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RISK-BASED CAPITAL AND FINANCIAL STABILITY: EMPIRICAL EVIDENCE FROM KENYAN LISTED BANKS

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Abstract:
Since the Global Financial Crisis, the stability of commercial banks has remained a central policy concern, intensifying in Kenya where mergers, acquisitions and restructuring have concentrated more than 75% of banking-sector market share among nine listed banks. The Central Bank of Kenya has simultaneously tightened Basel III-aligned risk-based capital requirements, yet whether such capital regulation, alongside the underlying risk composition of banks' balance sheets, translates into greater financial stability remains empirically unresolved for Kenya's listed banking segment. This study examines the effects of risk-based capital (RBC) on financial stability among Kenyan listed banks, controlling for the risk-weighted assets-to-total assets ratio, operational cost efficiency, and macroeconomic growth and anchored in the Buffer Theory of Capital. The study uses a balanced quarterly panel of eight Nairobi Securities Exchange-listed banks over 2013Q1–2025Q2. After introducing one-quarter lags, the estimation sample comprises 392 bank-quarter observations. A Hausman test supports bank fixed effects, and cross-sectional and period heteroskedasticity are addressed through Panel EGLS with cross-section weights and panel-corrected standard errors (PCSE). The lagged dependent variable, financial stability, is positive and highly significant ($\varrho = 0.5248$, $p < 0.001$), confirming strong persistence and path dependence in bank stability over time. Risk-based capital exerts a positive and significant effect on financial stability ($\beta = 1.2912$, $p = 0.0004$), and the risk-weighted-assets-to-total-assets ratio is also positively and significantly associated with stability ($\beta = 0.2656$, $p = 0.0045$). The cost-to-income ratio is negatively and significantly associated with stability ($\beta = -0.2210$, $p = 0.0002$), while GDP growth is negatively signed but statistically insignificant ($\beta = -0.0172$, $p = 0.1344$). The model explains 86.6% of the variation in financial stability ($F = 204.37$, $p < 0.001$), and the results are broadly robust to an alternative two-quarter lag structure. The findings confirm that adequate risk-based capitalisation is central to bank resilience in Kenya and

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that the composition of risk-weighted assets carries independent information for financial stability beyond capital adequacy alone. The study recommends that capital regulation remain the cornerstone of prudential policy in Kenya, that supervisors monitor the evolving risk-weighted composition of bank balance sheets, and that operational efficiency be strengthened alongside capital adequacy requirements.

JEL: G21; G28; G32; G34; L11

Keywords: risk-based capital; risk-weighted assets; bank capital; financial stability; lag structure; panel EGLS; Kenyan listed banks

1. Introduction

Financial stability denotes the capacity of banks to withstand both endogenous vulnerabilities and exogenous disturbances without impairing their core intermediation function or disrupting the wider economy (Houben *et al.*, 2004; Mishkin, 1997). Its importance arises from the central role banks play in financial intermediation, resource allocation and monetary policy transmission, particularly in emerging economies where underdeveloped capital markets render banks the primary source of financing for households and firms (Brei *et al.*, 2020). Banks additionally act as custodians of national savings and anchors of the payments system (Arun & Turner, 2004). Instability, conversely, generates severe economy-wide consequences, including constrained credit access, elevated borrowing costs and rising unemployment. Indeed, the fiscal cost of resolving banking crises has been shown to absorb up to 17% of GDP in developing economies (Emre Ergungor & Thomson, 2006).

In Kenya, interest has increasingly centred on banks listed at the Nairobi Securities Exchange (NSE) due to their systemic importance, particularly in the post-2013 period. Over this period, listed banks have exhibited notable resilience despite persistent exposure to interest-rate volatility, institution-specific governance challenges, and elevated credit risk, with the non-performing loans (NPL) ratio rising sharply from 5.2% in December 2013 to 17.6% in June 2025 (CBK, 2025a, 2025b). This has occurred against a backdrop of regulatory tightening following the implementation of Basel III reforms, motivated by the recognition that inadequate capital buffers amplified systemic vulnerabilities and magnified banking-sector losses during the 2007 Global Financial Crisis. Consequently, the Central Bank of Kenya (CBK) raised the minimum paid-up capital from KES 250 million in 2008 to KES 1 billion by December 2012, and revised risk-based capital thresholds upward to 10.5% for core capital and 14.5% for total capital to risk-weighted assets (CBK, 2013). This has drawn considerable attention from scholars and policymakers seeking to establish the extent to which strengthened risk-based capital requirements, alongside the underlying risk composition of banks' asset portfolios, as captured by the ratio of risk-weighted assets to total assets, have contributed to resilience among listed banks amid an increasingly fragile operating environment.

In spite of the above, the theoretical perspective on the risk-based capital–stability relationship remains contested. The Buffer Theory of Capital provides both opposing ends. On one end, it conceptualises capital as a strategic safeguard that strengthens banks' loss-absorption capacity and reduces the likelihood of default and systemic contagion, thereby promoting stability. On the other end, the theory suggests that heightened capital requirements may trigger unintended behavioural responses, including risk-shifting, constrained credit expansion, and portfolio reallocation toward higher-yield, higher-risk assets, all of which may offset the intended stability-enhancing effects of capital regulation. This latter channel underscores why the composition of a bank's risk-weighted assets — not capital adequacy alone — is relevant to understanding stability outcomes.

