et al., 2023). Efficient markets also discipline managers through the market for corporate control, reducing managerial opportunism and aligning incentives with shareholder wealth maximisation (Jensen, 1986; Kaczmarek, 2024; Okoye et al., 2024). While evidence from developed markets consistently finds a positive efficiency–value relationship (Walker et al., 2023), emerging market studies are more heterogeneous: institutional inefficiencies and information frictions can attenuate the beneficial effect of market efficiency on firm value (Ramos, 2024; Taiwo et al., 2022). These considerations motivate:

H3: Market efficiency has a significant positive effect on corporate value creation.

METHODOLOGY

Research Design, Sample, and Nigerian Context

This study adopts a cross-sectional quantitative survey design. Primary data were collected through structured questionnaires administered to senior executives and financial managers of publicly listed corporations in Nigeria. The unit of analysis is the firm, with one key informant the most senior executive with direct responsibility for financial reporting and investor relations representing each firm. This single-informant design is standard in executive survey research (Podsakoff et al., 2021) and avoids the need for within-group aggregation procedures.

The empirical context is exclusively the Nigerian capital market. The Nigerian Exchange Group (NGX), formerly the Nigerian Stock Exchange (NSE), is the largest and most active

stock exchange in West Africa. The NGX operates under oversight of the Securities and Exchange Commission (SEC) Nigeria. Mandatory disclosure standards are governed by the Financial Reporting Council (FRC) of Nigeria and the Companies and Allied Matters Act (CAMA) 2020. Nigeria adopted IFRS in 2012 and compliance levels have improved progressively, though enforcement remains uneven across sectors. Despite these frameworks, the NGX is characterised by moderate market depth, limited analyst coverage outside the banking and consumer goods sectors, and investor sophistication concentrated among institutional participants. These structural characteristics high information asymmetry, variable enforcement of disclosure obligations, and liquidity that varies markedly across sectors — make Nigeria an especially appropriate context for testing information quality effects on market efficiency and corporate valuation.

A G*Power (v3.1) power analysis was conducted to verify sample size adequacy. For the most complex regression equation (CVC predicted by IQ and ME), at $\alpha = 0.05$, power $1-\beta = 0.80$, and minimum expected $f^2 = 0.15$ (medium effect), the minimum required sample is $N = 55$. Under a conservative expectation of $f^2 = 0.10$, $N = 89$. The observed sample $N = 100$ comfortably exceeds both thresholds. Stratified random sampling was employed to ensure adequate industry representation. The sample frame comprised 450 eligible corporations satisfying: (1) minimum five consecutive years of NGX listing; (2) availability of complete financial data and annual reports; (3) market capitalisation exceeding ₦50 billion; and (4) willingness to participate. Six NGX sectors were represented: (1) Financial Services, (2) Consumer Goods, (3) Oil and Gas, (4) Industrial Goods, (5) ICT, and (6) Conglomerates. From 150 randomly selected firms, 112 responses were received; after screening for incomplete data, inconsistent responses, and statistical outliers (Mahalanobis distance), the final sample comprised 100 usable observations (response rate = 66.7%). Data were collected between January and April 2025 via online survey tools, direct email, and face-to-face interviews in Lagos, Abuja, and Port Harcourt. Procedural remedies to reduce common method bias included strong confidentiality guarantees, psychological separation of predictor and criterion variables, and reverse-coded attention-check items.

Control Variables

To mitigate omitted-variable bias, five firm-level control variables were included in robustness analyses: firm size (natural logarithm of total assets), firm age (years since NGX listing), financial leverage (debt-to-equity ratio), profitability (return on assets), and industry sector (six NGX sector dummy variables). These were extracted from audited annual reports and NGX filings. The extended structural specification for robustness checks follows: $CVC_i = \alpha + \beta_1 IQ_i + \beta_2 ME_i + \beta_3 SIZE_i + \beta_4 LEV_i + \beta_5 AGE_i + \sum \beta_k INDUSTRY_{ik} + \epsilon_i$. Robustness analyses using OLS regression with heteroscedasticity-robust standard errors on PLS composite scores confirmed that main findings remained substantively unchanged: $IQ \rightarrow ME$ $\beta = 0.698$, $p < 0.001$; $IQ \rightarrow CVC$ $\beta = 0.329$, $p < 0.001$; $ME \rightarrow CVC$ $\beta = 0.411$, $p < 0.001$. Ownership structure and board governance quality data were unavailable for all firms due to confidentiality constraints; this is acknowledged as a limitation in Section 5.

Measurement Instruments

All constructs were operationalised using multi-item reflective scales adapted from validated prior measures, adjusted for the Nigerian corporate context. A 7-point Likert format (1 = Strongly Disagree; 7 = Strongly Agree) was used throughout. The reflective measurement model is specified as: $IQ_j = \lambda_j IQ + \epsilon_j$ ($j = 1, \dots, 5$); $ME_j = \lambda_j ME + \epsilon_j$ ($j = 1, \dots, 4$); $CVC_j = \lambda_j CVC + \epsilon_j$ ($j = 1, \dots, 5$); where λ_j are factor loadings and ϵ_j are measurement errors. This reflective specification is appropriate because indicators covary as manifestations of the same underlying latent variable (Hair et al., 2019).

Information Quality (IQ) was measured with five items (Tapaninaho & Heikkinen, 2022) capturing accuracy, completeness, timeliness, consistency, and relevance. Sample items: "Our organisation provides accurate financial information to all stakeholders"; "Our financial reports are issued in a timely manner." Perceived Market Informational Efficiency (PMIE) was operationalised using four items adapted from Taiwo et al. (2022) and Okoye et al. (2024), capturing managerial perceptions of the speed and accuracy with which stock prices incorporate new information. Sample items: "Stock prices of our company quickly reflect new information released to the market"; "The market fairly values our company's securities relative to fundamentals." This construct is explicitly labelled as perceived informational efficiency rather than objective market efficiency, because measurement reflects executive perceptions of pricing responsiveness rather than direct market microstructure data such as bid-ask spreads or price delay statistics. This perceptual approach is pragmatically necessary given that objective high-frequency data are sparse for many NGX-listed firms; future research should supplement with objective proxies. Perceived Corporate Value Creation Capability (PCVC) was measured with five items capturing managerial assessments of the firm's capacity to generate sustained shareholder value and maintain competitive advantage. Sample items: "Our company consistently creates superior value for shareholders"; "We maintain strong and durable competitive advantages in our markets."

Analytical Procedures – Phase 1: Rasch Model Analysis

Phase 1 applied the Rating Scale Model (RSM) variant of the Rasch model (Andrich, 1978) using Winsteps software (version 5.4.0) to evaluate the psychometric quality of all scales prior to structural analysis. The RSM was selected because all items share the same ordered response categories (7-point Likert), making it more parsimonious than the Partial Credit Model. The RSM generalises the dichotomous Rasch probability formula $P(X_{ni}=1|\theta_n, \beta_i) = \frac{\exp(\theta_n - \beta_i)}{1 + \exp(\theta_n - \beta_i)}$ to polytomous items, modelling the probability of endorsing category k for person n on item i as a function of person ability θ_n , item difficulty δ_i , and category threshold τ_k (Andrich, 1978; von Davier, 2016). This pre-validation step is analytically justified on three grounds: (1) it provides sample-independent evidence of measurement quality before structural estimation; (2) it identifies and removes misfit items before they can bias structural parameter estimates; and (3) it supplies unidimensionality confirmation and DIF evidence that conventional reliability statistics (α , CR) cannot provide (Bond & Fox, 2013).

The following diagnostics were examined: (1) item fit (infit and outfit MNSQ, acceptable range 0.6–1.4; Linacre, 2023); (2) unidimensionality via PCA of Rasch residuals, requiring first-contrast eigenvalue < 2.0; (3) item threshold ordering, confirming monotonically ordered response category thresholds; (4) category functioning, confirming all seven response options were appropriately used; (5) person and item separation reliability; and (6) Differential Item Functioning (DIF) across industry sector and firm-size subgroups using Mantel-Haenszel statistics, with $|DIF\ contrast| < 0.50$ logits indicating negligible DIF. Local independence was confirmed: after extracting the primary dimension, no residual correlations exceeded $|0.30|$. All constructs satisfied all criteria.

Analytical Procedures – Phase 2: PLS-SEM

Phase 2 applied PLS-SEM using SmartPLS 4.0 with 5,000-resample bootstrapping for significance testing. PLS-SEM was selected over CB-SEM because: (1) the study is prediction-oriented rather than purely theory-confirmatory; (2) it is robust to nonnormality; (3) it handles complex models with small-to-medium samples efficiently; and (4) the focus on explaining endogenous construct variance aligns with PLS-SEM's variance-based optimisation (Hair Jr et al., 2017). The structural model is formally specified as: $ME = \gamma_1 IQ + \zeta_1$; $CVC = \gamma_2 IQ + \beta_1 ME + \zeta_2$; where γ_1 and γ_2 are exogenous-to-endogenous path coefficients, β_1 is the endogenous-to-endogenous path coefficient, and ζ_1 , ζ_2 are disturbance terms.

Measurement model quality was assessed via composite reliability ($CR \geq 0.70$), average variance extracted ($AVE \geq 0.50$), and HTMT ratio (< 0.85) for discriminant validity (Roemer et al., 2021). Bootstrapped 95% confidence intervals for HTMT ratios are reported alongside point estimates. Outer VIF values were computed for all indicators (all < 3.3 , confirming absence of indicator multicollinearity). Structural model multicollinearity was examined via inner VIF values (all < 3.3). Common method bias was evaluated through three complementary approaches: (1) Harman's single-factor test; (2) full collinearity VIF for all construct scores (Kock, 2015), with $VIF < 3.3$ indicating no critical lateral collinearity; and (3) a common latent factor (CLF) strategy in SmartPLS. Predictive relevance was assessed using Q^2 (blindfolding) and PLSpredict, with model RMSE and MAE compared to a naïve LM benchmark (Hair Jr, 2021). Model fit was assessed via SRMR (acceptable threshold < 0.08). Mediation was tested using bias-corrected bootstrap CIs following Hair et al. (2019). Because all data are cross-sectional and self-reported, potential endogeneity from reverse causality is explicitly acknowledged: firms with higher perceived value creation may invest more in information systems, and firms with better market pricing may have stronger disclosure incentives. Instrumental variable approaches or longitudinal panel data designs are required to establish causal directionality.

RESULTS

Descriptive Statistics and Preliminary Analysis

Table 1 presents descriptive statistics and Pearson correlations. Information Quality recorded the highest mean ($M = 5.42$, $SD = 0.87$), followed by Corporate Value Creation ($M = 5.28$, $SD = 0.93$) and Market Efficiency ($M = 4.86$, $SD = 1.04$). All interconstruct correlations were positive and significant ($r = 0.673$ – 0.721 , $p < 0.001$), providing preliminary support for the hypothesised relationships.

Table 1: Descriptive Statistics and Correlation Matrix ($n = 100$)

Variable	Mean	SD	IQ	ME	CV
Information Quality (IQ)	5.42	0.87	1		
Market Efficiency (ME)	4.86	1.04	0.673***	1	
Corporate Value Creation (CV)	5.28	0.93	0.721***	0.685***	1

Source: Authors' Computation (2026). Note. *** $p < 0.001$. SD = Standard Deviation. Pearson product-moment correlations.

Common method bias was assessed through three complementary approaches. First, Harman's single-factor test indicated that the first unrotated factor accounted for 38.4% of total variance, below the 50% threshold. Second, full collinearity VIF values were computed for all construct scores: IQ ($VIF = 1.94$), ME ($VIF = 2.18$), and CVC ($VIF = 2.07$), all well below the critical threshold of 3.3 (Kock, 2015), confirming absence of lateral collinearity. Third, a common latent factor (CLF) strategy was applied in SmartPLS; substantive path coefficients did not change meaningfully after partial out of CLF variance (maximum change = 0.04). Structural model VIF values were: $IQ \rightarrow ME = 1.00$; $IQ \rightarrow CVC = 1.95$; $ME \rightarrow CVC = 1.95$, all below 3.3, confirming absence of multicollinearity in structural paths.

Rasch Model Analysis Results

The Rasch RSM analysis confirmed adequate psychometric properties for all scales. All 14 items demonstrated acceptable fit: infit and outfit MNSQ values ranged between 0.86 and 1.15, within the 0.6–1.4 benchmark (Linacre, 2023). Point-measure correlations ranged from 0.66 to 0.75, confirming positive item-construct alignment. Item difficulty parameters spanned -1.76 to 2.47 logits, indicating broad coverage of the ability continuum. Unidimensionality was confirmed for all three constructs: PCA of Rasch residuals yielded first-contrast eigenvalues of 1.62 (IQ), 1.51 (ME), and 1.71 (CVC), all below the 2.0 threshold. Item threshold ordering was monotonically ordered for all items, confirming that response categories function as intended. DIF analyses revealed no substantial DIF ($|DIF \text{ contrast}| < 0.50$ logits) across industry sector or firm size subgroups for any item. Person-item maps indicated adequate coverage of the ability continuum, with mild ceiling effects (12% of respondents rated above the most challenging items).

Table 2: Rasch Model Item Statistics

Item	Measure (logits)	SE	Infit MNSQ	Outfit MNSQ	Point- Meas. Corr.
IQ1	-1.34	0.18	0.98	0.95	0.67
IQ2	-0.28	0.16	1.05	1.08	0.71
IQ3	0.52	0.15	0.89	0.87	0.74
IQ4	1.18	0.16	1.12	1.15	0.69
IQ5	2.47	0.19	0.95	0.92	0.68
ME1	-0.83	0.17	1.02	1.04	0.72
ME2	0.16	0.15	0.91	0.89	0.75
ME3	1.21	0.16	1.08	1.11	0.70
ME4	1.95	0.18	0.97	0.94	0.69
CV1	-1.76	0.19	1.04	1.06	0.66
CV2	-0.74	0.17	0.88	0.86	0.73
CV3	0.21	0.15	0.94	0.92	0.74
CV4	0.89	0.16	1.11	1.13	0.68
CV5	1.43	0.17	0.95	0.93	0.70

Source: Authors' Computation (2026).

Acceptable infit/outfit MNSQ range: 0.6–1.4 (Linacre, 2023).

Table 3: Rasch Model Summary Statistics

Construct	Person Reliability	Item Reliability	Person Separation	Item Separation
Information Quality	0.85	0.97	2.34	5.52
Market Efficiency	0.82	0.96	2.13	4.89
Corporate Value Creation	0.87	0.98	2.56	6.24

Source: Authors' Computation (2026). Person reliability ≥ 0.80 = high measurement quality. Separation > 2.0 = well-differentiated measurement.

Measurement Model Assessment

Table 4 presents measurement model results. All three constructs achieved Cronbach's α between 0.842 and 0.891, rho_A between 0.849 and 0.897, and composite reliability (CR) between 0.893 and 0.920, all exceeding the 0.70 threshold. Average Variance Extracted (AVE) values ranged from 0.673 to 0.698, surpassing the 0.50 benchmark and confirming convergent validity. All indicator loadings exceeded 0.70 (range: 0.781–0.867), with all t-values significant at $p < 0.001$, satisfying the formal convergent validity condition $CR = (\sum \lambda_i)^2 / [(\sum \lambda_i)^2 + \sum \text{Var}(\epsilon_i)] \geq 0.70$.

Table 4: Measurement Model Assessment Results

Construct	Cronbach's	Rh A	CR	AVE
Information Quality	0.876	0.883	0.911	0.673
Market Efficiency	0.842	0.849	0.893	0.676
Corporate Value Creation	0.891	0.897	0.920	0.698

Source: Authors' Computation (2026). Thresholds: α , rho_A, CR ≥ 0.70 ; AVE ≥ 0.50 .

Discriminant validity was assessed using the HTMT ratio (Roemer et al., 2021). All HTMT values fell below the conservative threshold of 0.85, with bootstrapped 95% confidence intervals confirming statistical separation across all construct pairs (Table 5).

Table 5: HTMT Ratios and Bootstrapped 95% Confidence Intervals

Construct Pair	HTMT	95% Lower	95% Upper	CI	Verdict
IQ – ME	0.789	0.698	0.861		Adequate
IQ – CVC	0.822	0.741	0.891		Adequate
ME – CVC	0.796	0.712	0.869		Adequate

Source: Authors' Computation (2026). HTMT < 0.85 confirms discriminant validity (Roemer et al., 2021). CI = bias-corrected bootstrap confidence interval, 5,000 resamples.

Structural Model and Hypothesis Testing

The structural model is specified as: $ME = \gamma_1 IQ + \zeta_1$ and $CVC = \gamma_2 IQ + \beta_1 ME + \zeta_2$. Structural path VIF values confirmed absence of multicollinearity (IQ→ME VIF = 1.00; IQ→CVC VIF = 1.95; ME→CVC VIF = 1.95, all < 3.3). SRMR = 0.061, below the 0.08 threshold, indicating acceptable model fit. PLS predict analysis confirmed out of-sample predictive relevance: model RMSE and MAE were lower than the naïve LM benchmark for all endogenous indicators, confirming genuine predictive power beyond explanatory fit (Hair Jr, 2021). Table 6 presents standardized path coefficients, standard errors, t-values, and hypothesis decisions.

Table 6: Structural Model Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	β	SE	t-value	p-value	Decision
H1	IQ → ME	0.716	0.058	12.345	< 0.001	Supported
H2	IQ → CVC	0.345	0.074	4.662	< 0.001	Supported
H3	ME → CVC	0.423	0.069	6.130	< 0.001	Supported

Source: Authors' Computation (2026). β = standardized path coefficient; bootstrapping 5,000 resamples, two-tailed test.

All three hypotheses were supported. Information quality exerts a strong positive direct effect on perceived market informational efficiency ($\beta = 0.716$, $t = 12.345$, $p < 0.001$; $f^2 =$

1.049), a moderate positive direct effect on perceived corporate value creation ($\beta = 0.345$, $t = 4.662$, $p < 0.001$; $f^2 = 0.187$), and market efficiency exerts a medium positive direct effect on corporate value creation ($\beta = 0.423$, $t = 6.130$, $p < 0.001$; $f^2 = 0.278$).

Table 7: Explanatory and Predictive Power

Endogenous Construct	R ²	R ² Adj.	Q ²	f ² (IQ)	f ² (ME)	SRMR
Market Efficiency	0.512	0.507	0.338	1.049	—	0.061
Corporate Value Creation	0.647	0.640	0.441	0.187	0.278	0.061

Source: Authors' Computation (2026). R²: 0.25 = weak, 0.50 = moderate, 0.75 = substantial. Q² > 0 = predictive relevance. f²: 0.02 = small, 0.15 = medium, 0.35 = large. SRMR < 0.08 = acceptable fit.

The structural model explains 51.2% of variance in perceived market efficiency and 64.7% in perceived corporate value creation — moderate and substantial explanatory power respectively (Hair Jr et al., 2017). These R² values must be evaluated alongside predictive Q² (0.338 and 0.441, both > 0) and PLS predict results, which together confirm that the model retains genuine out-of-sample predictive relevance. Effect size $f^2 = 1.049$ for IQ→ME confirms a very large structural effect; $f^2 = 0.187$ for IQ→CVC and $f^2 = 0.278$ for ME→CVC indicate medium effects.

Mediation Analysis

The indirect effect of information quality on corporate value creation through perceived market informational efficiency is calculated as: $IE = \gamma_1 \times \beta_1 = 0.716 \times 0.423 = 0.303$. The total effect is: $TE = DE + IE = 0.345 + 0.303 = 0.648$. The proportion of the total effect mediated through market efficiency is: $PM = IE/TE = 0.303/0.648 \approx 0.468$ (46.8%). The significant indirect effect (95% CI [0.203, 0.412], $p < 0.001$) alongside the significant direct effect ($\beta = 0.345$, $p < 0.001$) confirms complementary mediation (Table 8), whereby market efficiency amplifies and partially transmits the effect of information quality on corporate value creation.

