

Board Equity Ownership and Risk Management: Implications for Bank Performance in Ghana

Carl Mensah Ahadzi

carl.ahadzi@fc.gov.gh

Girne American University

Charlotte Adamkie Newman

Regent University College of Science and Technology

Godwin B. Akrong

McGill University <https://orcid.org/0000-0002-2822-2284>

Neema Isaack Landey

Concordia University <https://orcid.org/0009-0003-3715-1611>

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Abstract

The relationship between corporate governance, risk management, and bank performance is a critical concern for Ghanaian commercial banks, especially given persistent challenges such as high non-performing loans and weak internal controls. While global and local reforms have emphasized the importance of effective risk management and governance, the specific moderating role of board equity ownership in this relationship remains underexplored in the Ghanaian context. This study aims to examine whether board equity ownership moderates the impact of risk management practices on the financial and operational performance of Ghanaian commercial banks. The direct impact of risk management practices on the financial and operational performance of Ghanaian commercial banks is also examined. The study employed a panel data design, analyzing secondary data from eight commercial banks listed on the Ghana Stock Exchange between 2013–2023. The results indicate that neither risk management practices nor board equity ownership, individually or interactively, had a statistically significant effect on financial or operational performance. The results suggest that, in Ghana, formal risk management frameworks and board equity ownership alone may not be sufficient to drive performance improvements. Policymakers and practitioners should focus on deeper reforms, including enhancing board independence, technical expertise, and accountability, to achieve meaningful progress in the banking sector.

Keywords: Risk Management Practices, Board Equity Ownership, Financial Performance, Operational Performance, Corporate Governance, Ghanaian Commercial Banks

1. Introduction

Persistent problems, including high non-performing loans, weak internal controls, and inconsistent risk disclosures, continue to weaken risk management in Ghana's commercial banking sector, even after extensive regulatory reforms (Owusu-Ansah & Boateng, 2020; Cobbinah et al., 2024; Amoa-Gyarteng et al., 2025). Agency Theory and broader global governance research suggest that equity-based incentives should align directors' interests with those of shareholders, strengthening board monitoring and oversight of risk (Jensen & Meckling, 1976; Davis et al., 1997; Vetrivel et al., 2025). Yet those expectations frequently do not hold in Ghana. Institutional fragility, limited shareholder activism, concentrated ownership, and uneven enforcement of property rights reshape how board equity ownership is expected to affect risk management and bank performance (Bank of Ghana, 2021; Khan et al., 2022).

Existing literature on governance generally assumes that directors who own equity will have interests closer to those of shareholders, which should strengthen risk management and improve performance (Agyemang et al., 2020; Hossain et al., 2024). However, in Ghana, the anticipated benefits of board ownership are frequently offset by contextual realities: low capital market liquidity, evolving disclosure norms, and a history of governance failures (Owusu-Ansah & Boateng, 2020; Bank of Ghana, 2021). These factors impede the translation of formal ownership structures into effective monitoring and accountability, rendering the incentive alignment mechanism central to Agency Theory structurally impaired (Alzebdieh et al., 2026; Kamara & Bendu, 2026). As a result, empirical evidence from developed economies does not straightforwardly apply to Ghana's banking sector.

Thus, a more compelling theoretical foundation is needed, and this is evident in the complex relationship between incentive alignment and director entrenchment. While moderate board equity ownership may align interests and enhance oversight, high or concentrated ownership can entrench dominant directors, reduce responsiveness to minority shareholders, and weaken governance accountability (Adams & Ferreira, 2009; Vaghela & Sodha, 2025; Alshdaifat et al., 2025; Burdenko, 2026). This duality is particularly salient in Ghana, where weak enforcement and evolving governance structures allow both effects to coexist, potentially neutralizing the positive impact of board ownership on risk management. The relationship between these competing forces, alignment versus entrenchment, constitutes a stronger and more contextually relevant basis for scholarly inquiry than the assumption of universally positive effects. Accordingly, this study investigates whether board equity ownership moderates the relationship between risk management practices and bank performance in Ghanaian commercial banks, explicitly recognizing the possibility that incentive alignment and entrenchment effects may offset each other. By situating the analysis within Ghana's unique institutional environment, the research examines the boundary conditions of established governance theories and provides actionable insights for policymakers and practitioners seeking to enhance financial stability and organizational outcomes in emerging markets.