Empirical evidence mirrors this theoretical ambiguity. A substantial body of evidence documents a stabilising role for risk-based capital, including Siddika and Haron (2020) across 565 global banks, Velliscig *et al.* (2022) for 63 listed European banks, Ashraf *et al.* (2016) for Pakistan, Oyetade *et al.* (2022) and Mutarindwa *et al.* (2020) for African banking systems, Yakubu and Bunyaminu (2023) across 33 Sub-Saharan African countries, and Gudmundsson *et al.* (2013) and Kiemo *et al.* (2022) for Kenya specifically. Anginer *et al.* (2018) further show that this stabilising effect of bank capital is stronger in countries with sound institutional environments. Other empirical studies identify more nuanced or conditional effects. Abbas *et al.* (2021) find that risk-based capital and capital buffers reduce risk while traditional capital ratios can increase it; Nsanyan Sandow *et al.* (2021) document an inverse U-shaped relationship in which capital adequacy improves performance only up to an optimal threshold, beyond which further increases erode it; and Oduor *et al.* (2017) document that higher capital requirements can increase instability except among large banks, illustrating that capital enhancements alone do not reliably improve stability. Collectively, these studies reveal a limited focus on Kenya specifically, with most relying on annual data that obscures short-run dynamics, focusing on aggregate rather than bank-level analysis, with limited use of dynamic panel fixed-effects models, and general neglect of listed banks despite their systemic importance.

This study responds to these gaps by examining eight NSE-listed banks using quarterly, bank-level, dynamic panel data spanning 2013Q1 to 2025Q2. It estimates a dynamic fixed-effects model in which financial stability depends on its own lag, lagged risk-based capital, lagged risk-weighted assets to total assets, lagged cost-to-income ratio, and the lagged natural logarithm of GDP, thereby examining the direct effect of risk-based capital on financial stability while controlling for asset risk intensity, operational cost efficiency, and macroeconomic growth. The use of quarterly data captures adjustment dynamics more precisely than annual-frequency studies allow, while bank fixed effects account for unobserved time-invariant differences in governance, business models, and risk culture. Panel EGLS with cross-section weights and panel-corrected standard errors is employed to address the heteroskedasticity detected in the data. The study makes three contributions. First, it provides context-specific, focused evidence on the direct risk-based-capital–stability relationship for a systemically important group of banks in a small, highly concentrated, emerging African banking system, extending empirical literature otherwise dominated by cross-country and developed-market studies. Second, it advances a dynamic, quarterly panel regression framework that distinguishes the capital buffer from the risk intensity of the asset portfolio and captures persistence in a way annual-frequency studies cannot, while testing the robustness of the results at a two-quarter lag. Third, it offers directly actionable evidence for coordinating prudential capital regulation and bank risk management, evidence relevant to the Central Bank of Kenya, bank boards, risk committees, investors, and regulators in comparable bank-centred emerging markets.

2. Literature Review: Theoretical and Empirical Literature

2.1 Theoretical Literature

The Buffer Theory of Capital provides the central theoretical foundation for understanding banks' capital behaviour under prudential regulation. The theory emerged from early analyses of capital regulation and bank risk-taking, particularly the seminal work of Koehn and Santomero (1980), who demonstrated that minimum capital requirements influence banks' portfolio choices and risk incentives. Subsequent contributions by Calem and Rob (1999) extended this framework by modelling bank capital as a strategic buffer held above regulatory minima to reduce the likelihood of breaching regulatory thresholds and incurring supervisory sanctions. Similarly, Blum (1999) argued that banks deliberately maintain capital buffers to mitigate regulatory intervention costs and uncertainty regarding future vulnerabilities and shocks. Within this framework, capital is therefore not merely a regulatory constraint but a strategically managed cushion that commercial banks adjust in response to market conditions, regulatory pressures, and the risk composition of their asset portfolios.

The relevance of the buffer theory became more pronounced with the introduction of the Basel III framework by the Basel Committee on Banking Supervision (BCBS), which strengthened both the quantity and quality of bank capital requirements, requiring banks with riskier asset portfolios, that is, a higher proportion of risk-weighted assets to total assets, to maintain higher capital buffers. By linking capital ratios to the underlying risk profile of banks' assets and introducing additional safeguards such as the capital conservation buffer, Basel III transformed capital regulation into a behavioural instrument influencing banks' leverage, portfolio allocation, and risk-taking incentives (BCBS, 2011), with subsequent reforms finalising the calibration of risk-weighted-asset measurement and capital floors (BCBS, 2017). Also, when shareholders have more capital at risk, moral hazard should decline. From this perspective, stronger capitalisation, commensurate with the riskiness of a bank's balance sheet, enhances banks' capacity to absorb losses and reduces the probability of insolvency, hence strengthening financial stability and mitigating systemic contagion risks (Demirgüç-Kunt *et al.*, 2020).

However, the theory also recognises potential trade-offs and adjustment costs associated with stricter capital requirements. Raising capital ratios may dilute return on equity and increase banks' funding costs, potentially inducing banks to adjust their behaviour through balance-sheet contraction, reduced lending, changes in risk weights, or risk-shifting strategies toward higher-yield exposures aimed at restoring profitability — responses that may offset the intended stability gains (Repullo & Suarez, 2013). These dynamics suggest that the relationship between capital regulation, asset-risk composition, and stability may not be strictly linear but instead depends on broader bank-specific, structural, and macroeconomic conditions within the banking system.

This motivates the inclusion of several controls. Risk-weighted assets to total assets is included because an apparently strong capital ratio can coexist with a riskier asset mix, allowing the capital buffer to be distinguished from underlying portfolio risk. Operational efficiency is also relevant since a high cost-to-income ratio erodes retained earnings and weakens the internal generation of capital, thereby shaping banks' capacity to absorb shocks independently of regulatory capital. Further, macroeconomic conditions may alter loan performance and risk appetite, influencing financial stability through channels distinct from capital regulation itself. Together, these channels motivate an empirical specification that isolates the effect of risk-based capital on financial stability while controlling for portfolio risk, operational efficiency, persistence, and macroeconomic conditions.

2.2 Empirical Literature

Siddika and Haron (2020), using 565 banks across 52 countries, report that higher capital ratios reduce total and default risk, although some forms of regulatory stringency initially increase risk-taking. Ashraf *et al.* (2016) find that risk-based capital requirements reduce risk-weighted assets and non-performing loans among listed Pakistani banks. Ashraf *et al.* (2020) further show that stricter capital regulation reduces bank risk in normal periods and that stronger pre-crisis standards lower default risk during crises. Velliscig *et al.* (2023), using listed European banks, show that risk-based capital and asset quality jointly influence resilience. Abbas *et al.* (2021) distinguish traditional capital from risk-based capital and find that risk-based capital and capital buffers generally reduce risk among U.S. commercial banks. Huu Vu and Thanh Ngo (2023) add that liquidity creation partially transmits the relationship between bank capital and stability, with asset diversification shaping that channel.