Table 8: Mediation Analysis – Indirect Effects of IQ on CVC

Effect Type	Path	β	SE	95% CI Lower	95% CI Upper	P-value
Direct (DE)	IQ → CVC	0.345	0.074	0.201	0.489	< 0.001
Indirect (IE = $\gamma_1 \times \beta_1$)	IQ → ME → CVC	0.303	0.53	0.203	0.412	< 0.001
Total (TE=DE+IE)	IQ → CVC	0.648	0.062	0.528	0.768	< 0.001

Source: Authors' Computation (2026). Bias-corrected bootstrap CI, 5,000 resamples. Mediation type: Complementary. Proportion mediated $PM = IE/TE = 0.303/0.648 = 46.8\%$.

DISCUSSION

This study provides empirical evidence of the associations among information quality, perceived market informational efficiency, and perceived corporate value creation among NGX-listed firms in Nigeria. The strong positive association between information quality and perceived market efficiency ($\beta = 0.716$, $f^2 = 1.049$) is the largest structural path in the model and is particularly meaningful in the Nigerian institutional context. The NGX is characterised by variable enforcement of disclosure obligations by SEC Nigeria, limited analyst coverage outside the banking and consumer goods sectors, and investor sophistication concentrated among institutional participants. In this environment of elevated information asymmetry, incremental improvements in disclosure quality produce larger efficiency gains than in more mature markets, explaining the exceptionally large effect size. This finding is consistent with Signalling Theory (Spence, 1973): in markets where credible information is scarce, high-quality disclosures carry stronger signalling value and produce more pronounced reductions in pricing uncertainty (Ehiedu & Obi, 2022; Benjamin, 2024). It also reflects the structural reality that NGX corporate disclosures remain a primary pricing input due to limited alternative information channels.

The direct positive association between information quality and perceived corporate value creation ($\beta = 0.345$, $f^2 = 0.187$) reflects the firm-level channel through which transparency generates value, consistent with Agency Theory (Jensen & Meckling, 1976). The smaller effect size relative to the IQ→ME path suggests that internal value creation is constrained by factors orthogonal to disclosure quality including strategic capabilities, operational competence, and macroeconomic conditions especially salient in Nigeria (energy costs, infrastructure gaps, regulatory compliance burdens under CAMA 2020). The direct effect ($\beta = 0.345$) is substantially smaller than the total effect ($\beta = 0.648$), implying that market-level amplification via improved pricing efficiency materially enhances the ultimate valuation impact of disclosure improvements. The indirect effect (IE = 0.303, 46.8% of TE) reveals a dual-pathway architecture: information quality simultaneously reduces agency costs at the firm level and improves price discovery at the market level, explaining why transparency investments yield returns beyond the immediate cost-of-capital reduction.

The significant association between market efficiency and corporate value creation ($\beta = 0.423$, $f^2 = 0.278$) confirms the disciplinary and allocative roles of market pricing efficiency. In more efficiently priced segments of the NGX particularly large capitalisation banking and consumer goods firms with stronger institutional investor participation managers face stronger incentives to pursue value-maximising strategies through the corporate control market (Jensen, 1986). The medium effect size is consistent with the RBV (Barney, 1991): market efficiency is a significant but not sufficient condition for value creation, with firm-specific internal capabilities operating as a complementary force. The dual-pathway finding also resolves apparent tensions in the literature between firm-level disclosure studies and market microstructure studies by demonstrating that both mechanisms are operative and mutually reinforcing.

The Rasch RSM pre-validation added substantive value to the findings by confirming interval-level measurement properties, unidimensionality (first-contrast eigenvalues all < 2.0), absence of DIF across sectors, and monotonic threshold ordering.

These diagnostics provide assurance that the structural estimates are not inflated by measurement artefacts inherent in raw ordinal Likert data. Robustness checks incorporating firm size, age, leverage, profitability, and sector controls confirmed the stability of structural estimates, providing confidence that observed effects are not artefacts of firm heterogeneity.

This study has several limitations that should be addressed in future research. First, the cross-sectional design precludes causal inference; reverse causality is plausible firms with higher perceived value creation may invest more in disclosure systems and longitudinal or instrumental variable designs are needed to establish causal directionality. Second, the perceptual measurement of PMIE and PCVC, while theoretically defensible and pragmatically necessary given NGX data constraints, should be complemented by objective proxies in future research: Tobin's Q, Economic Value Added (EVA), Return on Invested Capital (ROIC), bid-ask spreads, return synchronicity, and analyst forecast accuracy. Third, the sample is restricted to large capitalisation NGX firms; generalisability to smaller or privately-owned enterprises requires separate investigation. Fourth, ownership concentration and board governance quality data were unavailable and should be incorporated as additional controls. Fifth, formal plagiarism screening via Turnitin or iThenticate should be conducted before final submission to verify text originality.

CONCLUSION

This study examined the associations among information quality, perceived market informational efficiency, and perceived corporate value creation among 100 NGX listed firms in Nigeria, using an integrated Rasch RSM and PLS-SEM analytical framework. All three hypotheses were supported: information quality is positively associated with both perceived market efficiency and perceived corporate value creation, and market efficiency positively predicts corporate value creation. Complementary mediation was confirmed: market efficiency transmits 46.8% of the total information quality effect on corporate value creation ($IE = \gamma_1 \times \beta_1 = 0.303$; $PM = 46.8\%$), with a significant direct effect also retained.

The study makes four distinct contributions. Methodologically, the integration of Rasch RSM pre-validation with PLS-SEM structural analysis overcomes the ordinal measurement limitations of raw Likert data and provides unidimensionality and DIF evidence unavailable from conventional reliability statistics. Theoretically, the dual pathway mediation architecture extends Agency Theory by demonstrating that the cost of-capital reduction channel operates alongside a market-level amplification mechanism in an emerging market context. Contextually, this is the first empirical test of this integrated framework in the Nigerian capital market, demonstrating that disclosure quality effects are both large and practically significant in a market characterised by structural information asymmetries. Practically, the findings generate the following specific recommendations: (1) For boards and management:

invest in integrated reporting quality and disclosure architecture as a strategic value-creation tool — the dual-pathway mechanism means returns accrue through both direct agency cost reduction and market-level amplification of valuations, not merely through compliance. (2) For regulators (SEC Nigeria, FRC of Nigeria): strengthen enforcement of IFRS compliance, reporting timeliness, and disclosure accuracy standards under CAMA 2020; the large IQ→ME effect size demonstrates that regulatory improvements in disclosure quality translate into substantial market efficiency gains in the NGX context. (3) For investors: incorporate disclosure quality scores into investment screening criteria and adjust valuation multiples downward for firms with poor informational transparency; the evidence confirms that disclosure quality is a material pricing factor on the NGX. (4) For listed firms: treat information quality investment as a strategic priority rather than merely a compliance obligation — returns materialise through both internal capability development and market recognition channels.

Future research should employ longitudinal designs, objective market microstructure measures, broader samples including smaller NGX-listed and privately owned firms, and additional governance controls (ownership concentration, board independence) to extend and validate these findings across emerging markets.

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**MACROECONOMIC RISK FACTORS AND STOCK MARKET RETURNS IN NIGERIA:
EVIDENCE FROM ARDL AND TODA-YAMAMOTO CAUSALITY APPROACHES**

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Abstract

This study re-examines the determinants of stock market returns in Nigeria using a parsimonious econometric framework that integrates the Autoregressive Distributed Lag (ARDL) model with the Toda–Yamamoto–Dolado–Lütkepohl (TYDL) causality approach. Annual data from 1985 to 2024 are analysed to capture both long-run relationships and short-run dynamic effects among major macroeconomic and financial variables. Stock returns are measured using a logarithmic transformation to ensure variance stability. The ARDL results revealed that only inflation exerts a statistically significant positive long-run effect on SMR, while other macroeconomic variables were found to be insignificant in both the long run and short run. The error correction mechanism confirmed the existence of a stable long-run relationship, although the adjustment process exhibited overshooting behaviour. The TYDL causality results further indicated that the Treasury bill rate Granger-causes SMR, while most other macroeconomic variables do not exhibit significant causal influence. In addition, strong interrelationships were observed among macroeconomic variables, particularly between inflation and interest rate, as well as oil price and exchange rate, while SMR remained largely weakly endogenous within the system. The findings suggest that stock market performance in Nigeria is not broadly driven by conventional macroeconomic fundamentals but is instead influenced by a limited number of key variables, particularly inflation and interest rate signals. The study concludes that macroeconomic transmission to the stock market is selective and constrained, with behavioural and structural factors likely playing a significant role in shaping market outcomes. The study recommends stronger monetary policy transmission, improved market efficiency, and enhanced institutional frameworks to strengthen the responsiveness of the stock market to macroeconomic conditions.

Keywords: Autoregressive model, Exchange Rate Dynamics, Granger Causality (TYDL), Macroeconomic Indicators, and Stock Market Returns

INTRODUCTION

The Nigerian stock market is a vital component of the country's financial system, serving as a platform for capital formation, investment diversification, and channelling savings into productive enterprises. By enabling publicly-listed firms to raise equity capital and investors to realise returns from both dividends and price appreciation, the stock market provides an essential mechanism for economic growth and development. In Nigeria, the performance of the stock market is intimately linked with macroeconomic conditions broad-based variables such as inflation, interest rates, exchange rate movements, money supply, and gross

domestic product (GDP) growth play salient roles in shaping the behaviour of stock returns. Understanding how these macroeconomic determinants affect stock market returns is of high importance for several reasons. For investors, a sound grasp of the macro-financial linkages supports portfolio allocation decisions, risk management, and market timing strategies. For policymakers and regulators, monitoring key macro variables can inform capital market policy, monetary and fiscal interventions, and regulatory oversight aimed at fostering market stability, liquidity, and investor confidence. For financial analysts and academics, mapping the dynamic interplay between macro-financial variables and equity returns enriches the literature on emerging markets and informs the modelling of stock market behaviour under varying economic regimes

A wide body of empirical research has explored how inflation, interest rates, exchange rates, money supply (monetary aggregates), and GDP growth influence stock market performance. In the Nigerian context, several studies have produced mixed results, underscoring the complexity of the stock-market/macro-economy nexus. For example, recent work by Ibekwe (2023) on the Nigerian equity market covering 1999-2021 found that inflation and GDP growth had significant and negative effects on the All-Share Index in both the short and long run, whereas interest and exchange rates were not significant drivers. Similarly, a 2024 study by Evbayiro-Osagie et al., which utilised data from 1987-2022 and applied an ARDL framework, reported that macrovariables (money supply, exchange rate, inflation, etc.) had a significant impact on stock returns, and recommended, amongst other things, that the government prioritise price stability and manage interest and exchange rates carefully.

More recently, research by Jacob and Udo (2022) found that GDP growth, broad money supply, exchange rate, and savings interest rate positively affected stock market performance in Nigeria, while inflation had a negative effect. This heterogeneous pattern of findings, some variables positively associated, others negatively, and with varying levels of statistical significance, reflects the intricacies of the Nigerian capital market environment. The macroeconomic landscape in Nigeria has noticeably evolved in recent years. According to the African Development Bank, Nigeria's inflation rate rose to 24.5 % in 2023 from 18.8 % in 2022, while the naira underwent a major depreciation following the June 2023 float, leading to elevated exchange-rate volatility, tighter monetary policy, and slower GDP growth (2.9 % in 2023) than in previous years. These developments have important implications for the equity market: heightened inflation erodes real returns, sharp currency movement affects foreign investor sentiment, and monetary tightening (via higher policy rates) raises discount rates for equities.

Major policy shifts such as the removal of fuel subsidies, currency devaluation and reform of importation regimes under the administration of Bola Tinubu have transformed macro-financial interactions in Nigeria. The removal of subsidies has triggered higher consumer prices; the free-floating naira has introduced increased exchange risk; and monetary authorities have had to respond to rising inflation and declining real interest rates. These reforms may alter the traditional relationships between macroeconomic variables and stock market returns; for instance, the elasticity of stock returns to inflation or exchange rate

changes may have changed post-reform. Despite its strategic importance, the Nigerian stock market remains characterised by high volatility, episodic downturns, liquidity constraints, and investor sentiment swings. From the standpoint of portfolio management, this environment creates significant risk and uncertainty: fluctuating returns make it harder for investors to plan long-term investments, and can deter participation by risk-averse domestic and foreign investors alike. The dynamics of macro shock transmission (e.g., a spike in inflation or a currency depreciation) can rapidly translate into equity market instability, compounding the challenges of market development.

While substantial empirical work has been conducted, the evidence remains inconclusive in several respects. Some studies point to a strong influence of inflation and GDP growth, others to money supply and exchange rate effects, and still others find weak or inconsistent links. For example, the recent study by Elijah et al. (2025) covering 1986-2023 reports that money supply and exchange rate had positive long-run influence on stock market performance in Nigeria, whereas interest rate and external debt exerted negative effects. At the same time, others suggest that variables like interest rate may be statistically insignificant in some models despite economic expectations of a relationship. In addition, the changing economic policy regime (floating exchange rate, subsidy removal, rising inflation) may have shifted the structural relationships between macro variables and stock returns, implying that earlier findings may no longer hold, or may need re-examination under the new context. There is thus a need for updated and comprehensive studies that (i) use more recent data, (ii) incorporate structural breaks or regime shifts (policy reforms, exchange regime change), (iii) consider additional macro or financial variables (e.g., monetary policy rate spreads, foreign portfolio flows, exchange rate volatility), and (iv) examine both short-run and long-run dynamics of stock returns in Nigeria.

In light of the foregoing, this study seeks to investigate the determinants of stock market returns in Nigeria with a specific focus on how key macroeconomic variables (inflation, interest rate, and exchange rate, money supply, and GDP growth) affect equity returns. By doing so, it aims to update the empirical evidence with more recent data and assess whether the traditional determinants remain significant under the evolving macro-financial environment

Empirical studies have explored these relationships with varying conclusions. For instance, Fagunmoju et al. (2021) found that money supply and industrial production positively and significantly affect stock returns, while exchange and inflation rates have a negative impact. Similarly, Akanbi (2025) highlighted that the overall macroeconomic environment, inflation, and interest rate spread negatively influence stock market performance, albeit insignificantly. These mixed findings underscore the complexity of the Nigerian stock market's response to macroeconomic dynamics. Recent economic reforms, such as the removal of fuel subsidies and currency devaluation under President Bola Tinubu's administration, have further complicated the macroeconomic landscape. These policy shifts have led to heightened inflation and exchange rate volatility, factors known to influence investor behaviour and stock market returns. Despite the critical role of the stock market in

Nigeria's economic development, it remains characterised by volatility and unpredictability. Investors often grapple with fluctuating returns, making portfolio management challenging and potentially deterring long-term investment

While numerous studies have examined the relationship between macroeconomic variables and stock market returns, the evidence remains inconclusive. For example, Yusuf et al. (2025) observed that money supply and interest rates have negative effects. Conversely, Udo et al. (2022) reported that GDP growth, money supply, exchange rate, and savings interest rate [positively affect stock market performance, while inflation exerts a negative influence. These discrepancies highlight the need for further investigation into determinants of stock market returns in Nigeria. Moreover, the recent economic reforms have introduced new variables into the equation, such as increased inflation and exchange rate volatility, which may alter traditional relationships between macroeconomic factors and stock market performance. The lack of consensus in existing literature, coupled with evolving economic policies, underscores the necessity for updated and comprehensive studies to elucidate these dynamics

LITERATURE REVIEW

Understanding what drives stock market returns is fundamental for investors, policymakers, and researchers because market returns reflect both expected future cash flows and the discount rates that price those cash flows (Ross, 1976; Acemoglu, 2012). In emerging markets such as Nigeria, returns are influenced by an interplay of domestic macroeconomic fundamentals, market microstructure characteristics, firm-level attributes, global risk factors, and the institutional/political environment. A core strand of the literature links stock returns to macroeconomic forces that affect expected cash flows and discount rates. Common macro variables studied include inflation, interest rates, output growth, exchange rates, and commodity prices (especially oil for oil dependent economies like Nigeria). Theory predicts that higher inflation raises nominal discount rates and can depress real returns (Fisher-type relationships), while stronger GDP growth improves corporate profits and supports higher returns. Exchange-rate depreciation and heightened exchange-rate volatility can negatively affect returns through higher input costs and currency risk, or positively affect some exporters via competitiveness channels. For Nigeria specifically, several empirical studies identify inflation, real interest rates, exchange-rate (or real effective exchange-rate) movements and world oil prices as important macro drivers of stock market performance.

Theoretical Perspectives

Theories serve as the backbone of empirical investigations, providing structured explanations for the complex interactions between macroeconomic indicators and stock market returns. In financial economics, stock return behaviour is often linked to investors' rational and irrational responses to information, risk perceptions, and expectations of future cash flows. The following theories were considered relevant to the study

Arbitrage Pricing Theory (APT)

Ross's (1976) Arbitrage Pricing Theory extends beyond the CAPM by suggesting that stock returns are influenced by multiple systematic risk factors, rather than a single market factor. In the Nigerian context, APT is highly suitable since domestic stock returns are likely affected by diverse macroeconomic risks, including exchange-rate movements, oil-price fluctuations, inflation, and monetary policy variables. Each factor represents a distinct source of systematic risk priced by the market. This provides a flexible framework for empirically modelling the relationship between macroeconomic indicators and stock returns without assuming market-wide beta sufficiency. For instance, Nigeria's oil dependence implies that global oil price shocks may be a priced factor, while exchange-rate volatility reflects external vulnerability, making them strong candidates within an APT-based specification (Chen et al, 1986; Bekaert & Harvey, 1997)

Behavioural Finance Theories

While classical theories assume rational expectations, behavioural finance highlights psychological biases and investor sentiment as important drivers of returns (Campbell & Shiller, 1988, Apergis & Eleftheriou, 2002; Barberis & Thaler, 2003; Umar et al., 2020). In Nigeria's relatively shallow and retail-driven stock market, investor overreaction, herding, and speculative behaviour often exacerbate market responses to macroeconomic news. For example, sharp swings in exchange rates or government policy announcements frequently trigger outsized price movements that cannot be fully rationalised by fundamentals alone. This suggests that non-fundamental factors may interact with macroeconomic variables to shape stock returns, reinforcing the importance of including measures of volatility, liquidity, and institutional confidence in empirical models.

This study is anchored on the Arbitrage Pricing Theory (APT), which posits that stock returns are driven by multiple systematic risk factors. In this context, macroeconomic variables such as inflation, exchange rate, money supply, oil prices, and foreign capital flows represent priced sources of risk. Unlike single-factor models, APT allows flexibility in specifying country-specific determinants, making it particularly suitable for an emerging economy like Nigeria, characterised by macroeconomic volatility and structural instability.

The APT is particularly suitable for the Nigerian stock market for three reasons. First, Nigeria's economy is characterised by high exposure to diverse macroeconomic shocks, especially oil-price volatility, exchange-rate fluctuations, and inflationary pressures. These conditions cannot be adequately explained by a single market risk factor as in the CAPM. Second, empirical evidence from Nigerian and other emerging markets shows that stock returns are simultaneously shaped by macroeconomic fundamentals, liquidity measures, and institutional factors, consistent with the multifactor nature of the APT (Adekoya & Oliyide, 2021). Third, the flexibility of the APT allows researchers to empirically specify relevant factors based on country-specific realities, making it well-suited for Nigeria, where oil dependence, policy uncertainty, and institutional quality are important return drivers.

Empirical Review

Ogunsakin and Awe (2020) investigated the macroeconomic determinants of stock market performance in Nigeria between 1985 and 2018. The source of the data for the study was from the World Bank Development Indicators, 2020 edition and the Central Bank of Nigeria statistical bulletin. The study employed the ARDL co-integration approach as an estimation technique. Findings from the study showed that inflation rate, real interest rate, real effective exchange rate and world oil price were the major determinants of Nigeria's stock market performance during the study period. Based on these findings, the study therefore concludes that both endogenous and exogenous macroeconomic variables determine Nigeria's stock market performance. Hence, the activities in the global oil market should be monitored in formulating policies to enhance stock market performance in Nigeria.