2. Literature and Conceptual Framework

In examining the relationship between corporate governance, risk management, and bank performance in Ghana, this paper adopts a robust theoretical and conceptual framework grounded in established organizational theories. These include Agency Theory, Stewardship Theory, and Resource Dependence Theory. These frameworks were chosen not merely as parallel alternatives but as complementary lenses that jointly explain how board equity ownership moderates the relationship between risk management practices and performance. Specifically, Agency Theory

provides the primary mechanism equity-owning directors internalize downside risk, creating incentives for more vigilant monitoring and robust internal controls; Stewardship Theory provides a complementary motivational pathway equity-owning directors may also be intrinsically motivated stewards committed to long-term institutional resilience (Davis et al., 1997); and Resource Dependence Theory contextualizes the moderation effect within the bank's external resource environment, where equity-holding board members secure critical institutional relationships and regulatory credibility that support effective risk governance (Pfeffer & Salancik, 2015; Celtekliligil, 2020; Banda & Mwange, 2023; Kpanga & Usman, 2026). Crucially, the potential tension between Agency Theory's entrenchment prediction that high or concentrated ownership may reduce accountability and Stewardship Theory's positive intrinsic motivation prediction is resolved contextually: in Ghana's weak enforcement environment, both alignment and entrenchment effects may be simultaneously present, producing the dampened moderating effects observed in our empirical results.

Agency Theory serves as the primary lens in this study, positing that conflicts of interest between principals (shareholders) and agents (managers/directors) can be mitigated through incentive alignment mechanisms such as board equity ownership. This theory suggests that when directors hold significant equity stakes, their interests align more closely with those of shareholders, reducing agency costs and promoting responsible risk behavior (Jensen & Meckling, 1976; Zajac & Goranova, 2026). In the Ghanaian banking sector, where weak enforcement and governance maturity are persistent challenges, Agency Theory underscores the importance of ownership-based governance mechanisms in strengthening the relationship between risk management practices and bank performance (Owusu-Ansah & Boateng, 2020).

Complementing Agency Theory, Stewardship Theory introduces the idea that directors, especially those with equity stakes, may be intrinsically motivated to act in the best interests of the organization, prioritizing long-term sustainability over short-term gains (Davis et al., 1997; Khan et al., 2022). This theory emphasizes psychological identification, ethical commitment, and organizational loyalty, suggesting that stewardship-oriented directors foster a culture of responsibility and accountability, which is particularly valuable in environments like Ghana, where regulatory enforcement may be inconsistent (Mensah & Yawson, 2019).

Resource Dependency Theory (RDT) adds a structural dimension by highlighting how organizations depend on external resources and must manage these dependencies to survive and thrive (Pfeffer & Salancik, 2003). In the banking sector, board members with substantial equity stakes are seen as strategic mediators who can secure critical resources and enhance institutional resilience (Carretta et al., 2017; Francisco & Hassan, 2021).

2.1 Conceptual Framework

The conceptual framework adopted for this study integrates the theories presented in Section 2, positing that *risk management practices* influence both *operational* and *financial performance*, with *board equity ownership* moderating this relationship. This framework is tailored to the unique challenges of the Ghanaian banking environment and is supported by empirical evidence

suggesting that board equity ownership enhances the effectiveness of risk governance and improves performance outcomes (Owusu-Ansah & Boateng, 2020; Francisco & Hassan, 2021; Erin et al., 2026; Jha & Tiwari, 2026).

The conceptual framework presented in Fig.1 integrates the relationships between *risk management practices (RMPs)*, *bank performance*, and *board equity ownership* within Ghana's commercial banking sector.

Fig. 1 Conceptual Framework

In the conceptual framework, risk management practices are positioned as the independent variable, directly influencing both operational and financial performance of banks; these are the dependent variables. *Board equity ownership (BEO)* is introduced as a moderating variable that strengthens the positive impact of *risk management practices (RMP)* on *performance (P)*.