Evidence from Africa also tends to support the stabilising channel, although results vary with institutional context. Mutarindwa *et al.* (2020), Oyetade *et al.* (2022), and Yakubu and Bunyaminu (2023) associate stronger capitalisation with improved resilience across African or Sub-Saharan African samples. Bawuah (2024) finds that regulatory capital supports both bank stability and economic growth in nine Sub-Saharan African countries. Haile *et al.* (2025) report that convergence toward Basel III standards improves banking resilience across 21 African countries, while institutional and regulatory differences remain important. Ayagre *et al.* (2024) show that the stability consequences of consolidation in Sub-Saharan Africa depend on whether consolidation is voluntary or regulation-induced, reinforcing the importance of prudential context. Consistent with this, Hoang *et al.* (2024) provide international evidence that institutional quality significantly conditions the strength of the capital–stability relationship. Kenyan evidence reported by Gudmundsson *et al.* (2013), Kiemo *et al.* (2019), and Kiemo *et al.*

(2022) similarly links capital strength and bank-specific conditions to stability. Conversely, Oduor *et al.* (2017) find that higher capital requirements can increase instability except among large banks. These divergent results reinforce the need for a direct test using institution-level Kenyan data and controls for the risk density of assets.

From the reviewed empirical studies, several gaps emerge. First, there is limited focus on developing economies like Kenya. Second, there is predominant use of annual data, which fails to capture short-term fluctuations in capital adequacy and stability; quarterly datasets are needed for a more accurate analysis. Third, most studies rely on aggregate rather than bank-specific data, underscoring the need for dynamic panel fixed-effects models. Fourth, the majority of studies overlook listed banks despite the systemic role they play in financial markets. Finally, few studies jointly examine risk-based capital alongside the underlying risk composition of banks' asset portfolios (as captured by the risk-weighted-assets-to-total-assets ratio) in a single dynamic framework. These gaps motivate the present study, which employs quarterly panel data and a dynamic fixed-effects model to examine how risk-based capital, together with asset-risk composition, cost efficiency and macroeconomic growth, shapes the financial stability of Kenya's listed banks. The study therefore tests the null hypothesis: H0: Risk-based capital has no statistically significant effect on the financial stability of Kenyan listed banks. The alternative hypothesis is that risk-based capital has a statistically significant effect on financial stability. Consistent with the buffer theory and the preponderance of prior evidence, the expected sign is positive.

The lagged dependent variable is expected to be positive because profitability, capital, asset quality, governance, and franchise conditions adjust gradually. The effect of risk-weighted assets to total assets is theoretically ambiguous. A higher ratio may represent greater portfolio risk, but it may also indicate productive lending that generates income and is properly capitalised. Anguren *et al.* (2024) show that capital requirements can change the risk composition of credit even where total credit changes modestly, underscoring the need to distinguish capital from portfolio risk density. The cost-to-income ratio is expected to reduce stability because inefficient operations compress earnings and internal capital formation; problem loans and inefficiency may also reinforce one another (Berger & DeYoung, 1997). GDP may improve borrowers' repayment capacity, but rapid expansion may encourage procyclical credit growth and weaker underwriting (Bawuah, 2024).

3. Research Methodology

This section presents the overall research structure, including the population of interest, the approaches for collecting data, and the strategies for data analysis and presentation.

3.1 Research Philosophy, Paradigm and Design

This study is anchored in the positivist research philosophy, which assumes that social and economic phenomena are objective, measurable, and amenable to empirical verification through systematic observation and statistical analysis (Hassmén *et al.*, 2016).

Positivism is appropriate for this study because the relationship among risk-based capital, asset-risk composition and financial stability can be quantified using observable financial-statement indicators and empirically tested to establish generalisable inferences. Consistent with this orientation, the study adopts a quantitative research paradigm emphasising objective measurement, hypothesis testing and statistical evaluation of relationships among the study variables (Kamal, 2019; McGrath & Johnson, 2003). A correlational research design is employed, enabling the study to evaluate the direction, magnitude and statistical significance of relationships among risk-based capital, asset-risk composition, control variables and financial stability without manipulating the study environment (Kothari, 2004).

3.2 Study Area

The study is situated within Kenya's banking sector, with specific focus on commercial banks listed on the Nairobi Securities Exchange (NSE). All listed banks operate under the regulatory oversight of the Central Bank of Kenya and the Capital Markets Authority, which enhances regulatory uniformity, transparency, comparability, and the availability of consistent financial and prudential information across institutions and over time.

3.3 Target Population

The target population refers to the full set of units sharing characteristics relevant to the research objectives and to which the findings may be generalised (Creswell & Creswell, 2017). The study targets all nine Kenyan-incorporated commercial banks listed on the Nairobi Securities Exchange over the period 2013Q1–2025Q2. For empirical analysis, the study employs a balanced panel framework comprising eight of the listed banks with uninterrupted operations and a complete dataset over the study horizon. Banks that underwent structural changes, such as merger-driven entities including NCBA Group Plc, are excluded to preserve panel balance, avoid structural breaks, and ensure estimation consistency.