Ekpete (2012) examined the relationship between macroeconomic effects on stock market returns in Nigeria, employing the CBN annual time series data spanning from 1985 to 2019. The study applied unit root test, auto-regressive distributed Lag and Granger causality tests to investigate the relationship between the all share index and interest rate, inflation rate, and exchange rate. The unit root test results for stationarity revealed that all the variables are reliable for economic decisions. The findings of the study revealed that the interest rate was negative and not significantly related to the all share index; also, the inflation rate was negative and not significantly related to the all share index, while the exchange rate was positive and significantly related to the all share index. The Granger causality result revealed unidirectional causality, which implies no causality. This study recommends that macroeconomic factors should be adequately managed by the Central Bank of Nigeria with a view to promoting investors' confidence in the stock market.

Ogiemudia (2022) examined the link between market risk and equity return in Nigeria from 1980 to 2019. It employs the vector error correction model (VECM) to determine the short-run dynamics and long-run effects of market risk factors on stock return. The findings revealed that a dynamic relationship exists between market risk factors and stock returns in Nigeria. Also, exchange rate risk and oil price risks have a significant influence on stock return, while inflation and interest rate risk, and political instability risks have a non-significant impact on stock return. Finally, a unidirectional relationship was detected between interest rate, oil price, political instability and stock return. The study concludes that market risk factors of exchange rate, oil price, interest rate and political instability risks are major determinants of stock return in Nigeria. It is recommended that rational investors seeking maximum returns should minimise market risk factors by diversifying their portfolios and studying the risk behaviour and level in the market before taking investment decisions.

Arikewuyo (2023) examined the exchange rate gap shock–stock market deepening nexus in Nigeria using the structural VAR-X (SVAR-X) technique for the period 1986Q1 to 2018Q4. Findings reveal that the exchange rate gap shock has a negative but statistically not significant effect on stock market deepening in Nigeria. It was also found that the exchange rate passed through the interest rate from the second to the thirteenth quarter, and further

through financial openness, whose effect, like the exchange rate gap, was negative. This implies that the exchange rate gap is significantly and negatively related to interest rate and financial openness in Nigeria. It is therefore recommended that the monetary authority should keep a constant tab on the gap between official and parallel market exchange rates, as its widening can have a damaging effect on stock market deepening. In addition, there is a need to establish a hedging instrument market to increase the resilience of the stock market and improve stock market deepening in Nigeria.

Adumah et al. (2024) investigated the impact of foreign portfolio investment (FPI) on the development of the Nigerian capital market from 1986 to 2023. Data were sourced from the Central Bank of Nigeria Statistical Bulletin and the National Bureau of Statistics. A quantitative methodology was employed, utilising the Johansen cointegration test, Vector Error Correction Model (VECM), and Granger causality test to analyse secondary time-series data. The Johansen co-integration test revealed a longrun relationship among the variables, while the VECM indicated that FPI negatively impacts market capitalisation. Additionally, the Granger causality test demonstrated unidirectional causality from capital market development to FPI. To address the identified challenges, the study recommends that policymakers create a more supportive environment that ensures foreign investors can repatriate capital and earnings. The government should prioritise exchange rate stability that reflects market realities to enhance investor confidence. Investments in advanced technology are crucial to improving efficiency and accountability in market transactions. By adopting these targeted recommendations, Nigeria can better leverage FPI to foster capital market growth and promote sustainable economic development.

Takyi and Bentum-Ennin (2021) evaluated and quantified the short-term impact of the coronavirus disease of 2019 (COVID-19) on stock market performance in thirteen (13) African countries, using daily time series stock market data spanning 1st October 2019 to 30th June 2020. The study employed a novel Bayesian structural time series approach (a state-space model) to estimate the relative effects of the COVID-19 pandemic on stock market performance in those countries. Generally, our Bayesian posterior estimates show that, in relative terms, stock market performances in Africa have significantly reduced during and after the occurrence of COVID-19, usually between -2.7 % and -21 %. At the heterogeneous level, we find that 10 countries have their stock markets significantly and adversely affected by the COVID-19 pandemic, whereas the remaining 3 countries see no significant impact (or a rather short-lived negative significant impact) of the COVID-19 pandemic on their stock markets. We find that, within our sample period, there is almost no chance that the COVID-19 pandemic would have positive effects on the stock market performance in Africa. Our findings contribute to the discussion and research on the economic impact of the COVID-19 pandemic by providing empirical evidence that the pandemic has restrictive effects on stock market performance in African economies.

Okoro and Okoro (2023) examined the effect of macroeconomic variables on the stock market performance in Nigeria from 1999 to 2021 using the Auto Distributive Lag Model (ARDL) of Multiple Regression. Market capitalisation (MCAP), aggregate spending (AGS),

money supply (MS), the exchange rate (EXR), and inflation rate (INF), and interest rate (INT) data were sourced from the CBN Annual report. ARDL cointegration bound test and error correction model estimation techniques were employed. The findings of the ARDL revealed that the exchange rate, interest rate, and money supply were all significantly related to market capitalisation in Nigeria at 5% levels of significance, while aggregate spending was insignificant. The results also concurred with the a priori expectations as the inflation rate showed a negative effect on the stock market performance. The study concluded that there exists a long-run relationship between macroeconomic variables and market capitalisation in Nigeria, and recommended that the Nigerian government should foster an economic policy capable of ensuring stability in the stock market as it has a commensurate effect on the general growth of the economy.

Ebi and Galeed (2022) examined the relationship between stock market performance and macroeconomic fundamentals in Nigeria. It employed the longitudinal research design, and secondary data sourced from the Central Bank of Nigeria statistical bulletin over the period of 1981 to 2018. Crude oil price, Consumer Price Index, Gross Domestic Product and Money Supply were the independent variables while Annual Market Capitalization of the Nigerian Stock Exchange was used as a proxy for stock market performance. Analytical techniques employed for this study included the Unit Root test, Co-integration test, Error Correction Model and Granger causality test. The study found a significant and positive relationship between crude oil price, money supply and average market capitalisation; a significant but negative relationship between consumer price index and average market capitalization while an insignificant but positive relationship was observed between gross domestic product and average market capitalisation. Further, a long-run relationship exists among the variables; thus, disequilibrium in stock market is offset by long-run changes in macroeconomic fundamentals.

In addition, a unidirectional relationship exists between average market capitalization and gross domestic product; bidirectional relationship exist between money supply and average market capitalization, and consumer price index and average market capitalization; but no causality exist between crude oil price and average market capitalization. Based on these findings, the study recommends for increased output by way of encouraging more investments in the stock market. In addition, the stock market should improve on information dissemination so as to enlighten corporate organizations about access to long-term funds that will enable them increase stock market activities. Gina et al. (2023) examined foreign direct investments and capital market development in Nigeria. The importance of foreign direct investments in complementing domestic savings to promote capital accumulation for economic growth, and through its feedback effect, enhance capital market development is settled in the literature. Employing the ARDL approach to analyze the short run dynamic relationships and long run stable relationships between foreign direct investments and capital market development (as proxied by market capitalization, turnover ratio and the All share index) in Nigeria for the period 1986 to 2021, the study finds that FDIs have positive and significant impact on capital market development in Nigeria, in the

long run. Furthermore, the study notes that gross capital formation serves as catalyst to FDI inflows and capital market development. The study recommends, among others, that efforts should be intensified to revamp the Nigerian economy and rejig the capital market such that the current situation where foreign investors face exchange control difficulty in the repatriation of profits genuinely made in the course of doing business in Nigeria can be avoided.

Ghanador (2024) investigated the influence of macroeconomic variables on stock price behaviour in Nigeria. The annual time series data spanning through the period of 1995 to 2021 and historical data research design were adopted for the study. The Augmented Dickey Fuller (ADF) and Phillips-Perron test were used to test for stationarity of the variables. Other econometric tests like Ramsey Reset test, Heteroskedasticity test, Cusum test, Johansen cointegration test, Parsimonious Error Correction model and the fully modified Least Square were used for the data analysis. The findings from the short-run result shows that all the macroeconomic variables adopted for the study have no positive and significant influence on stock price except inflation whose impact is positive and significant. However, the result from the long-run analysis reveals that interest rate and money supply have inverse and insignificant influence on stock price behaviour. Inflation has a positive and insignificant effect while exchange rate has a positive and significant influence on stock price behaviour in Nigeria. The result from the Johansen Cointegration and the fully modified least squares shows evidence of long-run relationship between the Dependent and independent variables. The study therefore suggest that the government through its relevant agencies should formulate good macroeconomic policies in order to enhance stock market performance.

Udo et al. (2022) investigated the effects of selected macroeconomic variables on stock market performance in Nigeria. The study employed time-series data obtained from the Central Bank of Nigeria's statistical bulletin and World Development Indicators. Stock market performance was measured using the all-shares index while the identified macroeconomic variables included GDP growth, broad money supply, exchange rate, savings interest rate, and inflation rate. An Autoregressive Distributive Lag (ARDL) estimation technique was used to establish the long run relationship among the variables, and it was revealed that a long run relationship existed among the variables in the estimated model. The result shows that macroeconomic variables such as gross domestic product, broad money supply, exchange rate, and savings interest rate have a positive effect on stock market performance in Nigeria. On the other hand, the results showed that the inflation rate has a negative effect on stock market performance in Nigeria. Predicated on the result, the study recommended that policies to increase gross domestic product, exchange rate, interest rate, and money supply should be implemented because they can lead to an improvement in the performance of the stock market, while the inflation rate should be maintained at a single digit to prevent its negative effect on the performance of the stock market in Nigeria.

Alalade et al. (2024) evaluated the critical role of foreign portfolio investment (FPI) in enhancing the liquidity and efficiency of Nigeria's capital markets from 1993 to 2023. FPI plays a pivotal role in broadening the spectrum of viable financing opportunities by

promoting market depth and expansion. This analysis, utilizing an ex-post facto research design, draws on data from the Central Bank of Nigeria Statistical Bulletin to investigate the effects of macroeconomic variables, specifically the interest rate and exchange rate, on FPI. Using a 5% level of significance for panel data analysis, the Fully Modified Ordinary Least Squares (FMOLS) estimation method showed that the interest rate and FPI were related in a way that was opposite to what was expected. These findings highlight the substantial impact of macroeconomic indicators such as interest and exchange rates on FPI flows into Nigeria. The research not only establishes a critical correlation between international portfolio flows and key domestic economic metrics, including GDP growth rate, foreign reserves, inflation, and interest rates, but also underpins the necessity for targeted policy measures. Policymakers should formulate and implement refined interest rate strategies to attract foreign portfolio investments, thereby enhancing Nigeria's economic landscape. Such strategic policy measures should aim to stabilize the macroeconomic environment, ensuring a conducive atmosphere for FPI and subsequently reinforcing Nigeria's financial market infrastructure.

Synthesis of Extant literature

Taken together, the reviewed studies do not present contradictory evidence in a strict sense; rather, they reveal that Nigeria's stock and capital markets respond conditionally, depending on macroeconomic stability, structural distortions, capital flow composition, risk exposure, and methodological framing. When these conditioning factors are jointly considered, the observed contrasts become mutually reinforcing. The apparent contrast between studies that find strong macroeconomic effects (Ogunsakin & Awe, 2020; Okoro & Okoro, 2023; Udo et al., 2022; Ebi & Galeed, 2022) and those reporting weak or insignificant effects (Ekpote, 2012; Ghanador, 2024; Arikewuyo, 2023) can be harmonised by recognising that macroeconomic variables exert influence only when transmission mechanisms are effective. In periods of policy credibility, moderate inflation, and exchange rate coherence, macroeconomic variables significantly explain stock market performance. Conversely, when markets are shallow, policy signals are inconsistent, or structural rigidities dominate, macroeconomic effects weaken or become statistically insignificant. Thus, macroeconomic fundamentals are necessary but not sufficient conditions for stock market performance in Nigeria. The divergence between studies reporting positive exchange rate effects and those identifying negative or insignificant impacts from exchange rate gaps reflects two complementary realities. Moderate and market-reflective exchange rate movements enhance competitiveness and firm profitability, thereby supporting stock market performance (Ekpote, 2012; Udo et al., 2022; Ghanador, 2024).

However, when exchange rate management creates misalignment between official and parallel markets, as shown by Arikewuyo (2023), the resulting uncertainty erodes investor confidence and suppresses stock market deepening. Hence, the exchange rate supports market performance only when it is unified, credible, and predictable. The mixed evidence on inflation and interest rate effects is harmonised by recognising their asymmetric and regime-dependent roles. Inflation generally undermines stock market performance by

reducing real returns and increasing uncertainty (Ogunsakin & Awe, 2020; Udo et al., 2022). However, in high-inflation environments where equities function as partial inflation hedges, inflation may exhibit a short-run positive association with stock prices (Ghanador, 2024). Interest rates, by contrast, show weak and inconsistent effects because Nigeria's financial system does not transmit monetary policy efficiently to the equity market. This explains why interest rates are often insignificant (Ekpete, 2012; Ogiemudia, 2022) despite their theoretical importance.

The contrasting findings on oil price effects are reconciled by recognising that oil prices influence the stock market indirectly rather than directly. Studies that model oil price as a risk or volatility channel (Ogunsakin & Awe, 2020; Ogiemudia, 2022) find significant effects, while those treating oil price as a standalone macro variable (Ebi & Galeed, 2022) often do not. Thus, oil price shocks matter primarily through their impact on exchange rates, fiscal balances, and investor sentiment, not through direct valuation channels. The contrast between positive FDI effects (Gina et al., 2023) and negative or volatile FPI effects (Adumah et al., 2024; Alalade et al., 2024) reflects differences in the quality and horizon of capital flows. FDI, being long-term and productive, strengthens market fundamentals and supports capital market development; however, FPI, being short-term and return-sensitive, amplifies volatility and can weaken market capitalisation when macroeconomic conditions are unstable. Therefore, capital market performance in Nigeria depends less on the volume of foreign capital and more on its composition and stability.

Risk-based and shock-focused studies (Ogiemudia, 2022; Arikewuyo, 2023; Takyi & Bentum-Ennin, 2021) harmonise the broader literature by explaining why traditional macroeconomic models sometimes fail. Nigeria's stock market is highly exposed to political risk, exchange rate uncertainty, global oil price volatility, and exogenous shocks such as COVID-19. When these risks dominate, macroeconomic fundamentals alone cannot explain market performance, leading to apparent inconsistencies across studies. When synthesised, the literature converges on a single insight that Nigeria's stock and capital market performance is macroeconomically driven, structurally constrained, risk sensitive, and capital-composition dependent. In effect, macroeconomic fundamentals matter, but their effectiveness is conditioned by exchange rate credibility, inflation dynamics, institutional strength, risk exposure, and the nature of foreign capital inflows. Apparent contradictions in the literature therefore reflect different windows into the same complex reality, rather than genuine empirical disagreement.

METHODOLOGY

This study adopts a parsimonious ARDL framework combined with the Toda Yamamoto Causality approach. The ARDL approach was adopted because it accommodates variables integrated of order $I(0)$ and $I(1)$, provides efficient small sample estimates, and distinguishes between short-run and long-run dynamics with the potential of taking care of endogeneity. The Toda–Yamamoto causality technique was further employed because it permits causality testing irrespective of integration and cointegration properties while avoiding potential pre-

test bias. To avoid over parameterisation, given the sample size ($T=40$), the model is restricted to key macroeconomic variables consistent with APT. The dependent variable is the stock market return. Stock market return in this study is defined as the logarithm of the percentage change in the value of the stock market index. The explanatory variables are: inflation rate, defined as a general increase in prices measured by the consumer price index (CPI), Exchange rate, which is the rate of naira to US dollar, money supply, defined as the total money in circulation including savings and demand deposit, oil price which is the Brent crude oil price per barrel, and foreign portfolio investment (FPI), which is measured as net inflow/outflow of capital into the Nigeria stock market as a percentage of Gross Domestic Product. Annual data covering 1985-2024 are sourced from World Development Indicators (WDI, 2025). To account for structural instability, the study employs a multiple structural breakpoint approach. The inclusion of the structural dummy variables accounts for major exogenous shocks and policy regime shifts capable of altering stock market behaviour and macroeconomic relationships in Nigeria. Specifically, the 2008 dummy captures the effects of the global financial crisis, the 2013 dummy captures the period of oil price instability associated with global crude oil market disruptions, while the 2023 dummy reflects the exchange rate liberalisation policy implemented in Nigeria. Incorporating these dummy variables helps control for structural breaks and improves the stability and reliability of the estimated ARDL model.

Model Specification

Functional Specification

$$SMR_t = f(INFL_t, TBR_t, lnEXCR_t, MSGR_t, OIL_t, DUM2008_t, DUM2013_t, DUM2023_t) \quad (1)$$

The econometric model of equation (1)

$$SMR_t = \beta_0 + \beta_1 TBR_t + \beta_2 INFL_t + \beta_3 lnEXCR_t + \beta_4 MSGR_t + \beta_5 OIL_t + \beta_6 FPI_t + \beta_7 DUM2008_t + \beta_8 DUM2013_t + \beta_9 DUM2023_t + \mu_t \quad (2)$$

Whereas:

SMR = Stock Market Return (measured by $\ln ASI_t - \ln ASI_{t-1}$)

INFL = Consumer Price Index

TBR = Treasury Bill Rate

lnEXCR = natural log of Exchange Rate

MSGR = Money Supply growth rate

OIL = Brent Crude Oil Price per barrel (USD)

FPI = Foreign Portfolio Investment

DUM2008 = structural break dummy variable representing the 2008 global financial crisis.

DUM2013 = structural break dummy variable representing the 2008 oil instability

DUM 2023 = structural break dummy variable representing the 2023 exchange rate liberalisation

β_0 = intercept parameter

$\beta_1 - \beta_9$, = slope coefficients

μ_t = white noise error term assumed to satisfy the standard OLS assumption

$$1, \quad \text{for 2008 Global financial Crisis period DUM1} \quad (3)$$

$$0, \quad \text{for otherwise}$$

$$1, \quad \text{for 2013 Oil instability period DUM2} \quad (4)$$

$$0, \quad \text{for otherwise}$$

$$1, \quad \text{for 2023 exchange rate liberalisation period DUM1} \quad (5)$$

$$0, \quad \text{for otherwise}$$

The Augmented ARDL-ECM (Short- run dynamics) version of equation (1):

$$\begin{aligned} \Delta SMR = & \alpha + \alpha \Delta SMR + \alpha \Delta INFL + \alpha \Delta TBR + \alpha \Delta \ln EXCR \\ & + \alpha \Delta MSGR + \alpha \Delta OIL + \alpha \Delta FPI + \alpha DUM2008 \\ & + \alpha DUM2013 + DUM2023 + \lambda ECT \\ & + \mu \end{aligned} \quad (6)$$

Where,

Δ = first-difference operator,

ECT_{t-1} = lagged error correction term,

λ = speed of adjustment coefficient, $p, q_1 \dots q_6$ = optimal lag lengths, μ_t = serially independent disturbance term.

The coefficient of the error correction term is expected to be negative and statistically significant to confirm long-run convergence toward equilibrium.

The Long-run Dynamics of Equation (1)

$$\begin{aligned} SMR = & \theta + \theta INFL + \theta TBR + \theta \ln EXCR + \theta MSGR + \theta OIL + \theta FPI \\ & + \theta DUM2008 + \theta DUM2013 + \theta DUM2023 \\ & + \mu \end{aligned} \quad (7)$$

TYDL Causality Model Specification

$$Y = \alpha + \alpha Y + \beta X + \mu \quad (8)$$

Where:

k = optimal lag length, $d_{\max}$ = maximum order of integration, Y_t and X_t = variables under investigation, μ_t = stochastic error term.

Lag Selection and TYDL

Optimal lag length is selected using SIC (see appendices). The TYDL model is estimated as VAR ($p + d_{\max}$), where $d_{\max} = 1$ based on unit root results

RESULTS

Table 1: Descriptive Statistics of the Variables

	<u>SMR</u>	<u>INFL</u>	<u>TBR</u>	<u>EXCR</u>	<u>MSGR</u>	<u>OIL</u>	<u>FPI</u>
Mean	0.0754	18.6546	14.0802	137.7085	21.5115	63.1700	0.4490
Median	0.1065	12.3810	12.1250	123.1930	19.1165	54.6750	0.0700
Maximum	0.3630	72.8360	64.6000	645.1940	87.7610	145.7900	2.5000
Minimum	-	5.3880	1.3880	0.8900	-1.7940	13.1000	-
	0.2660						1.2000
Std. Dev.	0.1253	16.9449	11.5316	143.4003	19.2298	37.9411	0.8375
Skewness	-	1.8585	2.9305	1.4985	1.2721	0.6886	0.7339
	0.5022						
Kurtosis	3.2533	5.2180	12.6296	5.3975	5.0097	2.5918	3.0836
Jarque-Bera	1.7881	31.2263	211.7993	24.5496	17.5196	3.4388	3.6021
Probability	0.4090	0.0000	0.0000	0.0000	0.0002	0.1792	0.1651
Sum	3.02	746.18	563.21	5508.34	860.46	2526.80	17.96
Sum Sq.	0.6	11198.0	5186.2	801982.3	14421.6	56141.6	27.4
Dev.							
Observations	<u>40</u>	<u>40</u>	<u>40</u>	<u>40</u>	<u>40</u>	<u>40</u>	<u>40</u>

Table 1 reveals the descriptive statistics of the variables in the study. The descriptive statistics of the variables provide important preliminary insights into the behaviour and distributional properties of the data over the period 1985–2024. Stock market returns (SMR) exhibit a relatively low average value of 0.0754, indicating modest returns in the Nigerian stock market over the study period. The standard deviation of 0.1253 suggests moderate volatility, while the range between the minimum (–0.2660) and maximum (0.3630) values reflects the presence of both significant downturns and periods of strong market performance. The negative skewness (–0.5022) implies that extreme negative returns occur more frequently than extreme positive returns, although the kurtosis value of 3.2533 indicates that the distribution is approximately normal. This is further supported by the Jarque–Bera probability value (0.4090), which confirms normality. Inflation (INFL) displays a high mean of 18.65% and a substantial standard deviation of 16.94, indicating considerable macroeconomic instability during the study period. The series is highly positively skewed (1.8585), suggesting the occurrence of extreme inflationary episodes, while the kurtosis value of 5.2180 indicates a leptokurtic distribution characterised by heavy

tails. The Jarque–Bera test strongly rejects normality ($p < 0.05$), reinforcing the presence of volatility and structural disturbances in inflation dynamics.

Similarly, the Treasury Bill Rate (TBR) shows a mean of 14.08% with a wide dispersion (standard deviation of 11.53), reflecting fluctuations in monetary policy stance. The variable is highly positively skewed (2.9305) and exhibits an exceptionally high kurtosis (12.6296), indicating extreme outliers and a heavy-tailed distribution. The Jarque–Bera statistic confirms non-normality, suggesting that interest rate movements have been highly irregular over time. The exchange rate (EXCR) demonstrates substantial variability, with a mean of 137.71 and a large standard deviation of 143.40, reflecting persistent depreciation and instability of the domestic currency. Its positive skewness (1.4985) and leptokurtic nature (kurtosis = 5.3975) indicate extreme exchange rate movements, likely driven by policy shifts and external shocks. The rejection of normality further highlights the volatile nature of the exchange rate in Nigeria. The money supply growth rate (MSGR) has a mean of 21.51 and a relatively high standard deviation of 19.23, suggesting inconsistent monetary expansion. The positive skewness (1.2721) and high kurtosis (5.0097) point to occasional spikes in liquidity growth, while the Jarque–Bera test confirms that the distribution deviates from normality.

Oil price (OIL), which is a critical exogenous variable for the Nigerian economy, has a mean value of 63.17 and a wide range between 13.10 and 145.79, reflecting exposure to global commodity price fluctuations. Although the distribution is moderately positively skewed (0.6886), the kurtosis value of 2.5918 suggests a distribution close to normal. This is supported by the Jarque–Bera probability (0.1792), indicating that oil price movements are relatively well-behaved compared to other macroeconomic variables. Foreign portfolio investment (FPI) exhibits a low average value of 0.4490 but a relatively high standard deviation of 0.8375, indicating significant variability in capital flows. The presence of both positive and negative values reflects episodes of capital inflows and outflows. The variable is moderately positively skewed (0.7339) with near-normal kurtosis (3.0836), and the Jarque–Bera test suggests that it does not significantly deviate from normality. Overall, the descriptive statistics reveal that most macroeconomic variables are characterised by high volatility, positive skewness, and leptokurtic distributions, indicating the presence of extreme values and structural instability in the Nigerian economy. These features justify the adoption of a dynamic econometric framework such as the ARDL model and further support the inclusion of structural break dummies to account for regime shifts and macroeconomic shocks.

Table 2: Correlation Matrix of the Variables

INFL	INFL			MSGR	OIL	FPI
	1.0000					
TBR	0.1963	1.0000				
lnEXCR	-0.3123	0.1553	1.0000			
MSGR	0.2177	-0.0901	-0.2574	1.0000		
OIL	-0.3221	-0.0147	0.6660	0.0412	1.0000	
FPI	-0.1961	0.3053	0.4493	0.1861	0.5175	1.0000

Source: Authors' Compilation (2026)

The correlation matrix is used as a preliminary diagnostic tool to assess the presence of multicollinearity among the explanatory variables. A common rule of thumb in econometric analysis is that multicollinearity becomes problematic when pairwise correlation coefficients exceed 0.80 in absolute terms. From Table 2, the correlation coefficients among the independent variables are generally low to moderate. The highest observed correlation is between the logarithm of exchange rate (lnEXCR) and oil price (OIL), with a coefficient of 0.6660, which, although relatively strong, remains below the critical threshold. Similarly, the correlation between foreign portfolio investment (FPI) and oil price (OIL) is 0.5175, while that between lnEXCR and FPI is 0.4493. All other pairwise correlations are weak, with values well below 0.50.

Importantly, none of the variables exhibit correlation coefficients approaching unity, and there is no evidence of perfect or near-perfect linear relationships among the regressors. This indicates that the explanatory variables are not highly collinear and can independently contribute to explaining variations in the dependent variable. While the moderate correlation between lnEXCR and OIL suggests some degree of association—likely reflecting the oil-dependent nature of the economy, it is not sufficiently strong to distort coefficient estimates or inflate standard errors significantly. Overall, the correlation analysis suggests that multicollinearity is not a serious concern in the model. This conclusion is consistent with the Variance Inflation Factor (VIF) results, which fall within acceptable limits. Consequently, all variables are retained in the regression model without the risk of unstable or unreliable parameter estimates arising from multicollinearity.

Table 3 (a): Bai–Perron Multiple Structural Break Test Results

Null Hypothesis: No breaks at specified breakpoints (Critical Value 5%)

Test	Statistic	Decision
UDmax	0.045 (Significant)	Reject hypothesis
WDmax	0.037(Significant)	Presence of Multiple breaks

Table 3(b): Estimated Break Dates

Break No	Break Year	Confidence Interval	Regime Interpretation
1	2008	2007-2009	Global Financial Crisis
2	2013	2012-2014	Oil Price Instability
3	2023	2022-2024	Exchange rate liberalisation

Source: Authors' Compilation (2026)

The Bai–Perron multiple structural break test in Table 3 (a) and (b) reveals strong evidence of parameter instability in the estimated model. Both the UDmax and WDmax statistics reject the null hypothesis of no structural break. The sequential F-statistics further confirm the presence of multiple breakpoints, with up to four structural regimes identified over the sample period. The detected breakpoints correspond closely with major macroeconomic events in Nigeria, particularly the 2008 global financial crisis and the 2023 exchange rate liberalisation. These findings indicate that the relationship between stock market returns and macroeconomic variables is subject to regime shifts, thereby justifying the inclusion of structural break dummies in the regression model.

Table 4: Unit Root Test for Stationarity

Panel A: Augmented Dickey Fuller Test

Variables	Level Intercept and Trend	First Difference Intercept and Trend	Integration order
SMR	-5.261189**	-	I (0)
INEI	-1.666398	-1.132591**	I (1)
TRR	-2.487647	-6.538753***	I (1)
MSGR	-3.132353	-6.304956***	I (1)
lnEXCR	-3.538062	-	I (0)
OII	-2.991405	-8.330811***	I (1)
FPI	-6.387526***	-	I (0)

Panel B: Stationarity (Phillips- Perron Test)

Variables	Level Intercept and Trend	First Differences Intercept and Trend	Integration order
SMR	-5.184682	-	I (0)
INFL	-2.844966	-6.186240***	I (1)
TBR	-2.457049	-6.561791	I (1)
MSGR	-2.642000	-7.517770	I (1)
lnEXCR	-3.511283	-	I (0)
OIL	-2.965825	-8.824526	I (1)
FPI	-6.536969***	-	I (0)

Note: ***, **, and * are 1%, 5% and 10% level of significance respectively

Source: Authors' Compilation (2026)

Unit Root Test

It is commonly believed that the simple time series around a deterministic pattern is stationary or at least stable; this is not always accurate. Nevertheless, the ARDL cointegration technique does not require unit root testing. However, to prevent ARDL from crashing in the presence of an embedded stochastic pattern of 1 (2), the study performs unit root tests to determine the presence of a unit root in the series. To confirm the outcome properties of the time series, this study used the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests (PP). The null hypothesis for the test (both ADF and PP) affirms that the data series in question has a unit root, while the alternative hypothesis affirms that the series is stationary. Table 4 presents the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests conducted to determine the stationarity properties of the variables in the model. Both tests were estimated with intercept and trend specifications, and statistical significance was evaluated at the 1%, 5%, and 10% levels.

The ADF results reveal a mix of stationary and non-stationary variables: Stationary at level [I (0)]: SMR, lnEXCR and FPI are stationary at their levels, indicating that these series do not contain unit roots and are mean-reverting in their natural form. Stationary at first difference [I (1)]: INFL, TBR, MSGR, OIL, become stationary only after first differencing, suggesting they follow a unit-root process at levels but become stable after transformation. The PP test results reinforce the ADF findings, showing high consistency across test procedures: Level-stationary variables [I (0)]: SMR, lnEXCR and FPI remain significant at levels. First-difference stationary variables [I (1)]: INFL, TBR, MSGR, OIL again exhibit stationarity only after differencing. Both tests reach identical integration orders for all variables, strengthening the credibility and robustness of the stationarity outcomes. This convergence is important because ADF is parametric while PP is non-parametric; agreement between them reduces the likelihood of specification or autocorrelation bias.

The mixture of I (0) and I (1) variables justifies the adoption of an estimation technique that accommodates different integration orders without requiring all variables to be stationary at the same level. Consequently, the dataset is suitable for ARDL modelling, which allows a combination of I (0) and I(1) regressors; the presence of no I(2) variables ensures the ARDL bounds testing approach remains valid. The results also support the application of Toda–Yamamoto (TYDL) causality, since the maximum order of integration is one.

Table 5: Bound Test for Cointegration (Dependent Variable: SMR)

Test Statistic	Value	K
F-statistic	3.732686	9
Level of Significance	Lower (Bound I (0))	Upper Bound I (1)
10%	1.88	2.99
5%	2.14	3.24
2.50%	2.37	3.60
1%	2.65	3.97

K is the number of exogenous variables in the model Source: Authors' Compilation (2026)

In estimating the long-run relationship, a two-step method is used: an initial analysis of the nature of a long-run relationship between the variables in Equation (2), which is accompanied by an approximation of the short-run and long-run parameters. Therefore, the bounds test method was used to determine the existence of a long-term relationship between the variables of interest by conducting an F-test on the coefficients of the model's lagged-level variables. Also, Pesaran and Shin (1995, 1998) suggested two critical values to evaluate the relationship (lower and upper bounds) due to the limitations of the traditional Wald test F-statistic. The computed F-test is then compared with the critical values for the hypothesis test. Therefore, if the calculated F-statistic is less than the lower bound value, the null is not rejected. On the contrary, the existence of a long-term relationship between the variables is suggested if the calculated Fstatistic exceeds the upper limit value. Finally, there is an inconclusive long-run relation between the variables if the calculated F-statistics are between the lower bound and the upper bound. However, the error correction term would be a useful way to establish cointegration in the inconclusive cases after Kremers et al. (1992) and Bannerjee et al. (1998).

Table 6 shows that the F-statistic value of 3.732686 is above both the lower limit (2.14) and the upper limit (3.24). This therefore reveals that there existed a longrun relationship among the variables, or, in other words, that the variables are cointegrated.

Table 6 shows the estimated ARDL (1, 0, 0, 0, 0, 0, 0, 1, 0, and 0), which model provides a coherent, though somewhat uneven, picture of the relationship between SMR and the selected macroeconomic variables when both long-run equilibrium conditions and short-run dynamics are jointly considered.

Table 6: Long and short run Dynamics of estimated results for the selected ARDL
(Selected Model: ARDL (1, 0, 0, 0, 0, 0, 0, 1, 0, and 0))

Variable	Coefficient	Standard Error	T-Statistics	P-Value
Panel A: Long-Run Dynamics:				
SMR				
INFL	0.002626	0.001016	2.585225	0.0162
TBR	-0.001612	0.003130	-0.514895	0.6113
lnEXCR	0.006817	0.020635	0.330346	0.7440
MSGR	0.000911	0.001145	0.795440	0.4342
OIL	0.000182	0.000848	0.214952	0.8316
FPI	0.004059	0.021109	0.192269	0.8491
DUM2008	-0.121630	0.072782	-1.671146	0.1077
DUM2013	0.054076	0.072415	0.746744	0.4625
DUM2023	0.166918	0.163091	1.023466	0.3163
C	0.015550	0.084800	0.183368	0.8560
Panel B: Short-Run Dynamics				
D(SMR(-1))	0.352100	0.149164	2.360493	0.0267
D(INFL)	0.001695	0.001370	1.237782	0.2278
D(TBR)	-0.002126	0.003995	-0.532242	0.5995
D(lnEXCR)	0.008993	0.026846	0.334982	0.7405
D(MSGR)	0.001202	0.001461	0.822374	0.4190
D(OIL)	0.000241	0.001126	0.213666	0.8326
D(FPI)	0.005354	0.028060	0.190822	0.8503
D(DUM2008)	-0.380436	0.124517	-3.055282	0.0054
D(DUM2013)	0.071339	0.100616	0.709024	0.4851
D(DUM2023)	0.220207	0.201580	1.092406	0.2855
CointEq(-1)	-1.319253	0.260932	-5.055928	0.0000
Panel C: Goodness-of-fit measures				
R -Squared	0.610206			

Adj. R-Squared 0.399067
F- statistics 2.890073
P-value (F-stat.) 0.011796
Durbin-Watson Statistics 2.226621

Test Probability
Breusch-Godfrey Serial Correlation LM Test: Z.3378
2.170379
VAR Residual Serial Correlation LM Tests 50.646370.4084

Heteroskedasticity Test: Breusch-Pagan-Godfrey 0.9635

5.464453

Heteroskedasticity Test: ARCH

0.0540930.8161

Ramsey RESET Specification Test

0.0058710.9396

Jarque-Bera Statistics

1.7676980.413190

Note: ***, **, and * are 1%, 5% and 10% level of significance respectively Source: Author's Computation (2026)

Figure 1: ARDL Model Selection Summary

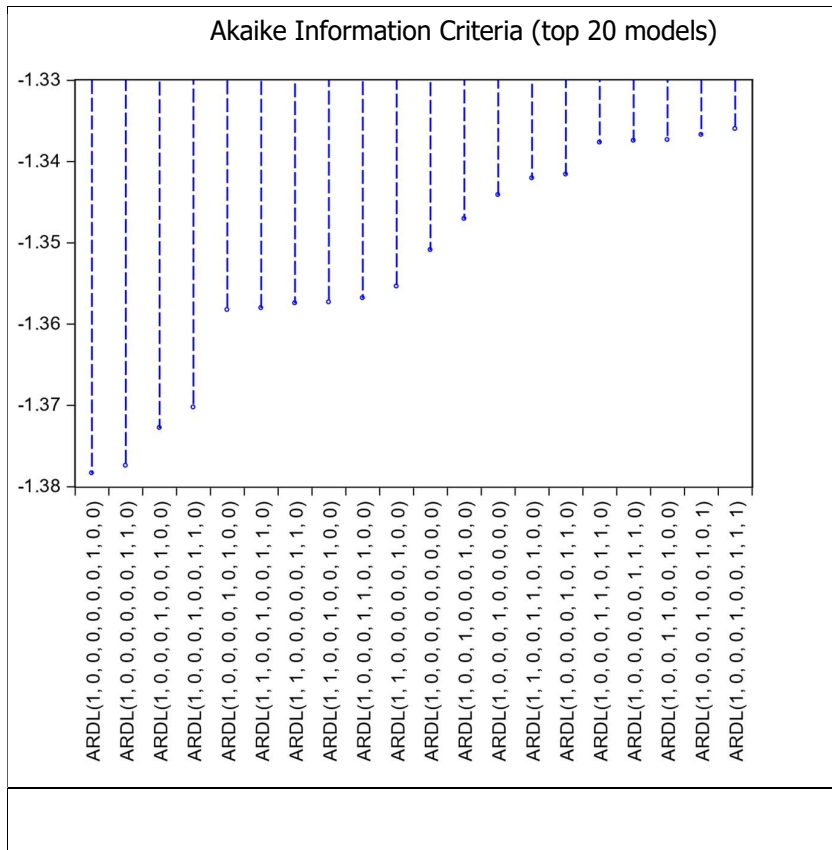


Table 6 shows that the long-run estimates indicate that inflation (INFL) is the only macroeconomic variable exerting a statistically significant influence on SMR. Its positive coefficient suggests that sustained increases in the general price level are associated with a corresponding rise in SMR over time. When harmonized with the short-run results, however, this relationship appears to be purely long-term in nature, as changes in inflation do not produce immediate or statistically significant short-run effects. This divergence implies that inflation operates through gradual adjustment mechanisms, possibly reflecting delayed pass-through effects or adaptive expectations within the economy.

In contrast, other macroeconomic variables, including Treasury bill rate (TBR), exchange rate (lnEXCR), money supply growth (MSGR), oil prices (OIL), and foreign portfolio investment (FPI), are consistently insignificant in both the long run and short run. This consistency strengthens the conclusion that these variables do not play a decisive role in explaining variations in SMR within the specified model. From a structural standpoint, this may reflect weak monetary policy transmission, limited financial market depth, or the dominance of non-macroeconomic factors in shaping SMR. The role of structural break dummies further clarifies the dynamics. While none of the dummy variables are significant in the long run, the short-run results reveal that the 2008 global financial crisis (DUM2008) had a strong and statistically significant negative effect on SMR. This suggests that major external shocks exert immediate disruptive impacts, but such effects are not sustained over time, as the system eventually reverts to its long-run equilibrium path. The insignificance of the 2013 and 2023 dummies in both periods indicates that these events did not materially alter the trajectory of SMR.

A critical point of convergence between the short-run and long-run frameworks is the error correction mechanism (ECM). The coefficient of the lagged error correction term is negative and highly significant, confirming the existence of a stable long-run relationship among the variables. However, the magnitude of the coefficient (-1.319) suggests a rapid and excessive speed of adjustment, where deviations from equilibrium are corrected within one period, but with an overshooting effect. This implies that the adjustment process is not smooth; instead, the system may oscillate around equilibrium before stabilizing. When viewed alongside the insignificance of most explanatory variables, this finding suggests that internal system dynamics, rather than external macroeconomic shocks, dominate the adjustment process.

Additionally, the significance of the lagged change in SMR in the short run indicates inertia or persistence, meaning that past movements in SMR significantly influence current changes. This reinforces the idea that SMR dynamics are largely self-driven, with limited immediate responsiveness to macroeconomic policy variables.

The goodness-of-fit statistics indicate that the model explains a moderate proportion of the variation in SMR, although the adjusted R-squared suggests some loss of explanatory efficiency when accounting for model complexity. Importantly, the F-statistic confirms that the model is jointly significant. The stability of the estimated ARDL model was evaluated using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) statistics (see appendix). As depicted in the first plot, the CUSUM line remains within the 5% significance boundaries throughout the evaluation period (1985–2024). This confirms that the model's recursive residuals are structurally stable, and the estimated parameters remain robust over time without noticeable structural shifts.