3.4 Data Collection, Reliability, Validity and Ethical Consideration

The study utilises secondary quantitative data obtained from quarterly financial reports of NSE-listed commercial banks. Bank-level data were extracted from statements of financial position and comprehensive income. Quarterly GDP data were sourced from the Kenya National Bureau of Statistics (KNBS) for the period 2013Q1–2025Q2. Validity was ensured through reliance on authoritative, institutionally credible sources prepared in accordance with IFRS and subject to regulatory oversight. Reliability was addressed through use of a balanced quarterly panel, standardised data-extraction protocols, and triangulation of bank-level data against multiple disclosures. Ethical standards were guided by established principles of responsible research conduct (Saunders, 2009); ethical rigour was maintained through adherence to institutional research guidelines, proper acknowledgment of data sources, and protection of confidentiality through anonymised, non-identifiable reporting. Because the study uses publicly available institutional data and does not involve human participants or personal identifiers, it presents minimal ethical risk. Formal ethical approval was obtained from the Maseno University Ethics Review Committee, and a research permit was granted by the National Commission for Science, Technology and Innovation (NACOSTI) prior to data collection.

3.5 Data Analysis and Presentation

Data analysis was conducted using EViews 12. The analysis commenced with descriptive statistics and pairwise correlations, followed by econometric estimation and diagnostic testing. Hypotheses were tested using the t-statistic, with findings presented through tables and graphical illustrations.

3.5.1 Model Specification

This study employs a panel regression framework using quarterly data for Kenyan listed banks over the period 2013Q1–2025Q2 to examine the effect of risk-based capital (RBC) on financial stability (FS), controlling for the risk-weighted-assets-to-total-assets ratio (RWA2TAT), the cost-to-income ratio (CI), and the natural logarithm of gross domestic product (LNGDP). The model adopts a one-quarter lag as the baseline specification for all explanatory variables, motivated by the expectation that changes in bank-specific characteristics and macroeconomic conditions are unlikely to affect stability instantaneously. Adjustments in capital adequacy, asset-risk composition, operational efficiency and macroeconomic conditions require time before they are reflected in banks' stability outcomes. From an econometric perspective, lagging the explanatory variables mitigates potential simultaneity and reverse-causality bias, strengthening the causal interpretation of the estimated relationships. To assess robustness, an alternative specification incorporating a two-quarter lag for all explanatory variables was also estimated.

The model further includes the lagged dependent variable, FS(-1), to capture the dynamic persistence of financial stability over time, since banks' capital positions, asset quality, risk exposures and earnings evolve gradually rather than changing abruptly from one quarter to the next. Including the lagged dependent variable accounts for inertia in financial stability and mitigates omitted-variable bias arising from unobserved historical factors. Accordingly, the model is specified as follows:

$$FS_{it} = \alpha_i + \varrho FS_{i,t-1} + \beta 1RBC_{i,t-1} + \beta 2RWA2TAT_{i,t-1} + \beta 3CI_{i,t-1} + \beta 4LNGDP_{t-1} + \mu_i + \varepsilon_{it}$$

In this specification:

FSit denotes financial stability of bank i at time t;

$FS_{i,t-1}$ is lagged financial stability;

$RBC_{i,t-1}$ is lagged risk-based capital;

$RWA2TAT_{i,t-1}$ is the lagged ratio of risk-weighted assets to total assets, proxying the riskiness of a bank's asset portfolio;

$CI_{i,t-1}$ is the lagged cost-to-income ratio;

$LNGDP_{t-1}$ is the lagged logarithm of GDP;

α is the common intercept;

ϱ is the persistence parameter;
$\beta 1 \ldots \beta 4$ are slope coefficients;
μi represents unobserved bank-specific effects; and
εit is the idiosyncratic error term.

Financial stability is operationalised as a composite index combining profitability and capital adequacy relative to earnings volatility, in the spirit of financial soundness indicators (IMF, 2006), composite financial stability indices (Manolescu & Manolescu, 2017), and refined Z-score-based insolvency-risk measures (Lepetit & Strobel, 2015). A detailed description of all variables is provided in Table 3.5.1.

Table 3.5.1: Description of Variables

No	Variable	Notation	Description
1	Financial Stability	FS	FS = Ln[(RoPAT + CAR) / SDROA]
2	Risk-Based Capital	RBC	Total bank capital to risk-weighted assets
3	Asset Risk Composition	RWA2TAT	Risk-weighted assets to total assets
4	Cost Efficiency	CI	Operating expenses to total income
5	Macroeconomic Growth	LNGDP	Natural log of GDP at market prices

3.5.1.1 Estimation Procedure

The adoption of the panel regression framework renders pooled OLS inappropriate, as it assumes homogeneity across banks and ignores unobserved time-invariant bank-specific effects, potentially yielding biased and inconsistent estimates (Wooldridge, 2010). Consequently, the study employs panel-data estimators, the Fixed Effects Model (FEM) and the Random Effects Model (REM), which explicitly account for such unobserved heterogeneity, with the choice between them determined through the Hausman specification test. Given the study's small-N, long-T panel structure ($N = 8$; $T \approx 49$–50), dynamic panel estimators such as the Generalized Method of Moments are generally less suited to this structure, since they are designed for large-N, small-T panels and are prone to instrument proliferation in long panels (Baltagi, 2008). The Nickell bias associated with a lagged dependent variable also diminishes as T becomes large (Judson & Owen, 1999; Wooldridge, 2010; Hsiao, 2022). Thus, the FEM and REM, estimated via Panel EGLS with cross-section weights and panel-corrected standard errors, are therefore the more appropriate and efficient estimators for the present small-N, long-T setting.

3.5.1.2 Diagnostic Tests

A set of pre- and post-estimation diagnostic tests was undertaken to ensure that the data and model specification satisfy the underlying assumptions of the Classical Linear Regression Model within a panel data framework, since violations of these assumptions may render coefficient estimates biased, inefficient or inconsistent (Wooldridge, 2010).

3.5.1.2.1 Unit Root Tests

The study employed the Levin, Lin and Chu (LLC) unit root test, suited to balanced panels with relatively large time dimensions. The null hypothesis of a unit root is rejected for all study variables at the 5% level, confirming that all series are stationary in levels and suitable for panel regression analysis.