Similarly, the CUSUMSQ test presented in the second plot shows that the cumulative squared residuals also lie within the critical bounds at the 5% significance level. This further reinforces evidence of parameter constancy and absence of instability in the variance of the

residuals. The combined diagnostic outcomes indicate that the selected ARDL specification is appropriate, reliable, and stable for policy analysis and forecasting of stock market returns in Nigeria. The diagnostic tests collectively support the reliability of the estimated results. There is no evidence of heteroskedasticity, functional form misspecification, or nonnormality of residuals, while serial correlation does not pose a serious concern. This implies that the estimated coefficients, even when statistically insignificant, are not biased due to econometric violations, but rather reflect underlying economic realities captured by the model

Overall, the findings suggest that SMR is not strongly anchored to conventional macroeconomic fundamentals but rather evolves through a combination of gradual inflationary effects, internal persistence, and occasional external shocks. This has important implications: policy instruments such as interest rates, exchange rate adjustments, or liquidity expansion may have limited direct influence on SMR, at least within the structure captured by this model.

Diagnostic and Stability Tests

To ensure the reliability, consistency, and stability of the estimated ARDL model, several post-estimation diagnostic and robustness tests were conducted. These include the Variance Inflation Factor (VIF) test for multicollinearity, Breusch–Godfrey Serial Correlation LM test, heteroskedasticity tests, Ramsey RESET specification test, Jarque–Bera normality test, and the CUSUM/CUSUMSQ stability tests. The results are presented below.

Table 7: Variance Inflation Factor (VIF) Test

Variable	Centered VIF
INFL	1.305
TBR	1.886
lnEXCR	2.957
MSGR	1.568
OIL	1.985
FPI	1.697

Source: Authors' Computation (2026)

The Variance Inflation Factor (VIF) test was conducted to examine the presence of multicollinearity among the explanatory variables. Multicollinearity becomes problematic when VIF values exceed the conventional threshold of 5 or 10. The results show that all centred VIF values are substantially below the critical threshold of 5, with the highest value being 2.957 for exchange rate. This indicates the absence of harmful multicollinearity among the regressors. Consequently, the explanatory variables are sufficiently independent of one another, and the estimated coefficients are stable and reliable for inference.

Table 8: Diagnostic Test Results

Diagnostic Test	Statistic	Probability
Breusch–Godfrey Serial Correlation LM Test	2.170379	0.3378
Heteroskedasticity Test: Breusch–Pagan–Godfrey	5.464453	0.9635
ARCH Heteroskedasticity Test	0.054093	0.8161
Ramsey RESET Test	0.005871	0.9396
Jarque–Bera Normality Test	1.767698	0.413190

Source: Authors' Compilation (2026)

The Breusch–Godfrey Serial Correlation LM test was employed to examine whether the residuals of the estimated ARDL model are serially correlated. The probability value of 0.3378 exceeds the 5% significance level; therefore, the null hypothesis of no serial correlation cannot be rejected. This confirms that the residuals are independently distributed and that the model does not suffer from autocorrelation problems.

The Breusch–Pagan–Godfrey heteroskedasticity test and ARCH test were further conducted to examine the constancy of the residual variance. The probability values of 0.9635 and 0.8161 respectively indicate the absence of heteroskedasticity effects. This implies that the variance of the error term remains constant over the sample period, thereby satisfying one of the key assumptions of classical regression estimation. The Ramsey RESET test was conducted to examine possible functional form misspecification in the estimated model. The probability value of 0.9396 indicates that the null hypothesis of correct model specification cannot be rejected. This confirms that the model is properly specified and does not omit significant nonlinear relationships. The Jarque–Bera normality test further reveals that the residuals are normally distributed, as indicated by the probability value of 0.413190, which exceeds the 5% significance level. The normality of the residuals enhances the reliability of statistical inference and confirms the adequacy of the estimated ARDL model. Collectively, the diagnostic test results indicate that the estimated model is econometrically sound, free from major specification errors, and suitable for reliable policy interpretation and forecasting.

Table 9: Stability Test Results

Stability Test	Result
CUSUM Test	Stable
CUSUMSQ	Stable

Source: Authors' Computation (2026)

The structural stability of the estimated ARDL model was examined using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests (see Figures 1 and 2). The CUSUM plot shows that the recursive residuals remain within the 5% critical bounds

throughout the sample period, indicating parameter stability and the absence of systematic structural instability in the estimated coefficients. Similarly, the CUSUMSQ plot remains within the critical boundaries, confirming the stability of the variance of the residuals over time. The combined results of the CUSUM and CUSUMSQ tests therefore indicate that the estimated ARDL model is stable, robust, and reliable for long-run and short-run policy analysis.

Figure 2: CUSUM Test

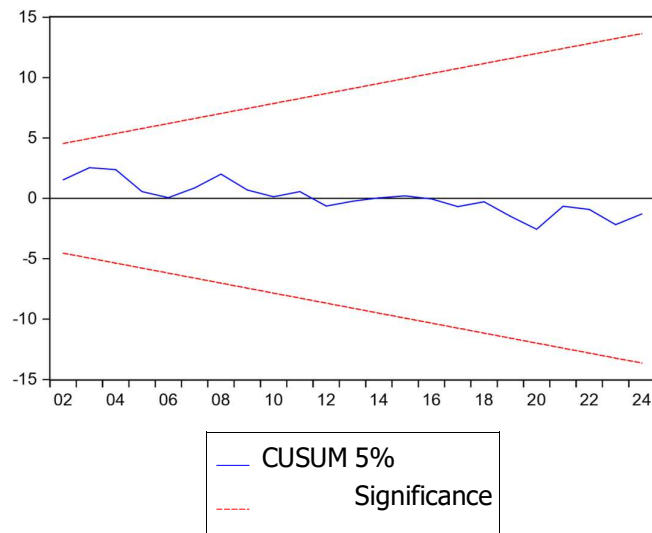


Figure 3: CUSUMSQ Test

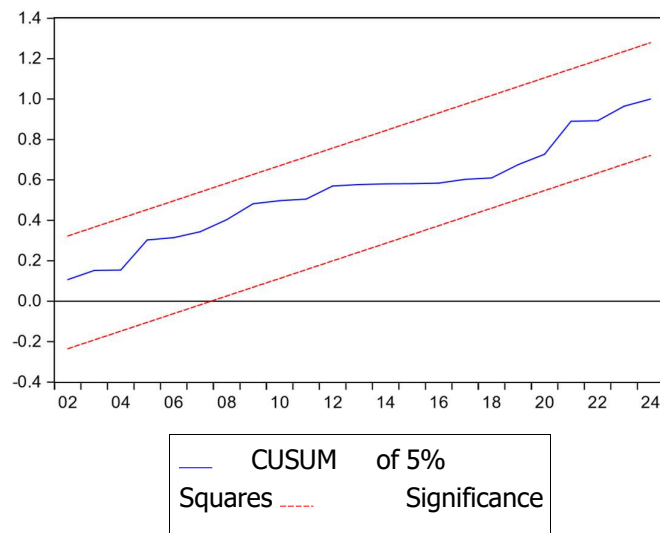


Figure 4: Residual Normality Test

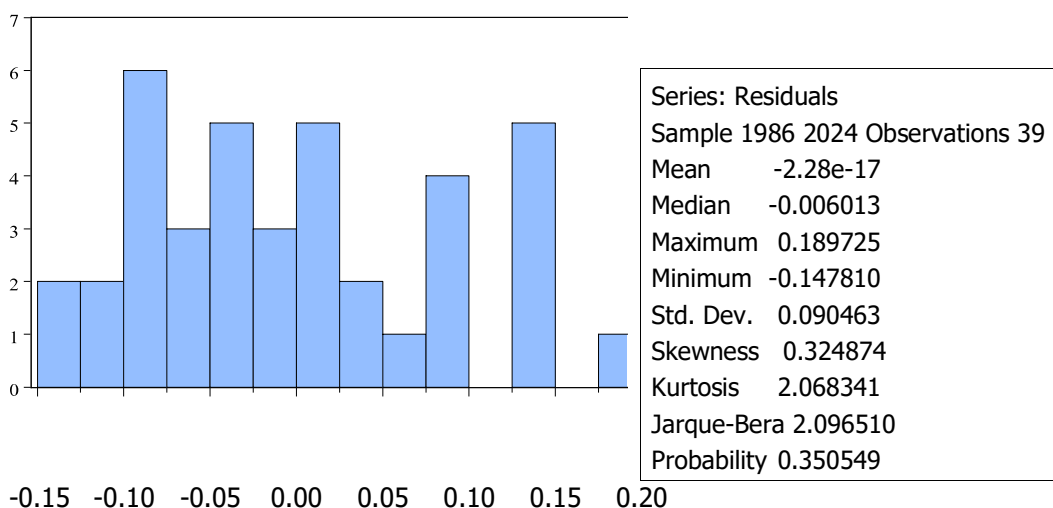


Table 10: TYDL Approach to Long-Run Granger Causality estimates for the model

Dependent Variable	Sources of Causality						
	SMR	INFL	TBR	MSGR	InEXCR	OIL	FPI
SMR		2.540	3.916	0.056	0.157	0.701	0.086
INFL	1.079		6.383**	0.359	2.112	0.724	0.241
TBR	6.205**	5.173*		3.636	2.196	5.082**	2.001
MSGR	1.760	1.032	0.724		1.602	0.980	0.049
InEXCR	2.064	3.184	4.186	1.767		1.410	0.475
OIL	1.109	1.213	1.134	2.909	5.067*		4.928
FPI	2.223	1.525	10.662	4.030	1.135	14.848***	

Source: Authors Compilation (2026)

A central feature of the results in Table 10 is the dominant role of the Treasury bill rate (TBR) as both a driver and a recipient of causality. Specifically, TBR is found to Granger-cause SMR, inflation, and the exchange rate, while it is itself influenced by SMR, inflation, and oil price. This positioning establishes TBR as a key transmission channel within the system, reflecting its function as a policy instrument that both responds to macroeconomic conditions and transmits policy signals to other variables. Closely related to this is the presence of feedback mechanisms, particularly between inflation and TBR. The bidirectional causality between these variables suggests a policy-response loop, where monetary authorities adjust interest rates in response to inflationary pressures, and these adjustments in turn influence future inflation dynamics. A similar feedback pattern is observed between SMR and TBR, indicating that SMR is not only influenced by monetary policy but may also provide informational signals that feed back into policy decisions.

In terms of the dependent variable, the results show that SMR is Granger-caused only by TBR, with no significant predictive influence from inflation, exchange rate, money supply

growth, oil price, or foreign portfolio investment. This indicates that interest rate dynamics constitute the primary channel through which macroeconomic conditions affect SMR, while other variables do not exhibit meaningful predictive power. At the same time, SMR Granger-causes TBR, reinforcing the existence of a bidirectional relationship. This suggests that movements in SMR are not entirely passive but may influence monetary policy decisions, possibly through their implications for financial stability or market conditions. Money supply growth (MSGR) stands out as largely disconnected, with no significant causal relationships either as a source or recipient. This implies that, within this system, money supply does not serve as an effective transmission mechanism for influencing other macroeconomic variables.

Oil price behaves as a predominantly exogenous variable, which is consistent with its determination in international markets. Its causal influence on TBR and exchange rate underscores its importance as an external shock variable, even though it does not receive feedback from the domestic economy. Foreign portfolio investment (FPI), on the other hand, is characterised by strong persistence, as evidenced by the high significance of its own lag. However, it neither significantly influences nor is influenced by most of the other variables. This suggests that FPI dynamics are driven more by external or global financial conditions than by domestic macroeconomic fundamentals captured in the model.

The causality pattern suggests that macroeconomic dynamics are internally interactive but selectively transmitted, with monetary policy acting as the main conduit through which influences propagate. However, the limited number of significant causal paths, particularly toward SMR, indicates that the system is not broadly responsive to multiple macroeconomic drivers, but rather depends on a few critical channels, most notably the interest rate mechanism. This highlights a structure where policy and external shocks matter, but their influence is neither widespread nor uniformly distributed across variables. The ARDL results indicate that the macroeconomic environment exerts limited direct influence on SMR, with only inflation showing a statistically significant longrun effect. However, the TYDL causality results refine this conclusion by revealing that the Treasury bill rate (TBR) Granger-causes SMR, even though its coefficient is insignificant in the ARDL framework. This apparent divergence is analytically meaningful rather than contradictory.

Specifically, the TYDL result ($TBR \rightarrow SMR$) suggests that monetary policy has predictive relevance for SMR over time. In other words, past values of TBR contain information useful for forecasting SMR, even if the magnitude of its effect is not sufficiently strong or stable to manifest as a significant long-run coefficient. When harmonised with the ARDL findings, this implies that monetary policy influences SMR indirectly or with lagged and diffuse effects, rather than through a strong and immediate transmission channel. In contrast, other macroeconomic variables, exchange rate, money supply growth, oil price, and foreign portfolio investment, are neither statistically significant in the ARDL model nor do they exhibit causal influence on SMR in the TYDL framework. This consistency strengthens the conclusion that SMR is largely insulated from conventional macroeconomic drivers, and that its

behaviour is not strongly anchored to these variables in either a structural or predictive sense.

The causality results further reveal a dense network of interrelationships among the explanatory variables themselves, even though these do not translate into strong effects on SMR. Notably, there is evidence of bidirectional causality between inflation and Treasury bill rate, indicating a feedback mechanism consistent with monetary policy practice, where interest rates respond to inflation, and inflation dynamics are in turn influenced by policy actions. Similarly, Treasury bill rate and oil price are found to Granger-cause exchange rate movements, reflecting the combined role of monetary policy and external sector dynamics in shaping currency behaviour. Despite this interconnected macroeconomic system, the weak transmission to SMR suggests a disconnect between macroeconomic policy variables and the dependent variable. This reinforces the earlier ARDL insight that SMR dynamics are largely driven by internal adjustment mechanisms, as evidenced by the significance of the lagged dependent variable and the error correction term. The strong and negative error correction coefficient confirms that deviations from long-run equilibrium are corrected rapidly, albeit with overshooting, indicating that SMR adjusts primarily through its own internal dynamics rather than through external macroeconomic shocks. The TYDL results also show that SMR does not significantly Granger-cause other variables, confirming its role as a passive variable within the system. This further aligns with the ARDL evidence, where SMR responds to disequilibrium and past values rather than actively influencing the broader macroeconomic environment.

An additional layer of insight comes from the role of structural shocks. While the ARDL results show that the 2008 financial crisis had a significant short-run negative effect on SMR, the TYDL framework does not indicate persistent causal propagation of such shocks through the system. This suggests that external shocks affect SMR in the short term but do not fundamentally alter long-run causal relationships, supporting the notion of eventual reversion to equilibrium.

Discussion of Findings

The empirical results of this study, when situated within the broader Nigerian literature and theoretical frameworks, point to a more selective and structurally constrained macro-stock market linkage than is commonly reported. The evidence indicates that only inflation exerts a significant long-run effect on stock market returns (SMR), while other macroeconomic variables remain largely insignificant, with causality confined mainly to the interest rate channel. This outcome contrasts with, but also refines, existing empirical and theoretical expectations. More importantly, the findings suggest that the Nigerian stock market does not respond uniformly to macroeconomic fundamentals; rather, macroeconomic influences appear to be transmitted selectively, indirectly, and through weak institutional and financial channels.

A substantial body of prior Nigerian studies, such as those by Ogunsakin and Awe (2020), Okoro and Okoro (2023), and Udo et al. (2022), argue that stock market performance is

broadly determined by a combination of macroeconomic variables, including interest rate, exchange rate, oil price, and money supply. These studies typically report significant and theoretically consistent relationships, thereby supporting the notion of a strong macroeconomic foundation for stock market behaviour. However, the present findings do not fully corroborate this position. Instead, they suggest that the influence of macroeconomic variables is narrow rather than comprehensive, with most variables failing to exhibit either statistical significance or causal relevance. This divergence implies that the macroeconomic transmission mechanism in Nigeria may be weaker, unstable, or highly conditional on model specification, policy regime, and the structural characteristics of the financial system. The findings further indicate that inflation represents the most important long-run macroeconomic variable influencing SMR in Nigeria. Economically, this positive longrun relationship may reflect the tendency of investors to treat equities as a partial hedge against inflationary erosion of wealth, especially during periods of persistent macroeconomic instability. In an environment characterised by high and persistent inflation, nominal corporate revenues and asset prices may rise even when real productive performance remains weak, thereby increasing nominal stock valuations. This suggests that investors may shift away from fixed-income securities toward equities in an attempt to preserve the real value of wealth. However, the absence of significant short-run inflation effects indicates that the transmission mechanism is gradual rather than immediate, likely reflecting adaptive expectations, delayed portfolio adjustments, and informational inefficiencies within the Nigerian capital market. Inflationary pressures also increase uncertainty regarding future earnings, monetary policy direction, and discount rates, thereby complicating the asset pricing process and weakening the precision of market valuation.

At the same time, the results are not entirely isolated from the empirical literature. They align more closely with studies such as Ekpete (2012) and Ghanador (2024), which report weak or insignificant effects of key macroeconomic variables, particularly in the short run. Similarly, Arikewuyo (2023) finds that exchange rate shocks do not significantly influence stock market deepening, reinforcing the present study's conclusion that exchange rate dynamics may not be as dominant as often assumed. Nevertheless, this does not imply that exchange rate fluctuations are economically irrelevant. In Nigeria, exchange rate movements affect stock market performance indirectly through imported inflation, production costs, investor confidence, and foreign capital flows. Since many listed firms depend heavily on imported machinery, raw materials, and intermediate inputs, exchange rate depreciation increases operating costs and compresses profit margins. Exchange rate instability also heightens uncertainty regarding future earnings and weakens foreign investor confidence because of concerns over currency conversion losses and capital repatriation risks. However, the insignificance of exchange rate in the estimated model suggests that these effects may already be internalised as structural features of the Nigerian economy, thereby limiting their marginal predictive influence on stock returns.

This strand of evidence therefore suggests that macroeconomic variables do not exert uniformly strong or stable effects on the Nigerian stock market, thereby supporting a more

cautious interpretation of their role. The findings imply that macroeconomic conditions influence stock returns only when transmission channels are sufficiently effective and credible. In an environment characterised by structural rigidities, policy uncertainty, shallow market depth, and speculative investor behaviour, macroeconomic signals may not translate efficiently into stock market outcomes.

Further consistency is observed in relation to studies on external shocks and risk factors. For instance, the significant short-run impact of the 2008 crisis dummy in the present study resonates with the findings of Takyi and Bentum-Ennin (2021), who document the adverse but largely short-lived effects of COVID-19 on African stock markets. This indicates that external shocks tend to have immediate but transitory effects, without fundamentally altering long-run relationships. The significant negative short-run effect of the 2008 dummy reflects the vulnerability of the Nigerian stock market to sudden global liquidity contractions, panic-driven selloffs, and investor pessimism during crisis periods. However, the eventual reversion to equilibrium suggests that such shocks, although disruptive in the short term, do not permanently redefine the structural behaviour of the market.

Similarly, the limited role of oil price and exchange rate in the present model contrasts with Ogiemudia (2022), who finds these variables significant, but still supports the broader notion that not all macroeconomic risks are equally transmitted to stock returns. Given Nigeria's dependence on crude oil exports, oil price shocks remain economically important because they affect government revenue, foreign exchange earnings, fiscal balances, and exchange rate stability. Positive oil price shocks typically improve external reserves, strengthen fiscal capacity, and enhance investor confidence, while negative shocks weaken macroeconomic stability and intensify exchange rate pressures. However, the insignificance of oil price in the ARDL estimation suggests that oil price effects operate indirectly through other macroeconomic channels, particularly monetary conditions and exchange rate dynamics, rather than through direct valuation effects on stock returns. This interpretation is reinforced by the TYDL causality results, which indicate that oil prices influence Treasury bill rate and exchange rate dynamics within the system.

With respect to capital flows, the insignificance of foreign portfolio investment (FPI) in this study challenges the strong emphasis placed on it in works such as Adumah et al. (2024) and Alalade et al. (2024), where FPI is shown to influence market development. Instead, the present findings suggest that FPI behaves more as a persistent but weakly integrated variable, driven largely by its own dynamics or external global financial conditions rather than domestic macroeconomic fundamentals. This reinforces the argument that Nigeria's capital market may not be deeply integrated with global financial flows in a way that systematically affects market performance. The high persistence of FPI further suggests that foreign capital movements respond more strongly to exchange rate expectations, global risk sentiment, and international monetary conditions than to domestic macroeconomic fundamentals captured in the model. Consequently, episodes of capital inflows and reversals may contribute to market volatility without establishing stable long-run relationships with stock returns. The TYDL causality results further identify Treasury bill rate as the principal

macro financial transmission mechanism influencing SMR. Although Treasury bill rate is statistically insignificant in the ARDL long-run estimation, its causal influence on SMR suggests that monetary policy possesses predictive relevance for stock market behaviour. Economically, Treasury bill rates represent the benchmark risk-free return within the financial system and therefore influence portfolio allocation decisions between equities and fixed-income securities. Higher Treasury bill rates increase the attractiveness of government securities relative to equities, thereby reducing stock market liquidity and investor demand for shares. Conversely, lower interest rates encourage investors to shift toward equities in search of higher returns. The bidirectional causality between Treasury bill rate and inflation also reflects a policy response mechanism in which monetary authorities adjust interest rates in response to inflationary pressures, while interest rate movements subsequently shape inflation expectations and financial market conditions. This finding underscores the central role of monetary conditions in influencing capital market performance, even when the transmission effects are indirect or diffuse.

The weak and insignificant role of money supply growth further indicates limited monetary transmission efficiency within the Nigerian financial system. Under normal theoretical conditions, increases in money supply are expected to stimulate investment activity and improve stock market performance through enhanced liquidity and lower financing costs. However, the present findings suggest that liquidity expansion does not effectively translate into increased capital market activity, likely due to structural bottlenecks, underdeveloped financial intermediation, weak investor participation, and low market depth.

When interpreted through the lens of the Arbitrage Pricing Theory (APT), the results provide only partial support. APT posits that asset returns are driven by multiple systematic risk factors, including macroeconomic variables. The significance of inflation and the causal role of interest rate are consistent with this framework, indicating that some macroeconomic risks are indeed priced within the Nigerian stock market. However, the absence of significance for most other variables contradicts the core APT proposition of multiple pervasive risk factors. This suggests that the Nigerian stock market does not fully conform to the assumptions of APT, likely due to market imperfections, structural rigidities, weak policy transmission, and incomplete integration between macroeconomic fundamentals and financial asset pricing.

In contrast, the findings align more strongly with behavioural finance theory. The weak linkage between SMR and macroeconomic fundamentals suggests that market outcomes are not purely driven by rational valuation based on economic variables.

Instead, the significance of the lagged dependent variable points to persistence and momentum effects, while the large error correction coefficient indicates overshooting and possible overreaction to disequilibrium. Additionally, the pronounced short-run effect of crisis periods reflects investor sentiment, panic-driven adjustments, and speculative reactions, all of which are central to behavioural explanations of financial market behaviour. These

outcomes imply that investor psychology, adaptive expectations, and informational inefficiencies play substantial roles in shaping stock market performance in Nigeria.

In synthesising these insights, the study suggests that the Nigerian stock market operates within a hybrid framework. On one hand, there is limited evidence of macroeconomic pricing consistent with APT, particularly through inflation and interest rate channels. On the other hand, the dominance of internal market dynamics, weak macroeconomic transmission, selective policy responsiveness, and sensitivity to shocks point toward a market that is behaviourally influenced and structurally constrained. The implication is that while macroeconomic policy remains relevant, its ability to influence stock market performance is neither broad-based nor uniformly effective. Rather, stock market outcomes in Nigeria appear to depend on selective macroeconomic signals, internal adjustment dynamics, external vulnerability, and behavioural responses. This highlights the need for policy measures that go beyond macroeconomic stabilisation to include improvements in institutional quality, market efficiency, investor protection, information dissemination, and policy credibility in order to strengthen the responsiveness of the Nigerian stock market to macroeconomic fundamentals.

CONCLUSION AND RECOMMENDATIONS

This study re-examined the dynamic relationship between selected macroeconomic variables and stock market-related performance (SMR) in Nigeria using the ARDL framework and the Toda–Yamamoto/Dolado–Lütkepohl (TYDL) causality approach. The results provide a nuanced understanding of how macroeconomic fundamentals interact with stock market behaviour in both the long run and short run.

The ARDL findings reveal that inflation is the only macroeconomic variable with a statistically significant long-run effect on SMR, while other variables, Treasury bill rate, exchange rate, money supply growth, oil price, and foreign portfolio investment, do not exhibit significant direct effects. In the short run, macroeconomic variables remain largely insignificant, with SMR dynamics driven primarily by its own past values and adjustment to long-run equilibrium. The error correction mechanism confirms the existence of a long-run relationship, although the speed of adjustment suggests overshooting and instability in the adjustment process.

The TYDL causality results further indicate that causality is selective rather than widespread, with treasury bill rate emerging as the only variable that Granger-causes SMR. At the same time, macroeconomic variables display interdependence among themselves, particularly between inflation and interest rate, without translating into a strong influence on SMR. External variables such as oil price and foreign portfolio investment behave largely as exogenous or weakly integrated factors within the system. Overall, the findings suggest that the Nigerian stock market is not strongly anchored to a broad set of macroeconomic fundamentals but rather responds to a limited set of variables, notably inflation and interest-rate signals. The dominance of internal dynamics, persistence, and short-run responses to

shocks indicates that market behaviour is shaped as much by structural and behavioural factors as by macroeconomic conditions. Consequently, the explanatory power of traditional macroeconomic models, such as the Arbitrage Pricing Theory, appears limited in this context, while behavioural finance provides a more compelling lens for understanding observed patterns. The study concludes that while macroeconomic variables remain relevant, their influence on stock market performance in Nigeria is limited, selective, and mediated by structural and behavioural factors. Effective policy intervention, therefore, requires a holistic approach that combines macroeconomic stability with institutional strengthening and market development

The study recommends that policymakers, particularly the Central Bank of Nigeria, should prioritise maintaining price stability through consistent and credible monetary policies, while also strengthening the transmission mechanism of monetary policy to ensure that interest rate signals effectively influence the capital market. In addition, there is a need to enhance market efficiency by improving transparency, disclosure standards, and investor education so that macroeconomic information is properly reflected in stock prices. Structural and institutional reforms should be pursued to deepen the financial market, strengthen regulatory frameworks, and improve corporate governance, thereby increasing the responsiveness of the stock market to economic fundamentals. Furthermore, measures should be implemented to enhance the market's resilience to external shocks, including the development of hedging instruments and diversification strategies, while policies on foreign portfolio investment should focus not only on attracting inflows but also on ensuring their stability and productive integration into the economy. Finally, future research should incorporate behavioural and institutional variables to provide a more comprehensive understanding of stock market dynamics in Nigeria.

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EFFECTS OF SUPPLY CHAIN FINANCING ON PALM OIL VALUE CHAIN PERFORMANCE: EVIDENCE FROM BAISSA, TARABA STATE.

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Abstract

This study examines the effects of supply chain financing on palm oil value chain performance in Baissa, Taraba State, Nigeria, drawing on Resource-Based View (Barney, 1991), Transaction Cost Economics (Williamson, 1985), Value Chain Theory (Porter, 1985), and Supply Chain Finance Theory (Pfohl & Gomm, 2009). Specifically, it evaluates the influence of contract farming finance, digital/fintech-enabled finance, inventory/warehouse financing, and trade credit financing on performance outcomes such as productivity, efficiency, and profitability. A cross-sectional survey design was adopted, with data collected from 380 value chain actors using structured questionnaires. Data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings reveal that inventory/warehouse financing has the strongest positive and significant effect on value chain performance ($\beta = 0.653$, $p < 0.001$), followed by contract farming finance ($\beta = 0.202$, $p = 0.012$) and digital/fintech-enabled finance ($\beta = 0.130$, $p = 0.007$), while trade credit financing is not significant ($\beta = 0.039$, $p = 0.421$). The model explains 88% of the variance in value chain performance. The study concludes that embedded and coordinated financing mechanisms are critical for enhancing agricultural value chains. The study recommends investment in warehouse infrastructure and inventory financing systems to reduce post-harvest losses, strengthening contract farming arrangements to improve coordination and risk-sharing, expanding digital financial services in rural areas to enhance inclusion and transaction efficiency, and developing supportive regulatory frameworks to encourage adoption of innovative supply chain financing mechanisms.

Keywords: Supply Chain Financing, Palm Oil, Value Chain Performance, Inventory Financing, Contract Farming

INTRODUCTION

Agricultural value chains play a critical role in promoting economic growth, ensuring food security, and sustaining rural livelihoods across both developed and developing economies. In advanced countries, well-structured financing systems, efficient logistics, and strong institutional frameworks enable agribusiness sectors to achieve high productivity and global competitiveness (Abolade et al., 2025). In contrast, developing economies often face constraints such as weak financial systems, inadequate infrastructure, and fragmented supply chains, which limit agricultural productivity and reduce market competitiveness (Abolade et al., 2025; World Bank, 2024). These disparities underscore the importance of

supply chain financing as a mechanism for improving value chain performance and unlocking the full potential of agricultural sectors.

In Nigeria, agriculture remains central to economic diversification, employment generation, and food production, yet it continues to be constrained by structural and financial challenges. Nigeria produced approximately 1.4 million metric tons of palm oil in 2023, which is significantly below the estimated domestic demand of about 3 million metric tons. This supply gap has resulted in import expenditures of over \$600 million annually, despite the country's favourable agro-ecological conditions for oil palm production (Prime Business Africa, 2023; Nairametrics, 2025). This situation reflects inefficiencies within the palm oil value chain and highlights the need for improved financing mechanisms to support production and processing activities.

Supply chain financing (SCF) encompasses a range of financial solutions designed to facilitate the flow of capital among value chain actors, including farmers, processors, distributors, and marketers, thereby enhancing liquidity, reducing transaction risks, and enabling investment in productivity-enhancing technologies (Hofmann & Kotzab, 2010; Moretto & Caniato, 2021). In agricultural systems, SCF includes instruments such as trade credit, contract farming arrangements, inventory financing, and digital financial services, which contribute to improved coordination, efficiency, and market access (Akinwale et al., 2021; Yusuf & Salami, 2023). Recent innovations, including commodity-backed lending and digital platforms, have also demonstrated potential to improve loan disbursement and liquidity among farmers in Nigeria (AllAfrica.com, 2025; BusinessDay NG, 2025).

The performance of the palm oil value chain measured through indicators such as production efficiency, processing capacity, profitability, market access, and income stability is closely linked to the availability and effectiveness of financing. Limited access to finance restricts investment in improved seedlings, mechanized processing equipment, storage facilities, and logistics infrastructure, thereby constraining productivity and value addition (Obisesan & Akinlade, 2020; Ogundele et al., 2022). Conversely, well-structured financing mechanisms enable value chain actors to expand operations, adopt improved technologies, and integrate into broader markets, thereby improving overall performance and competitiveness (Abolade et al., 2025). In rural areas such as Baissa in Taraba State, the palm oil value chain is dominated by smallholder farmers and small-scale processors who often rely on informal and insufficient sources of finance. These limitations hinder their ability to scale operations, improve efficiency, and achieve stable incomes. Nigeria's agribusiness financing environment continues to face persistent challenges, including limited long-term agricultural lending and structural weaknesses in financial markets that disproportionately affect rural sectors (World Bank, 2024).

Furthermore, existing empirical studies on agricultural finance in Nigeria largely focus on aggregate or national-level analyses, with limited attention to how specific supply chain financing mechanisms influence value chain performance at the community level. This creates a gap in understanding the localized impact of financing instruments such as trade

credit, contract farming, inventory financing, and digital financial services on palm oil value chain outcomes. Against this backdrop, this study investigates the effects of trade credit financing, contract farming finance, inventory/warehouse financing, and digital/fintech-enabled finance on palm oil value chain performance in Baissa, Taraba State. The study aims to provide empirical evidence that can inform policy formulation, financial innovation, and strategic interventions for enhancing productivity, competitiveness, and sustainability within the Nigerian palm oil sector.

Statement of Problem

Palm oil remains one of Nigeria's most economically strategic agricultural commodities, serving as a major source of income, employment, food security, and industrial raw materials. However, despite Nigeria's comparative advantage in palm oil production, the sector continues to underperform relative to its potential, largely due to inefficiencies across the value chain ranging from farm-level production to processing, storage, transportation, and marketing (Obisesan & Akinlade, 2020; Ogundele et al., 2022). In Baissa, Taraba State, where palm oil production represents a key livelihood activity, actors within the value chain face persistent challenges including low processing capacity, limited value addition, post-harvest losses, poor market integration, and unstable incomes.

A major underlying constraint is inadequate and poorly structured supply chain financing. Palm oil farmers, processors, and traders in Baissa often struggle to access formal financial services due to high collateral requirements, elevated interest rates, limited financial literacy, and the perception of agriculture as a high-risk sector by financial institutions (Akinwale et al., 2021; World Bank, 2024). Consequently, many rely on informal financing sources such as personal savings, money lenders, and trade credit arrangements, which are frequently insufficient, costly, and unsustainable. These financial limitations restrict investment in improved seedlings, mechanized processing equipment, storage facilities, and logistics systems, thereby weakening overall value chain performance (Obisesan & Akinlade, 2020).

From a practical and contextual perspective, insufficient supply chain financing has been linked to delayed harvesting, low extraction rates, inefficient processing methods, high production costs, weak bargaining power among smallholder actors, and reduced competitiveness of locally produced palm oil (Ogundele et al., 2022; Oyeboode et al., 2024). These challenges contribute to lost revenue opportunities, constrained enterprise growth, and reduced economic resilience within palm oil-producing communities in Baissa. Despite ongoing government and donor-led agricultural finance initiatives, their effectiveness in strengthening palm oil value chain performance at the local level remains uncertain due to weak alignment with supply chain realities (World Bank, 2024).

From a theoretical standpoint, Supply Chain Finance Theory emphasizes the role of coordinated financial flows in enhancing operational efficiency, reducing risk, and improving value creation across interconnected actors (Pfohl & Gomm, 2009; Hofmann, 2005). However, much of the existing theoretical and empirical literature is based on manufacturing

systems, export-oriented agribusinesses, or large-scale commercial farming, with limited application to smallholder-dominated rural value chains in sub-Saharan Africa (Gelsomino et al., 2016). This raises concerns about the contextual validity and explanatory power of existing models in explaining financing performance dynamics in informal and fragmented agricultural systems such as those found in Baissa.

Empirically, while prior studies have examined agricultural credit and rural finance in Nigeria, there remains a notable gap in localized, data-driven evidence on how specific supply chain financing mechanisms influence palm oil value chain performance at the community level (Abolade et al., 2025; Chinwuba et al., 2019). Existing research often adopts broad national or regional perspectives, fails to disaggregate financing types across value chain actors, or does not adequately link financing access to measurable performance outcomes such as productivity, processing efficiency, profitability, market access, and value addition. This empirical limitation constrains evidence-based policymaking and limits the ability of financial institutions and development agencies to design targeted financing solutions tailored to palm oil value chain stakeholders.

In the light of these practical constraints, contextual realities, theoretical gaps, and empirical deficiencies, there is a compelling need for a systematic investigation into the effects of supply chain financing on palm oil value chain performance in Baissa, Taraba State. Addressing this problem will contribute to improved understanding of financing-performance linkages, support the development of context-specific financial models, and provide actionable insights for enhancing the productivity, competitiveness, and sustainability of the palm oil sector in the study area. The main objective of this study is to assess the effect of supply chain financing on palm oil value chain performance. Specifically, the study will examine the effect of trade credit financing, contract financing, inventory/warehouse financing and digital/fintech-enabled finance on palm oil value chain performance.

Research Hypotheses

- H₀₁: Trade credit financing (TCF) has no significant effect on palm oil value chain performance.
- H₀₂: Contract farming finance (CFF) has no significant effect on palm oil value chain performance.
- H₀₃: Inventory/warehouse financing (IWF) has no significant effect on palm oil value chain performance.
- H₀₄: Digital/fintech-enabled finance (DFF) has no significant effect on palm oil value chain performance.

LITERATURE REVIEW

Conceptual Review

Supply Chain Financing (SCF)

Supply Chain Financing (SCF) refers to financial mechanisms designed to optimize cash flows, improve liquidity, and reduce working capital constraints across interconnected actors in a value chain (Hofmann, 2005; Gelsomino et al., 2016). In agricultural contexts, SCF addresses chronic credit constraints faced by smallholder farmers and agri-SMEs, enabling access to inputs, mechanized processing, and storage infrastructure, thereby improving productivity and value addition (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2017). Fintech-enabled SCF further reduces transaction costs, mitigates information asymmetry, and enhances financial inclusion (Wan & Cui, 2024). In the palm oil value chain, SCF facilitates operational efficiency, strengthens coordination among producers, processors, and marketers, and supports sustainable rural agribusiness development (Adwiyah et al., 2023).

Trade Credit Financing

Trade credit financing involves short-term arrangements where suppliers provide goods or inputs immediately and allow buyers to defer payment (Wang et al., 2024; Bichi et al., 2025). In agriculture, it enables smallholders and processors to sustain operations without relying solely on formal bank loans, thereby smoothing procurement cycles and mitigating liquidity constraints (Denashurya & Azizu, 2025; Gyimah, 2025). Trade credit fosters inter-firm trust and continuity of production but remains underutilized in rural contexts due to institutional limitations (Bichi et al., 2025).

Contract Farming Finance

Contract farming finance is a formal agreement between farmers and agribusiness firms or processors, providing inputs, technical assistance, and pre-agreed financial support in exchange for guaranteed produce delivery (Denashurya & Azizu, 2025; Wang et al., 2024). This arrangement reduces production and market risks, promotes adoption of improved technologies, ensures stable cash flows, and strengthens market access (Gyimah, 2025; Bichi et al., 2025). In developing countries, contract farming has been shown to enhance productivity, income stability, and overall value chain performance.

Inventory/Warehouse Financing

Inventory or warehouse financing involves using stored agricultural produce as collateral to obtain short-term credit (Moretto & Caniato, 2021; Denashurya & Azizu, 2025). It allows value chain actors to manage cash flow, reduce post-harvest losses, and stabilize supply while leveraging inventory to secure loans (Gyimah, 2025; Wang et al., 2024). While effective in grain and cocoa sectors, evidence in palm oil production in Nigeria remains limited, with operational inefficiencies affecting its impact on production efficiency and profitability.

Digital/Fintech-Enabled Finance

Digital or fintech-enabled finance leverages mobile money, digital wallets, online lending, and blockchain platforms to facilitate financial inclusion, credit access, and real-time monitoring of transactions (Denashurya & Azizu, 2025; Yusuf & Salami, 2023). In agriculture, fintech solutions lower transaction costs, improve transparency, and enable timely input financing. However, adoption in rural contexts is constrained by infrastructure gaps, low digital literacy, and platform accessibility (Ozili, 2022; Wan & Cui, 2024).

Palm Oil Value Chain Performance

Value chain performance encompasses efficiency, productivity, profitability, market access, and income stability of actors involved in production, processing, and distribution (Kaplinsky & Morris, 2020; Nadvi, 2021). High-performing chains reduce post-harvest losses, optimize resource utilization, and enhance competitiveness. SCF mechanisms directly influence these outcomes by improving liquidity, enabling investment, and facilitating coordination across the chain (Adewale & Ojo, 2020; Ogundele et al., 2022).

Theoretical Review

This study is grounded in four complementary theoretical perspectives that collectively explain how supply chain financing (SCF) influences palm oil value chain performance in Baissa, Taraba State.