Table 3.5.1.2.1: Unit Root Test Results (Levin, Lin & Chu)

Variable	LLC Statistic	p-value
FS	-2.3105	0.0104*
RBC	-1.9786	0.0239*
RWA2TAT	-4.9486	0.0000**
CI	-2.8899	0.0019**
LNGDP	-7.9988	0.0000**

** significant at 1% ($p < 0.01$); * significant at 5% ($p < 0.05$). Source: Author's computation from panel data (2013Q1–2025Q2).

3.5.1.2.2 Model Specification Test: Hausman Test

The Hausman specification test (Hausman, 1978) was conducted to determine the appropriate estimator. The results, reported in Table 3.5.1.2.2, lead to rejection of the null hypothesis of no systematic difference between the fixed- and random-effects estimates, confirming the presence of correlation between bank-specific effects and the regressors. Consistent with this, the random-effects estimation returns a cross-section random-effects variance of zero, reinforcing the preference for the fixed-effects specification. Accordingly, the Fixed Effects (FE) estimator is selected as the preferred model specification, and all subsequent estimations, diagnostic tests and statistical inferences are based on the FE specification.

Table 3.5.1.2.2: Hausman Test Results

Test Statistic (χ^2)	Degrees of Freedom (df)	p-value	Decision
68.8133	5	0.0000**	Reject H_0 (Prefer Fixed Effects)

3.5.1.2.3 Multicollinearity Test

The Variance Inflation Factor (VIF) was calculated to assess multicollinearity among the regressors. As reported in Table 3.5.1.2.3, the centred VIF values ranged from 1.176 to 2.448, well within the acceptable threshold of 10 (Gujarati & Porter, 2003; Kutner *et al.*, 2005), confirming that multicollinearity is not a concern.

Table 3.5.1.2.3: Variance Inflation Factor (VIF) Results

Variable	Centered VIF
FS(-1)	2.4475
RBC(-1)	1.8484
RWA2TAT(-1)	1.7784
CI(-1)	1.1762
LNGDP(-1)	1.2153

3.5.1.2.4 Test of Normality of Residuals

The Jarque-Bera (JB) test (Jarque & Bera, 1980) was applied to assess the normality of residuals. The residuals are normally distributed, with the JB test yielding a probability value of 0.1840 ($p > 0.05$). Accordingly, the null hypothesis of normality cannot be rejected, confirming the reliability of the estimated coefficients and associated statistical inferences.

3.5.1.2.5 Heteroskedasticity Test

Likelihood Ratio (LR) tests were conducted for both cross-sectional and period-specific heteroskedasticity. The results, reported in Table 3.5.1.2.5, indicate evidence of heteroskedasticity in both cases ($p < 0.01$). To address this, Generalized Least Squares (GLS) estimation with cross-section weights, supplemented by panel-corrected standard errors (PCSE), was employed to ensure efficiency of the coefficients and validity of subsequent hypothesis tests.

Table 3.5.1.2.5: Heteroskedasticity Test Results

Test Type	LR Test Statistic	Df	p-value
Cross-Section	31.2236	8	0.0001**
Period	212.5337	8	0.0000**

3.5.1.2.6 Test for Autocorrelation

The Durbin-Watson (DW) statistic (Durbin & Watson, 1950) was applied within the panel EGLS specification. In the baseline (one-quarter lag) model, the DW statistic of 1.9825 (weighted) approximates 2.00, consistent with the absence of serial correlation, confirming that the standard errors of the estimated coefficients are reliable and that inference based on t- and F-tests remains valid.

4. Results and Discussions

This section presents the results of the descriptive analysis, correlation analysis and regression analysis in line with the study objectives.

4.1 Descriptive Statistics

Table 4.1 presents the descriptive measures for financial stability (FS), risk-based capital (RBC), the risk-weighted-assets-to-total-assets ratio (RWA2TAT), the cost-to-income ratio (CI), and economic growth (LNGDP). Financial stability (FS) exhibited a mean of 2.8853, suggesting moderate stability among banks during the study period, with a standard deviation of 0.2223, indicating minimal variation. Risk-based capital (RBC) averaged 0.1568 (15.68%), consistent with regulatory capital requirements above the Central Bank of Kenya's minimum thresholds. The risk-weighted-assets-to-total-assets ratio (RWA2TAT) averaged 0.8418, indicating that, on average, more than 84% of listed banks' total assets are risk-weighted, reflecting a relatively risk-intensive asset composition. The cost-to-income ratio (CI) averaged 0.5443, indicative of moderate operational efficiency, while economic growth (LNGDP) had a mean of 28.4875, signalling a generally expanding macroeconomic environment. Skewness and kurtosis values indicate mild deviations from perfect normality, with RBC exhibiting slight positive skew and leptokurtosis.

Table 4.1: Summary of Descriptive Statistics

Variable	N	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
FS	400	2.8853	2.9183	0.2223	2.2285	3.4075	-0.4003	2.8949
RBC	400	0.1568	0.1552	0.0178	0.1079	0.2199	0.5266	3.9854
RWA2TAT	400	0.8418	0.8423	0.0747	0.6366	1.0404	-0.1036	2.4392
CI	400	0.5443	0.5432	0.0834	0.3255	0.8177	0.2081	3.4121
LNGDP	400	28.4875	28.5513	0.4001	27.7900	29.1377	-0.1654	1.8719

Source: Author's computation from panel data (2013Q1–2025Q2). N denotes the number of observations per variable prior to lagging.

4.2 Correlation Analysis

Correlation analysis was conducted to examine the strength and direction of relationships among the study variables, using 392 quarterly observations from 2013Q2 to 2025Q2. Table 4.2 presents the correlation matrix along with the corresponding t-statistics and p-values. Financial Stability (FS) is strongly and positively correlated with its lagged value FS(-1) ($r = 0.9064$, $t = 42.37$, $p < 0.001$), confirming persistence in stability over time. Risk-Based Capital (RBC(-1)) shows a strong positive correlation with FS ($r = 0.4677$, $t = 10.45$, $p < 0.001$), highlighting the stabilising effect of adequate capital buffers. The risk-weighted-assets-to-total-assets ratio (RWA2TAT(-1)) is positively but weakly and non-significantly correlated with FS ($r = 0.0574$, $t = 1.14$, $p = 0.2570$). Cost inefficiency (CI(-1)) exhibits a negative and significant correlation with FS ($r = -0.1772$, $t = -3.56$, $p = 0.0004$), indicating that operational inefficiency adversely affects stability, while GDP growth (LNGDP(-1)) is negatively and significantly correlated with FS ($r = -0.2265$, $t = -4.59$, $p < 0.001$), suggesting that macroeconomic expansion does not automatically enhance stability.

Table 4.2: Correlation Matrix of Study Variables

Variable	FS	FS(-1)	RBC(-1)	RWA2TAT(-1)	CI(-1)	LNGDP(-1)
FS	1.0000					
FS(-1)	0.9064**	1.0000				
RBC(-1)	0.4677**	0.4963**	1.0000			
RWA2TAT(-1)	0.0574	0.0955	-0.3170**	1.0000		
CI(-1)	-0.1772**	-0.1753**	-0.1177*	-0.1002*	1.0000	
LNGDP(-1)	-0.2265**	-0.2565**	-0.0663	-0.2135**	0.2389**	1.0000

** significant at 1%; * significant at 5%. Source: Author's computation from panel data (2013Q2–2025Q2), N = 392.

4.3 Regression Results

Table 4.3 presents the results of the panel Fixed Effects regression estimated via Panel EGLS with cross-section weights and panel-corrected standard errors (PCSE), consistent with the Hausman test result favouring the fixed-effects specification and the evidence of heteroskedasticity established in Section 3.5.1.2.5. The weighted R-squared value is

0.8661, implying that 86.61% of the variation in financial stability is explained by the model, indicating high explanatory power. The adjusted R-squared of 0.8619 confirms that the model retains strong explanatory power after adjusting for the number of predictors. The F-statistic is 204.3726 with a probability value of 0.0000, confirming that the explanatory variables jointly have a statistically significant effect on bank financial stability at the 1% level. The Durbin-Watson statistic of 1.9825 indicates no evidence of serial correlation in the residuals.

Table 4.3: Panel Fixed-Effects (EGLS) Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.555866	0.373264	4.168268	0.0000**
FS(-1)	0.524846	0.053635	9.785553	0.0000**
RBC(-1)	1.291227	0.361579	3.571075	0.0004**
RWA2TAT(-1)	0.265574	0.092948	2.857235	0.0045**
CI(-1)	-0.221010	0.059378	-3.722096	0.0002**
LNGDP(-1)	-0.017224	0.011480	-1.500333	0.1344

Weighted R^2 = 0.8661; Adjusted R^2 = 0.8619; F-statistic = 204.3726 (p = 0.0000); Durbin-Watson = 1.9825. Unweighted R^2 = 0.8499; Unweighted DW = 1.9814. Cross-section fixed (dummy variables). ** significant at 1%; * significant at 5%. Source: Author's computation from panel data (2013Q2–2025Q2), N = 392.

From the results, the estimated model is specified as follows:

$$FS_{it} = 1.5559 + 0.5248\ FS(-1)_{it} + 1.2912\ RBC(-1)_{it} + 0.2656\ RWA2TAT(-1)_{it} - 0.2210\ CI(-1)_{it} - 0.0172\ LNGDP(-1)_{it} + \mu_i + \varepsilon_{it}$$

4.3.1 Effect of Risk-Based Capital on Financial Stability

The regression results indicate that risk-based capital, measured by the lagged risk-based capital ratio (RBC(-1)), has a positive and highly significant effect on financial stability. The estimated coefficient is 1.2912 (t = 3.5711, p = 0.0004), suggesting that a one-unit increase in the lagged risk-based capital ratio is associated with a 1.2912-unit increase in financial stability, holding other factors constant. This finding implies that banks with stronger capital buffers are better positioned to absorb shocks and withstand periods of financial stress. The result strongly supports the Buffer Theory of Capital, which posits that well-capitalised banks are better able to absorb shocks, restrain excessive risk-taking, and maintain solvency during periods of stress. The finding is consistent with the prudential logic underpinning the Basel II and Basel III frameworks and reinforces the Central Bank of Kenya's emphasis on capital adequacy as a cornerstone of financial stability policy. The result aligns with a broad body of studies, including Abbas *et al.* (2021), Ashraf *et al.* (2016, 2020), Berger and Bouwman (2013), Gudmundsson *et al.* (2013), Kiemo (2025), Kiemo *et al.* (2022), Kiemo *et al.* (2019), Mutarindwa *et al.* (2020), Oyetade *et al.* (2022), Velliscig *et al.* (2022), and Yakubu and Bunyaminu (2023), that have documented a stabilising role of bank capital across diverse settings, including Kenya and Sub-Saharan Africa. The result contrasts with evidence of heterogeneous or risk-shifting responses to capital pressure (Oduor *et al.*, 2017; Anguren *et al.*, 2024), suggesting that, within the observed Kenyan range, the loss-absorption channel dominates.

The dynamic coefficient permits a useful long-run calculation. With persistence of 0.5248, the implied long-run RBC coefficient is approximately 2.7175 [1.2912/(1 − 0.5248)]. Thus, a sustained one-percentage-point increase in RBC is associated with an approximate 0.0272 increase in log stability after adjustment, or about 2.76%. This calculation assumes model stability and that the coefficient structure remains unchanged; it is therefore supplementary to the primary short-run result.