The Resource-Based View (RBV), as propounded by Barney (1991), provides a foundational lens for understanding how access to strategic resources enhances firm performance. RBV posits that organizations achieve sustained competitive advantage when they possess resources that are valuable, rare, inimitable, and non-substitutable. In the context of this study, supply chain financing represents a critical strategic resource that enables value chain actors particularly farmers, processors, and marketers to invest in improved production technologies, storage facilities, and processing equipment. Such investments enhance productivity, reduce inefficiencies, and ultimately improve competitiveness within the palm oil value chain. Thus, access to financing is not merely a financial tool but a capability that strengthens operational performance.

Complementing this perspective is the Transaction Cost Economics (TCE) theory developed by Williamson (1985), which emphasizes the role of governance structures in minimizing transaction costs associated with economic exchanges. TCE explains that uncertainties, opportunistic behaviour, and information asymmetry often increase the cost of transactions, particularly in fragmented and informal markets such as rural agricultural systems. Supply chain financing mechanisms especially contract farming and trade credit help mitigate these challenges by formalizing relationships, improving trust, and enhancing contractual compliance among value chain actors. As a result, coordination improves, risks are reduced, and operational efficiency is enhanced.

The study also draws on Value Chain Theory, introduced by Porter (1985), which focuses on how value is created and enhanced across different stages of production, processing, and distribution. According to this theory, upgrading activities within the value chain such as improving processing quality, adopting better logistics systems, and expanding market access leads to increased value addition and competitive advantage. Supply chain financing plays a critical role in enabling these upgrades by providing the necessary financial resources for investment in innovation, infrastructure, and market expansion. In the palm oil sector, such improvements are essential for enhancing product quality, reducing post-harvest losses, and increasing profitability.

Furthermore, the study is anchored on Supply Chain Finance Theory, as articulated by Pfohl and Gomm (2009), which provides a direct and integrated explanation of how financial flows can be embedded within supply chain relationships. This theory emphasizes that financing should not be treated as a standalone activity but rather as an integral component of supply chain management. Coordinated financial instruments such as inventory financing, receivables discounting, and digital/fintech enabled lending help reduce working capital constraints, stabilize cash flows, and enhance collaboration among supply chain actors. In agricultural contexts, particularly in developing economies, this approach is critical for addressing liquidity challenges and improving overall value chain performance.

Among these theoretical perspectives, Supply Chain Finance Theory (Pfohl & Gomm, 2009) is the most relevant to this study. This is because it directly explains the central phenomenon under investigation the relationship between supply chain financing mechanisms and value chain performance. Unlike RBV, TCE, and Value Chain Theory, which provide broader conceptual insights, Supply Chain Finance Theory specifically focuses on the integration of financial solutions within supply chain processes. It offers a clear framework for understanding how mechanisms such as inventory/warehouse financing, contract farming finance, and digital finance influence liquidity, coordination, and efficiency across the value chain.

The relevance of this theory is further reinforced by the empirical findings of the study, which show that inventory/warehouse financing has the strongest impact on value chain performance, followed by contract farming and digital finance. These results align closely with the propositions of Supply Chain Finance Theory, which emphasizes the role of structured and coordinated financing instruments in enhancing supply chain outcomes. Therefore, while all four theories provide valuable insights, Supply Chain Finance Theory serves as the primary theoretical foundation for explaining the observed relationships in this study.

Empirical Review

Empirical studies consistently show that SCF improves agribusiness performance. In Nigeria, Ojo and Ayanwale (2019) reported that structured financing enhanced productivity and income among agricultural producers. Chinwuba, Davina, and Lucky (2019) confirmed that value chain finance increased processing capacity and efficiency among palm oil processors

in Delta State. Oyeboode, Oyesola, and Fadairo (2024) found that limited finance caused production delays and inefficiencies, while Abolade, Lawal, Akanbi, and Salami (2025) demonstrated a strong positive relationship between financial access and overall agribusiness productivity.

Internationally, Nartey (2023) showed that SCF adoption among SMEs in Ghana improved competitiveness and operational efficiency, while Aliamutu and Mkhize (2024) found that value chain financing enhanced profitability, reduced working capital constraints, and strengthened supplier relationships in South Africa's edible oil sector. Cooperative game-theory-based studies indicate that profit-sharing and coordinated financial contracts improve fairness, collaboration, and value chain efficiency (Bekolli, Guardiola, & Meca, 2023).

Despite these positive outcomes, context-specific gaps remain. Digital/fintech enabled finance and warehouse financing remain underexplored in rural African contexts, with adoption limited by low digital literacy, infrastructural constraints, and operational inefficiencies (Wan & Cui, 2024; Ozili, 2022). Macro-level evidence suggests that well-structured financial mechanisms stabilize supply chains, while excessive financialization can increase volatility and disrupt commodity markets (Manogna & Kulkarni, 2025).

In summary, empirical evidence indicates that SCF particularly contract farming and trade credit significantly enhances palm oil value chain performance, while warehouse and fintech enabled financing have emerging potential that requires context specific adaptation in rural Nigeria. These findings justify the focus of the present study on evaluating SCF mechanisms within Baissa, Taraba State.

METHODOLOGY

This study adopts a cross-sectional survey design to examine the relationship between supply chain financing mechanisms and palm oil value chain performance in Baissa, Taraba State. The target population comprises key actors in the palm oil value chain, including farmers, processors, and marketers. A sample size of 140 respondents was determined using appropriate sampling techniques, and stratified random sampling was employed to ensure adequate representation across the different actor groups.

Primary data were collected using a structured questionnaire designed on a fivepoint Likert scale, ranging from strongly disagree to strongly agree. The questionnaire items were adapted from validated instruments in existing literature to ensure content validity. Data analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable for predictive analysis and complex models involving multiple constructs (Hair et al., 2022).

Reliability and validity of the measurement model were assessed using Cronbach's alpha, composite reliability, and average variance extracted (AVE). Discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) ratio, while multicollinearity was assessed using Variance Inflation Factor (VIF) values. Structural model evaluation involved examining

path coefficients, coefficient of determination (R^2), effect size (f^2), and model fit indices such as SRMR.

RESULTS

Measurement Model Assessment

Table 1: Reliability and Convergent Validity of Constructs

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Contract farming finance	0.769	0.85	0.787	0.588
Digital/fintech-enabled finance	0.857	0.867	0.904	0.703
Inventory/warehouse financing	0.914	0.921	0.936	0.746
Trade credit financing	0.791	0.755	0.777	0.586
Value chain performance	0.894	0.898	0.927	0.76

Interpretation:

Table 1 shows that all constructs demonstrate acceptable internal consistency and convergent validity. Cronbach's alpha values exceed the recommended threshold of 0.70, while composite reliability values are above 0.77. AVE values for all constructs are above 0.50, confirming adequate convergent validity.

Table 2: Discriminant Validity (HTMT Criterion)

Construct	CFF	DF	IWF	TCF	VCP
Contract farming finance	-	-	-	-	-
Digital/fintech-enabled finance	0.642	-	-	-	-
Inventory/warehouse financing	0.722	0.846	-	-	-
Trade credit financing	0.569	0.579	0.422	-	-
Value chain performance	0.686	0.659	0.019	0.405	-

Interpretation:

Table 2 indicates that discriminant validity is established. All HTMT values are below the threshold of 0.90, demonstrating that constructs are distinct and measure different aspects of supply chain financing and value chain performance.

Figure 1: The measurement model showing factor loadings for all constructs presented

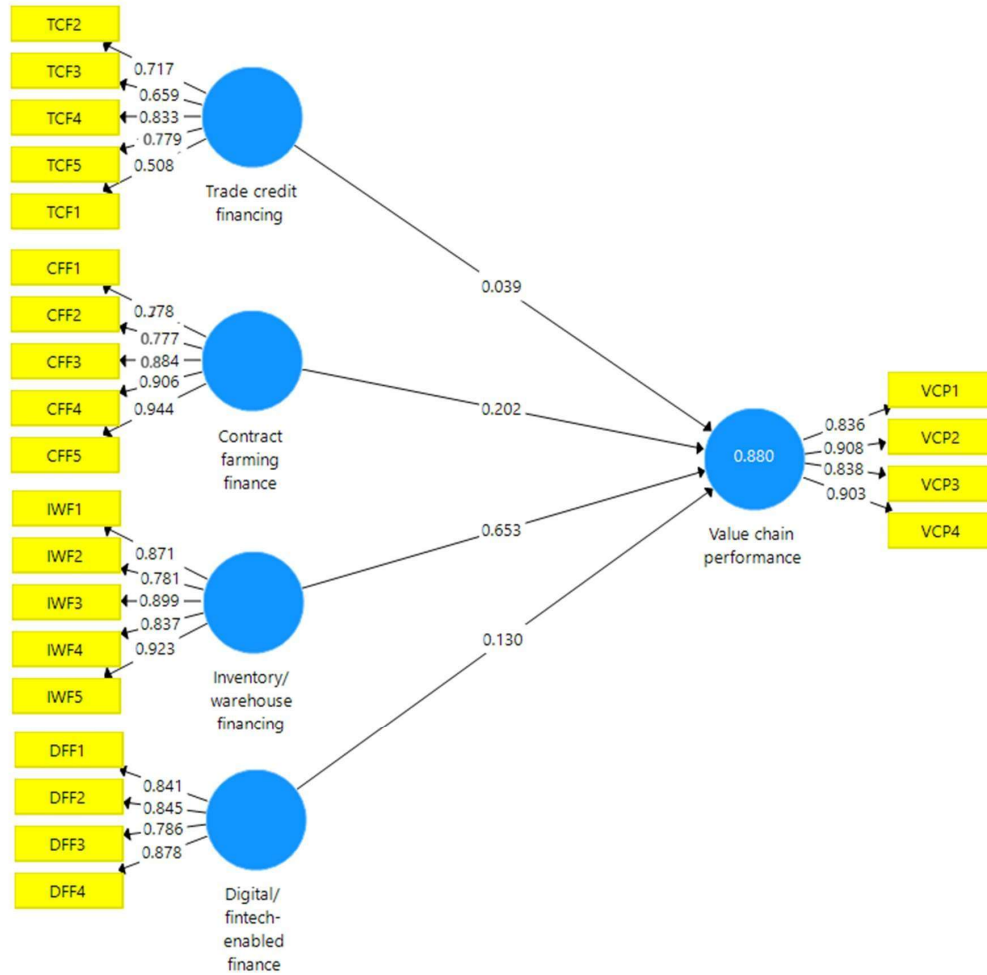


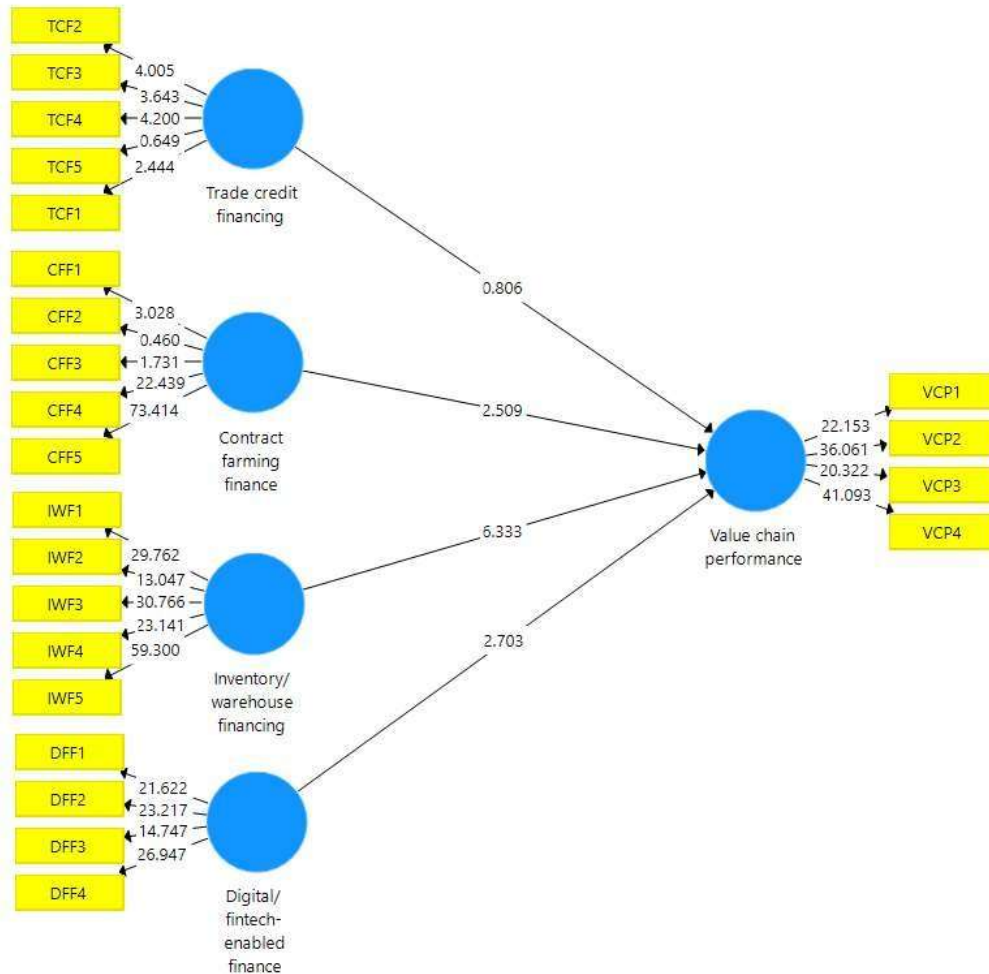
Table 3: Collinearity Diagnostics

Construct	VIF
Contract farming finance	2.719
Digital/fintech-enabled finance	2.548
Inventory/warehouse financing	2.164
Trade credit financing	1.337
Value chain performance	-

Interpretation:

Table 3 reveals no multicollinearity issues among predictors, as all VIF values are below 5. This indicates that each financing mechanism contributes independently to explaining value chain performance.

Figure 2: The structural model illustrating the hypothesized relationships and path coefficients among constructs



Structural Model Assessment

Table 4: Path Coefficients

Predictor	β (Path Coefficient)	t-value	pvalue
Contract farming finance → Value chain performance	0.202	2.509	0.012
Digital/fintech-enabled finance → Value chain performance	0.130	2.703	0.007
Inventory/warehouse financing → Value chain performance	0.653	6.333	<0.001
Trade credit financing → Value chain performance	0.039	0.806	0.421

Interpretation:

Table 4 shows that inventory/warehouse financing has the strongest significant positive effect on value chain performance, followed by contract farming finance and digital/fintech-enabled finance. Trade credit financing does not significantly influence performance.

Table 5: Coefficient of Determination (R^2)

Dependent Variable	R^2	Adjusted R^2
Value chain performance	0.88	0.874

Interpretation:

Table 5 indicates that 88% of the variance in value chain performance is explained by the four supply chain financing mechanisms. This high explanatory power suggests a robust structural model.

Table 6: Effect Size (f^2)

Predictor	f^2
Contract farming finance	0.125
Digital/fintech-enabled finance	0.055
Inventory/warehouse financing	0.85
Trade credit financing	0.041

Interpretation:

Table 6 reveals that inventory/warehouse financing has a large effect size on value chain performance, contract farming finance has a moderate effect, while digital/fintech-enabled finance and trade credit financing have small effect sizes.

Table 7: Model Fit Indices

Fit Index	Saturated Model	Estimated Model
SRMR	0.035	0.035
d_ULS	5.007	5.007
d_G	3.625	3.625
Chi-Square	1373.559	1373.559
NFI	0.478	0.478

Interpretation:

Table 7 confirms that the structural model demonstrates good fit. The SRMR value (0.035) is below the threshold of 0.08, supporting model adequacy.

Discussion of Findings

The findings of this study highlight the critical role of supply chain financing in enhancing palm oil value chain performance in Baissa, Taraba State. Inventory/warehouse financing emerges as the most significant predictor, underscoring the importance of storage infrastructure and asset-backed financing in reducing postharvest losses and improving market timing. This finding aligns with prior studies that emphasize the role of inventory financing in stabilizing agricultural markets and enhancing profitability (Chen et al., 2021; Liu et al., 2022).

Contract farming finance also demonstrates a significant positive effect, suggesting that structured agreements between farmers and buyers enhance access to inputs, technical support, and guaranteed markets. This supports the transaction cost economics theory, which posits that contractual arrangements reduce uncertainty and improve efficiency (Williamson, 1985). Digital/fintech-enabled finance shows a positive and significant impact, reflecting the growing importance of digital financial services in improving financial inclusion and transaction efficiency in rural areas. This finding is consistent with recent studies that highlight the transformative potential of fintech in agricultural value chains (Aker & Mbiti, 2010; Ozili, 2023). In contrast, trade credit financing does not significantly influence value chain performance, suggesting that informal and short-term credit arrangements may be insufficient to drive meaningful improvements in productivity and efficiency. This may be

due to the limited scale and high uncertainty associated with such financing mechanisms in rural contexts.

CONCLUSION

This study concludes that supply chain financing plays a significant role in enhancing palm oil value chain performance in Baissa, Taraba State. Among the financing mechanisms examined, inventory/warehouse financing has the strongest impact, followed by contract farming finance and digital/fintech-enabled finance. Trade credit financing, however, does not significantly influence performance outcomes. The high explanatory power of the model indicates that targeted financial interventions can substantially improve agricultural value chains. Therefore, policymakers and stakeholders should prioritize structured and scalable financing solutions to enhance productivity, efficiency, and sustainability in the palm oil sector. Based on the findings of this study, the following key recommendations are highlighted:

- **Investment in Warehouse Infrastructure:** Government agencies and private sector stakeholders should prioritize investment in modern warehouse facilities and promote inventory/warehouse financing systems to enhance storage capacity and significantly reduce post-harvest losses.
- **Strengthening Contract Farming Arrangements:** There is a need to reinforce contract farming frameworks to improve coordination, ensure market stability, and enhance risk-sharing among farmers, processors, and marketers within the palm oil value chain.
- **Expansion of Digital Financial Services:** Stakeholders should promote and expand digital/fintech-enabled financial services in rural areas to improve financial inclusion, facilitate access to credit, and enhance transaction efficiency.
- **Supportive Policy and Regulatory Frameworks:** Policymakers should develop and implement enabling policies and regulatory frameworks that encourage the adoption and scalability of innovative supply chain financing mechanisms across the agricultural sector.

This study contributes to the existing literature by providing localized empirical evidence on the impact of supply chain financing mechanisms on agricultural value chain performance in rural Nigeria. It extends the application of supply chain finance theory within the context of palm oil production and offers practical insights for policymakers, development practitioners, and agribusiness stakeholders.

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HOW PERSISTENT ARE NIGERIAN SECTOR STOCKS? A LONG MEMORY ANALYSIS

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Abstract

This paper studies the long range dependence of ten sectors of Nigerian stock market using data from January, 2007 to December, 2016. Rescaled (R/S) analysis and fractional integration were used to examine the market efficiency of the sector's stocks. The findings indicate a rejection of the hypothesis of random walk in the sectoral prices, thus indicating that the Nigerian sectoral stock prices are largely inefficient. Only the Agriculture stock prices seems to be efficient. Therefore, stock market traders can strategically predict the stock prices of the sectors except Agriculture to earn abnormal returns.

Keywords: Stock price; Market efficiency; Persistence; R/S analysis; Fractional integration

JEL Codes: C22; G12

INTRODUCTION

Modelling the long-range dependence in asset returns has been an interesting subject for both academics and policy makers over time. Understanding the existence of long memory in asset prices through efficiency market hypothesis (EMH) in its weak form is crucial for investors, portfolio managers and policy makers. It implies that historical sequence prices or security returns are immediately embodied in asset prices. This guides the decisions of investors and allows potential investors to formulate decisions based on specific information (Fama and French, 1988; Sensoy and Tabak, 2016; Mensi et al., 2018). For this reason, testing this hypothesis has important implications for optimal asset allocation, investment strategies and forecasting.

In developed markets, persistency in the stock market has been the issue of considerable research by financial experts, the outcome of which is a strong measure of consensus among economists on the validity of the weak and semi-strong forms of the EMH for the major developed countries (Fama, 1970; Ross and Westerfield, 1988). However, the EMH debate has also been carried into the emerging markets sparsely and the conclusions of the studies have been mixed (Gandhi, Saunders and Woodward, 1980; Cooper, 1982; Parkinson, 1987; Ayadi, 1984; Dickinson and Muragu, 1994; Adelegan, 1995; Matome, 1998; Olowe, 1999).