4.3.2 Effect of Risk-Weighted Assets to Total Assets on Financial Stability

The risk-weighted-assets-to-total-assets ratio (RWA2TAT(-1)) exerts a positive and statistically significant effect on financial stability, with a coefficient of 0.2656 ($t = 2.8572$, $p = 0.0045$). This result indicates that, among Kenyan listed banks, a higher proportion of risk-weighted assets in the balance sheet is associated with greater, not lesser, financial stability. Read alongside the strong stabilising effect of risk-based capital, this finding suggests that Kenyan listed banks price and provision adequately for the additional risk embedded in risk-weighted assets, so that the higher expected returns associated with a more risk-intensive asset composition translate into stronger earnings and capital-generation capacity rather than heightened fragility, provided capital buffers are maintained above regulatory minima. The finding is broadly consistent with the view that capital regulation, by tying capital requirements to the risk-weighting of assets, allows banks with well-managed risk portfolios to generate this positive association, while it also echoes the caution raised by studies such as Nsanyan Sandow *et al.* (2021) and Mateev *et al.* (2021) that the relationship between a bank's capital position and its performance or stability is conditional and can turn adverse beyond certain thresholds, rather than being mechanical.

4.3.3 Effect of Control Variables on Financial Stability

The lagged value of financial stability (FS(-1)) exhibits a positive and significant effect on current financial stability, with a coefficient of 0.5248 ($t = 9.7856$, $p < 0.001$), indicating strong persistence. That is, banks that were stable in the previous period are more likely to remain stable in the current period. This result underscores the dynamic nature of bank stability and justifies the inclusion of a lagged dependent variable in the empirical specification.

The cost-to-income ratio (CI(-1)) has a significant negative effect on financial stability, with a coefficient of -0.2210 ($t = -3.7221$, $p = 0.0002$). This result suggests that higher operational inefficiency, reflected in elevated operating costs relative to income, undermines bank stability, as inefficient banks are likely to experience reduced profitability, which erodes their capacity to absorb shocks and build capital buffers. This finding is consistent with efficiency–stability arguments in the banking literature, which identify operating-cost management as a key bank-specific determinant of performance and soundness (Athanasoglou *et al.*, 2008; Ongore & Kusa, 2013), and emphasise cost management, technological adoption and improved governance as complementary tools for promoting banking-sector stability.

Economic growth, proxied by the natural log of GDP (LNGDP(-1)), is negatively signed but not statistically significant at the 5% level, with a coefficient of -0.0172 (t = -1.5003, p = 0.1344). While the negative sign is consistent with a potentially counter-cyclical or procyclical risk-taking channel, whereby periods of economic expansion may coincide with more aggressive credit growth or relaxed lending standards, the effect is not statistically robust in the baseline specification, suggesting that, over the 2013Q1–2025Q2 period, macroeconomic growth has not been a decisive driver of financial stability among Kenyan listed banks once capital adequacy, asset-risk composition and cost efficiency are accounted for.

4.4 Robustness Test Using an Alternative Lag Structure

Consistent with the robustness strategy outlined in SectionThree, the study re-estimated the baseline model using a two-quarter lag for all explanatory variables while maintaining the same estimation technique and control variables. The purpose was to determine whether the empirical findings were sensitive to the adopted lag structure. The robustness results, presented in Table 4.4, indicate that the principal empirical relationships remain qualitatively unchanged. Risk-based capital continues to exhibit a positive and highly significant effect on financial stability ($\beta = 2.6851$, $p < 0.001$), the risk-weighted-assets-to-total-assets ratio remains positive and significant ($\beta = 0.4362$, $p = 0.0001$), and the cost-to-income ratio retains its negative and significant effect ($\beta = -0.4186$, $p < 0.001$). Economic growth remains negatively signed and becomes marginally significant at the 10% level under the two-quarter lag ($\beta = -0.0262$, $p = 0.0522$), suggesting that its adverse effect on stability may become more evident over a longer transmission period.

Table 4.4: Robustness Test — Two-Quarter Lag Specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.675046	0.434789	6.152520	0.0000**
FS(-2)	0.136803	0.063587	2.151443	0.0321*
RBC(-2)	2.685145	0.434284	6.182919	0.0000**
RWA2TAT(-2)	0.436236	0.109871	3.970438	0.0001**
CI(-2)	-0.418628	0.071470	-5.857436	0.0000**
LNGDP(-2)	-0.026209	0.013455	-1.947955	0.0522

Weighted $R^2 = 0.8017$; Adjusted $R^2 = 0.7952$; F-statistic = 124.9621 (p = 0.0000); Durbin-Watson = 1.2087 (weighted), 1.1297 (unweighted). N = 384.

Comparison of the two specifications shows that the one-quarter lag model provides superior explanatory power and diagnostic performance. The baseline model records a weighted R-squared of 0.8661 and adjusted R-squared of 0.8619, compared with 0.8017 and 0.7952, respectively, under the two-quarter lag model. The F-statistic declines from 204.37 to 124.96 under the alternative specification. The Durbin-Watson statistic also decreases from 1.9825 under the baseline model to 1.2087 under the two-quarter lag specification, indicating comparatively weaker residual properties — the two-quarter lag DW value falls below the conventional 1.5–2.5 acceptable range, signalling some residual positive autocorrelation. Overall, the analysis confirms that the substantive findings are stable across reasonable alternative lag structures, but the one-quarter lag model is retained as the preferred specification on the basis of superior explanatory power, overall model performance and diagnostic properties.

Table 4.5: Summary of Robustness Comparison

Criterion	Lag 1 (Baseline)	Lag 2 (Robustness)	Assessment
R^2 (weighted)	0.8661	0.8017	Lag 1 superior
Adjusted R^2	0.8619	0.7952	Lag 1 superior
F-statistic	204.3726	124.9621	Lag 1 superior
Risk-Based Capital	Positive, Significant	Positive, Significant	Robust
RWA2TAT	Positive, Significant	Positive, Significant	Robust
Cost-to-Income	Negative, Significant	Negative, Significant	Robust
GDP Growth	Negative, Insignificant	Negative, Marginal (10%)	Same direction
Durbin-Watson	1.9825	1.2087	Lag 1 superior

4.5 Summary of Regression Findings

Table 4.6 summarises the regression results on the determinants of financial stability among Kenyan listed banks. Risk-based capital exerts a positive and statistically significant effect on financial stability, confirming that better-capitalised banks are more resilient to financial distress. The risk-weighted-assets-to-total-assets ratio also exerts a positive and significant effect, indicating that a more risk-intensive asset composition is not, in itself, destabilising once adequate capitalisation is in place. The coefficient of the one-period lag of financial stability is positive and highly significant, confirming the persistence of financial stability over time. The cost-to-income ratio negatively and significantly affects financial stability, highlighting the importance of operational efficiency, while economic growth (GDP) is negatively signed but not significant at the 5% level over the sample period. Overall, the findings suggest that financial stability in Kenyan listed banks is driven primarily by capitalisation strength, the composition of risk-weighted assets, and operational efficiency.

Table 4.6: Summary of Regression Results

Variable	Coefficient (β)	Std. Error	t-Statistic	p-value
FS(-1)	0.5248	0.0536	9.7856	0.0000**
RBC(-1)	1.2912	0.3616	3.5711	0.0004**
RWA2TAT(-1)	0.2656	0.0929	2.8572	0.0045**
CI(-1)	-0.2210	0.0594	-3.7221	0.0002**
LNGDP(-1)	-0.0172	0.0115	-1.5003	0.1344

** significant at 1% ($p < 0.01$); * significant at 5% ($p < 0.05$). Source: Author's computation from panel data (2013Q2–2025Q2).

5. Summary, Conclusion and Recommendations

This section synthesises the empirical findings on risk-based capital, asset-risk composition and financial stability among NSE-listed banks in Kenya. Using a balanced quarterly panel dataset for 2013Q1–2025Q2 and a dynamic fixed-effects Panel EGLS estimator with PCSE, the analysis accounts for persistence, bank-specific effects, heteroskedasticity and serial correlation. The chapter presents conclusions, policy implications, the study's contribution, limitations, and recommendations for future research.

5.1 Summary of Findings

First, the lagged financial stability variable is positive and statistically significant, confirming the persistence and path dependence of bank stability in Kenya. This result indicates that financial stability evolves gradually, with historical balance-sheet conditions exerting a strong lasting influence on current outcomes, justifying the dynamic specification adopted in the study. Second, risk-based capital exerts a strong, positive, and highly significant effect on financial stability. This result underscores the effectiveness of capital regulation in enhancing banks' loss-absorbing capacity, mitigating moral hazard, and strengthening resilience against macroeconomic and financial shocks. The magnitude and robustness of this effect highlight regulatory capital as a cornerstone of banking stability in Kenya. Third, the risk-weighted-assets-to-total-assets ratio exerts a positive and statistically significant effect on financial stability. This finding indicates that a more risk-intensive asset composition, when accompanied by adequate risk-based capitalisation, does not undermine — and may in fact support — bank stability, consistent with the Basel-aligned logic of linking capital requirements to the riskiness of a bank's asset portfolio. Fourth, among the control variables, the cost-to-income ratio enters the model negatively and significantly, indicating that operational inefficiency undermines financial stability. Finally, economic growth is negatively signed but statistically insignificant at the 5% level in the baseline specification, though it becomes marginally significant under the two-quarter lag robustness check, pointing to a potentially procyclical, but not decisive, role for macroeconomic growth in shaping bank stability.

5.2 Conclusions

Based on the empirical findings, several conclusions emerge. First, financial stability among Kenyan listed banks is highly persistent, implying that regulatory and structural reforms have long-lasting effects, and that preventive, forward-looking policies are more effective than reactive measures. Second, risk-based capital plays a dominant and stabilising role, meaning well-capitalised banks are significantly more resilient to shocks, confirming the effectiveness of Basel III-aligned capital regulation in the Kenyan context. Third, the composition of risk-weighted assets carries independent, positive information for stability, indicating that capital adequacy and asset-risk composition operate as complementary, rather than competing, channels of resilience. Finally, operational efficiency remains material to financial stability, while macroeconomic growth plays a comparatively muted role once capitalisation, asset-risk composition and cost efficiency are accounted for.

5.3 Policy and Practical Recommendations

The findings yield several policy-relevant implications for Kenya. First, capital regulation should remain the cornerstone of banking stability policy; given its strong stabilising effect, any relaxation of risk-based capital requirements should be approached with caution. Second, supervisors should continue to monitor the evolving risk-weighted composition of bank balance sheets alongside capital adequacy, since the two interact to shape overall resilience. Third, supervisors should intensify oversight of operational efficiency and governance, as cost inefficiency materially undermines stability. Finally, bank management should prioritise capital adequacy, prudent asset-risk management and cost efficiency as core strategic objectives.

5.4 Overall Contribution of the Study

This study makes theoretical, methodological and practical contributions to the banking and financial-stability literature. It provides context-specific empirical evidence on the relationship between risk-based capital, asset-risk composition and financial stability within Kenya's banking sector, enriching the limited body of evidence from emerging and developing economies. Methodologically, the study advances empirical banking research through the application of a balanced quarterly panel dataset and a dynamic fixed-effects framework capable of capturing persistence effects and short-run dynamics that annual-frequency studies cannot detect. The findings also generate managerial and policy implications relevant to prudential regulation and banking supervision within emerging financial systems.

5.5 Limitations of the Study

Despite its strengths, the study has limitations. First, it focused exclusively on listed banks in Kenya, which may limit the generalisability of the findings to smaller, unlisted banks operating under different structural and regulatory conditions. Second, the analysis relied predominantly on accounting-based measures of stability, which may not fully capture broader market-based dimensions of bank resilience.

5.6 Suggestions for Further Research

Future research may extend this study in several directions. Subsequent studies could broaden the scope beyond listed commercial banks to include unlisted institutions in order to enhance generalisability. Future research could also incorporate market-based measures of financial stability and systemic risk alongside accounting-based indicators, examine whether the relationship between risk-based capital, asset-risk composition and financial stability varies across bank-specific characteristics such as size or ownership structure, and explore potential nonlinearities or threshold effects in the capital–risk-weighting–stability nexus.

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The authors declare no conflicts of interest.

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