In addition to the scarce literature on Africa, one thing that is also conspicuously scanty in the literature is sector specific analysis. Most of the studies in the literature essentially focus on inter-country financial market spillovers which account for spillovers across countries/international financial markets. Of course, the outcome of such analyses offers useful insights to foreign portfolio investors/managers on how to diversify their asset base in the international financial markets. However, domestic investors within a country would also require information on how to diversify their assets within the domestic sector stocks. Such information can only be teased out from sectoral stocks returns; that is, spillovers among sector-stock assets within the same domestic economy. The only few recent studies dealing with intra-country spillovers are Dean et al. (2010) focusing on Australia; Karmakar (2010) on India; Raimony and El-Nader (2012) on Jordan; Diebold and Yilmaz (2012), Weber (2013), and Cronin (2014) focusing on US; Duncan and Kabundi (2013) on South Africa; Kanga et al. (2013) on Korea; and Wahyudi and Sani (2014) on Indonesia.

On the basis of these limitations in the literature, the contribution of this paper is in two folds. First, our paper focuses on sectoral level analysis drawing evidence from Nigeria. Some of the attractions to Nigeria are highlighted as follows. According to the 2015 KPMG report, in the whole of Africa, Nigeria has one of the largest pools of investment capital with approximately five million registered capital market investors. Furthermore, the report also showed the significance of the Nigerian financial markets in servicing the largest economy in sub-Saharan Africa (KPMG report, 2015), hence, the database is more likely to provide very rich and solid information about the dynamic behaviour of investors as well as the managers of the financial institutions. Second, it contributes methodologically. In addition to the popular R/S analysis developed by Hurst (1951), we introduce the fractional integration. In all, three forms of techniques are employed for the sake of robustness- non-parametric approach (R/S analysis), parametric approach (based on Robinson, 1994) and semi-parametric techniques (based on Robinson, 1995a,b).

We present the remainder of this paper as follows. Section 2 opens the plethora of past studies, Section 3 gives the methodology and data description. In Section 4, we render the presentation and discussion of results including the robustness checks, and Section 5 highlights the policy implications and concludes the paper.

LITERATURE REVIEW

Long term dependence of stock markets has been a guide for practitioners and academics in making investment decisions as decisions to curb abnormal profit can be made when there is vivid information on behavioural pattern of stock prices and returns. Literature has detailed record of studies that had considered sectoral pattern of stock markets.

Studies from the Asian emerging market has examined persistence and weak form efficiency of stock markets. Ruan et al. (2018) use the MF-DFA to examine the multifractal property of Shanghai and Hong Kong stock markets. They show that the considered stock markets reveal multifractality. Furthermore, the market efficiency of Shanghai stock market is improved

after the implementation of Shanghai-Hong Kong Stock Connect. The evidence of cross-correlation between the two markets is stronger in the long run than in the short run. Evidence of multifractal properties in the CSI 800 index of Chinese stock market was also shown (Zhu and Zhang, 2018). In addition, Cao et al. (2013) investigate the asymmetric multifractal scaling behaviour of Chinese stock markets and show that the multifractality degree of uptrend Chinese stock markets is stronger than that of downtrend Chinese stock markets. They find strong asymmetric correlations in large fluctuations than in small fluctuations.

Tabak and Staub (2016) tested the Random walk hypothesis by examining Brazilian sectoral equity market. The authors employed Variance ratio statistics with derived heteroscedasticity-consistent distributions using a weighted bootstrap method. The result indicated that all sector indices obeys random walk hypothesis with weekly returns except for basic industries. Random walk hypothesis can be used to price assets and build financial models. He and Chen (2010) investigated the causes and multifractality features of Brent and WTI. Using multifractal detrended fluctuation analysis (MF-DFA) and multifractal singular spectrum analysis (MF-SSA) there exist multifractal features in both markets. Shuffling original time series eliminated the market memories but price fluctuations distribution remains the same. In monofractal sense, WTI is more persistent than Brent. In multifractal sense, the width of multifractal spectrum of WTI market is narrower than that of Brent.

Mensi et al (2016) explores the efficient market hypothesis of 10 sector indices of Islamic stock market and examines the effects of the GFC on the level of efficiency using the MF-DFA method. The results provide strong evidence that the level of market efficiency varies over time and decreases after market collapse. The Islamic sectoral market indices are more efficient in the long term than in the short term. Shahzad, et al (2017) examines the power law properties of 11 US credit and stock markets at industry level. Using multifractal detrended fluctuation analysis (MF-DFA) and multifractal detrended cross-correlation analysis (Mf-DXA), the credit default swap (CDS) markets are relatively more inefficient than their equity counterparts. Banks and financial credit markets are relatively more efficient. CDS and equity indices is the most inefficient sector of the US economy.

METHODOLOGY

Data Description

This paper covers returns of ten (10) different sectoral stock prices. These sectors include, Agriculture (AGR); Consumer goods (CGD); Conglomerate (CGL); Construction (CON); Financial Services (FIN); Health (HTH); Industrial (IND); Natural Resources (NTR); Oil and Gas (OGS); Service (SVS). The sample period runs from January 2007 to December 2016. The scope and frequency of our study is based on data availability. Data on the monthly sectoral stock prices are obtained from <http://www.cashcraft.com/plistorder.php>

Rescaled Range Analysis (R/S Analysis)

This is a non parametric approach to measure the level of efficiency using Hurst exponent. This technique was developed by Hurst (1951) whose original methodology was applied to detect long memory in hydrologic time series and later augmented by Mandelbrot (1972), Peters (1991, 1994) and others for analysis of the financial markets. This Hurst exponent algorithm of R/S analysis for the financial data is well documented in the work of Mynhardt et al. (2014) which is presented below.

A time series of length M transforms into one of length $N = M - 1$ using logs and converting prices into returns:

$$N = \log_2 \left(\frac{Y}{t} \right) 1, 2, 3, \dots, (M - 1) \quad (1)$$

1. This period is divided into contiguous A sub-periods with length n , so that $A_n = N$. Then, we identified each sub-period as I_a , given the fact that $a = 1, 2, 3, \dots, A$. Each element I_a is represented as N_k with $k = 1, 2, 3, \dots, N$. For each I_a with length n , the average and e_a is defined as:

$$e = \frac{1}{n} \sum_{k=1}^n N_k, \quad k = 1, 2, 3, \dots, N; \quad a = 1, 2, 3, \dots, A \quad (2)$$

2. Accumulated deviations $X_{k,a}$ from the average e_a for each sub-period I_a are defined as:

$$X_{k,a} = (N_{k,a} - e_a) \quad (3)$$

The range is defined as the maximum index $X_{k,a}$ minus the minimum $X_{k,a}$, within each sub-period (I_a):

$$R = \max(X_{k,a}) - \min(X_{k,a}), \quad 1 \leq k \leq n \quad (4)$$

3. The standard deviation S_{I_a} is calculated for each sub-period I_a :

$$S = \sqrt{\frac{1}{n} \sum_{k=1}^n (N_{k,a} - e_a)^2} \quad (5)$$

4. Each range R is normalised by dividing by the corresponding S . Therefore, the re-normalized scale during each sub-period I_a is R/S . In step 2 above, we obtained adjacent sub-periods of length n . Thus, the average R/S for length n is defined as:

$$\bar{R/S} = \frac{1}{A} \sum_{a=1}^A \frac{R_a}{S_a}$$

$$\left(\frac{1}{s} \right) = \frac{1}{A} \sum \frac{1}{s} \quad (6)$$

5. The length n is increased to the next higher level, $(M-1) / n$, and must be an integer number. In this case, we use n –indices that include the initial and ending points of the time series, and Steps 1-6 are repeated until $n = (M-1)/2$.

6. The least square is used to estimate the equation $\log(R/S) = \log(c) + H \cdot \log(n)$. The angle of the regression line is an estimate of the Hurst exponent (H). The Hurst exponent H changes over the interval $[0, 1]$.

Based on the values of the Hurst exponent, the series can be classified into three categories. The first category is when the Hurst exponent is within the range $0 \leq H < 0.5$, the distribution has a flat tail, hence the series are anti-persistent and returns are negatively correlated (Efficient Market Hypothesis (EMH) not confirmed); in the second category, the EMH is confirmed when $H = 0.5$, there is no memory in the series hence data are random, the data are normally distributed, returns are uncorrelated; and in the last category, the EMH is not confirmed when $0.5 < H \leq 1$. In this case, there is memory in the series, hence the distribution has fat tails, the series are persistent, and returns are positively correlated.

Fractional Integration Approach

In addition to the non parametric technique, we also employ both parametric and semi-parametric fractional integration or $I(d)$ models. Consideration of these models were motivated by the observation that the estimated spectrum in many aggregated series exhibits a large value at the zero frequency, which is consistent with nonstationary behaviour. However, it becomes close to zero after differencing, which suggests overdifferencing (Granger, 1980; Granger and Joyeux 1980). For this purpose we need to define first an integrated of order 0 (or $I(0)$) process, which is a covariance stationary process with a spectral density function that is positive and finite at the zero frequency. Then, a process is said to be integrated of order d (and denoted by $I(d)$) if it can be represented as:

$$(1 - L) x = u, \quad t = 1, 2, 3, \dots \quad (7)$$

with $x = 0, t \leq 0$, L is the lag operator (i.e., $Lx = x_{t-1}$), and where u_t is $I(0)$. Fractional integration takes place when d is a fractional value. In this context, d plays a crucial role since it will be an indicator of the degree of dependence of the time series. Thus, the higher the value of d is, the higher the level of association will be between the observations. In addition, the process admits an infinite Moving Average representation such that, assuming, for instance that u_t is white noise,

$$x = \beta u \quad (8)$$

with $\beta = \frac{\Gamma(k+d)}{\Gamma(k+1)\Gamma(d)}$ where $\Gamma(x)$ means the Gamma function. Thus, the impulse

responses are also affected by the magnitude of d , and the higher the value of d is, the higher the responses will be. In this context, if $d > 0$ in (1), x_t displays the property of long memory, so-named because of the strong degree of association between observations far distant in time. Moreover, if $0 < d < 0.5$, x_t is covariance stationary, and if $0.5 \leq d < 1$, x_t becomes non-stationary, in the sense that the variance of the partial sums increase in magnitude with d ; Nevertheless, in both cases (i.e. with $d < 1$), the series will be mean reverting, with shocks having temporary effects, and disappearing in the long run (i.e., $\beta \rightarrow 0$ as $k \rightarrow \infty$). On the other hand, if $d \geq 1$, the shock will be permanent, lasting forever unless strong policy measures are adopted.

In the following section we estimate the differencing parameter d by using both parametric and semi parametric approaches. For the former we use a Whittle estimate in the frequency domain as proposed in Dahlhaus (1989) along with a parametric Lagrange Multiplier (LM) test due to Robinson (1994) that has the advantage that it remains valid even in nonstationary contexts ($d \geq 0.5$). The results were practically identical in the two cases. The test of Dahlhaus (1989) considers the following null hypothesis:

$$H : d = d_0 \quad (9)$$

for any real value d_0 , in the model given by Eq. (7), where x_t can be the errors in a regression model of form:

$$y_t = \Phi' z_t + x_t, \quad t = 1, 2, 3, \dots \quad (10)$$

where y_t is the time series we observe and z_t is a $(k \times 1)$ vector of deterministic terms that might include a constant and a time trend. This test has a standard null limit distribution and its functional form can be found in any of the numerous empirical applications of the tests, (see, Gil-Alana et al., 2012; Abbritti et al., 2016; Gil-Alana et al., 2018, among others). Additionally, we use a semi parametric approach of Robinson (1995) that is also based on the Whittle function and that uses only a band of frequencies degenerating to zero. This method is implicitly defined by:

$$\begin{aligned} d &= \arg \min_d \frac{\log C(d) - 2d \log \lambda}{m} \\ \text{for } d \in [-1/2, 1/2]; \quad C(d) &= m^{-1} \int_0^1 I(\lambda) \lambda^{-2d} d\lambda, \quad \lambda = \frac{2\pi}{m}, \quad m^{-1} + m^{-1} \rightarrow 0, \end{aligned} \quad (11)$$

where m is the bandwidth parameter, and $I(\lambda)$ is the periodogram of the time series of interest. Under finiteness of the fourth moment and other mild conditions, Robinson (1995) proved that:

$$\sqrt{m}(\hat{d} - d_0) \rightarrow_d N(0, 1/4) \text{ as } T \rightarrow \infty,$$

where d_0 is the true value of d and with the only additional requirement that $m \rightarrow \infty$ slower than T .

EMPIRICAL RESULTS

The results for the d estimates are presented for both parametric and semiparametric approaches. Beginning with the parametric approach as presented in Table 3, we report the estimated value of d for the three standard cases of: (i) no deterministic terms; (ii) an intercept, and (iii) an intercept and linear time trend. It is seen that the model without intercept and trend appears to be the best, as adjudged by the t -values of the coefficients, for five sectors namely Agriculture, Construction, Financial Services, Natural Resources and Oil & Gas, while the model with an intercept is the most efficient for the remaining five sectors. Therefore, these best models are re-presented in Table 4 with the intercept values of those sectors whose best model is the one with an intercept. The results reveal that the d estimates are significantly higher than 1 in all the sectors except Agriculture (1.0055) and Natural Resources (0.9725). Therefore, the random walk hypothesis which is established on the first-order integration property of a series is not rejected only for the Agriculture sector. The $I(1)$ null hypothesis is rejected in favour of the alternative hypotheses of $d < 1$ for the Natural Resources sector whose d estimates is lower than unitary and $d > 1$ for the 10 sectors whose d estimates exceed unitary.

Table 3: Estimates based on the Parametric Method

Sector	No regressors	An intercept	A linear time trend
Agriculture	1.0055 (0.0731)	1.0054 (0.1041)	0.9937 (0.3269)
Conglomerate	1.1365 (0.0708)	1.2788 (0.0901)	1.2707 (0.0924)
Construction	1.2162 (0.0797)	1.2217 (0.0848)	1.2130 (0.0860)
Consumer Goods	1.1266 (0.0625)	1.2891 (0.0864)	1.2937 (0.0870)
Financial Services	1.0577 (0.0679)	1.0812 (0.0832)	1.0606 (0.0874)
Health	1.1319 (0.0758)	1.1654 (0.0786)	1.1392 (0.0818)
Industrial	1.1905 (0.0792)	1.2169 (0.0806)	1.2136 (0.0804)
Natural Resources	0.9725 (0.0485)	1.0000 (0.0000)	1.0000 (0.0000)
Oil and gas	1.2734 (0.0893)	1.2813 (0.0918)	1.2810 (0.0919)
Services	1.4429 (0.0905)	1.3353 (0.0910)	1.0000 (0.0000)

Table 4: Estimated coefficients in the selected models from Table 3

Sector trend	d-estimates	An intercept	A linear time
Agriculture	1.0055 (0.0731)	-----	-----
Conglomerate	1.2788 (0.0901)	-1.0748***	-----
Construction	1.2162 (0.0797)	-----	-----
Consumer Goods	1.2891 (0.0864)	-0.7644***	-----
Financial Services	1.0577 (0.0679)	-----	-----
Health	1.1654 (0.0786)	-1.1798*	-----
Industrial	1.2169 (0.0806)	-0.6471**	-----
Natural Resources	0.9725 (0.0485)	-----	-----
Oil and gas	1.2734 (0.0893)	-----	-----
Services	1.3353 (0.0910)	-0.5073*	-----

Values in parentheses are standard errors.

It can thus be deduced from the results that only the stock for the Agriculture sector is efficient following the definition of an efficient financial market as one whose prices exhibit random walk, hence cannot be subjected to accurate prediction or forecast. The results suggest inefficiency for the stock markets of the remaining sectors.

Table 5: Estimates based on the Semi-parametric Whittle Method

Sector	3	6	9	12	15	18
Agriculture	0.9319	0.9225	1.2559	1.1951	1.1382	1.0357
Conglomerate	1.2093	1.0890	1.0769	1.1611	1.2157	1.5418
Construction	1.0482	1.0924	0.9892	0.9548	0.9602	0.7580
Consumer Goods	1.0636	1.1099	1.2339	1.1616	1.1420	1.1018
Financial Services	0.9465	1.0540	1.0319	1.1147	1.3748	1.3748
Health	1.1417	1.0546	0.9019	0.9630	1.0913	1.3448
Industrial	1.1786	1.1193	1.0422	1.0463	1.0793	0.9339
Natural Resources	1.0676	0.9717	1.1195	1.2192	1.2759	0.9242
Oil and gas	1.1496	1.0364	0.9720	1.0551	0.7508	0.5512
Services	1.1622	1.1184	0.9307	0.9267	1.0473	1.2568

Using another approach, the d estimates are calculated using the semiparametric Whittle method. Presented in Table 5, the results indicate market inefficiency for most of the sectors across the chosen bandwidths. Expectedly, the d estimates change across the chosen bandwidths (see Table 5), but are largely above 1 in most cases, except Construction and Oil & Gas sectors. The reason for this is as a result of the sensitivity of the semi-parametric Whittle function to bandwidth choice. Usually, the technique performs better for series with large scope, hence the results could be bias (Caporale et al., 2018). Corroborating the findings of the parametric approach, the semi-parametric results presented in Table 5

convincingly supports stock market inefficiency for Conglomerate, Consumer Goods, Financial Services, and Industrial sectors by rejecting the random walk or $I(1)$ hypothesis of the stock price series since the estimates are significantly higher than 1. For other sectors, although the estimates are also higher than 1 in majority of the chosen bandwidths, they are not convincing enough to conclude market inefficiency or otherwise.

Therefore, due to the sensitivity of the semi-parametric estimates to bandwidth choice, thus leading to a less conclusive report for some of the sectors, and consequently causing disagreement between the conclusion of the results of the parametric and nonparametric techniques in most of the sectors, we further employ the non-parametric technique to establish a stronger footing for our conclusion. The results of the nonparametric R/S analysis are shown in Table 6. Obviously, the R/S statistic gives a value greater than 0.5 for all the sectors, indicating persistence and absence of random walk in the stock prices.

Table 6: Estimates based on Non-parametric Method

Sector	R/S Statistic	Sector	R/S Statistic
Agriculture	0.5477	Health	0.5602
Conglomerate	0.5991	Industrial	0.5407
Construction	0.5512	Natural Resources	0.6726
Consumer Goods	0.6535	Oil and gas	0.5829
Financial Services	0.5350	Services	0.6135

Comparatively, it is discovered that the non-parametric results obviously align with the market inefficiency conclusion reached for nearly all the sectors, with the exemption of the Agriculture sector. While the parametric test concludes market efficiency for the Agriculture sector, the non-parametric test appears to show an R/S value that is a little above random walk. This notwithstanding shows that the Agriculture sector is still close to being efficient than being inefficient since the R/S value of 0.5477 can still be approximated to 0.5 which is the threshold for random walk. Therefore, the inefficiency of the stock of the other sectors apart from Agriculture implies that investors can strategically predict future prices of stock to make abnormal gains. On the other hand, traders in the Agriculture sector cannot make abnormal returns due to their inability to accurately forecast stock prices.

CONCLUSION

This paper examines the degree of persistence, and by implication market efficiency, of ten sectors in Nigeria using the parametric and semi-parametric techniques within the fractional integration long memory framework. The nonparametric R/S technique is further employed to bridge the gap between the differences between the results of the parametric and non-parametric approaches. Briefly, there is evidence that the Nigerian sectoral stock returns are largely inefficient. Only the Agriculture stock returns seems to be efficient.

While the results from the semi-parametric method appears to be less conclusive for most of the sectors as the estimated values of d are not convincingly higher or lower than 1 across the chosen bandwidths, the results from the parametric and nonparametric techniques align

for a good number of sectors. The inconclusive nature of the semi-parametric results is due to the sensitivity of the technique to choice of bandwidth. Therefore, since market inefficiency or persistence means predictability, stock market traders can strategically predict the stock prices of the sectors, except Agriculture, to earn abnormal returns.

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