2.2 Hypothesis Development

2.2.1 Risk Management Practices and Performance

Effective risk management practices, including the management of credit risk, liquidity risk, market risk, and operational risk, positively influence the financial and operational performance of banks. Empirical studies from Akomeah et al. (2017), Tassew and Hailu (2019), and Agyemang et al. (2020) consistently show that banks with robust risk management practices achieve higher profitability indicators such as Return on Assets (ROA), Return on Equity (ROE), and net profit margin. For example, Saeed and Hollack (2023) argued that improved liquidity and market risk management significantly enhance financial performance in Ghanaian rural banks, while Akomeah et al. (2017) and Kwashie et al. (2022) show that effective credit risk management, as measured by lower non-performing loan ratios and higher capital adequacy, leads to increased profitability and financial stability. Similarly, Agyemang et al. (2020), Fadun and Oye (2020), Toufaili (2021), and Amar and Tjahjadi (2026) acknowledge that comprehensive risk management across all major risk categories enables banks to anticipate, mitigate, and monitor risks, resulting in improved asset utilization, reduced losses, and enhanced shareholder returns.

Furthermore, effective risk management practices are not only crucial for financial outcomes but also for operational performance. Studies such as Agyemang et al. (2020), Fadun and Oye (2020), and Amar and Tjahjadi (2026) argue that integrating risk management into daily operations, through strong internal controls, regular staff training, and adherence to regulatory standards, minimizes operational disruptions, controls costs, and ensures resilience against market fluctuations. For instance, Fadun and Oye (2020) argue that effective operational risk management is associated with lower cost-to-income ratios and higher operational efficiency, while Agyemang et al. (2020) state that improvements in risk management policies and procedures directly enhance

both financial and operational outcomes. Therefore, the following hypotheses (H1a-d) are advanced:

H1. Banks in Ghana prioritizing and continuously improving their risk management practices across **(a)** credit, **(b)** liquidity, **(c)** market, and **(d)** operational risks are more likely to achieve significant financial and operational performance, ensuring long-term sustainability and competitiveness.

2.2.2 Moderating role of Board Equity Ownership (BEO)

Board equity ownership (BEO) is a strategic governance mechanism that aligns board members' interests with shareholders' (Jonsdottir et al., 2025). However, the relationship between board equity ownership and governance effectiveness is theoretically ambiguous, reflecting two competing views. The Incentive Alignment View (Agency Theory, Stewardship Theory) posits that at moderate levels, board equity ownership aligns director interests with shareholders, enhances monitoring intensity, promotes conservative risk behavior, and motivates directors to ensure that risk management frameworks are effectively implemented (Jensen & Meckling, 1976; Davis et al., 1997; Ahmed & Manab, 2016; Javed et al., 2024). This view supports a positive moderating effect of BEO on the RMP–performance relationship. In contrast, the Entrenchment View (Adams & Ferreira, 2009; Zona & Zamarian, 2022; Doan, 2024) posits that at higher levels of ownership, or in environments where ownership is concentrated among a few directors, equity stakes may entrench dominant board members, reduce their responsiveness to minority shareholders, create conflicts between large-stake directors and external stakeholders, and ultimately weaken the quality of risk oversight rather than strengthen it (Lizares, 2022; Bhanu & Nair, 2026). When board members hold larger equity stakes with effective monitoring commitment, they take a more proactive role in ensuring that risk management frameworks are effectively implemented. Additional empirical support shows that the positive effect of risk management on non-financial (operational) performance is significantly stronger in firms with equity-holding board members because they are more diligent and more likely to support decisions that promote long-term value (Ahmed & Manab, 2016; Agyemang et al., 2020).

Also, BEO has a moderating effect on financial performance measures such as return on assets (ROA) and return on equity (ROE). In banks and firms where board equity ownership is higher, better risk management leads to more profitability, efficiency, and stability. It has been argued that the benefits of effective risk management are even more noticeable in high board equity ownership banks and firms, where this ultimately results in better profitability and efficiency (Agyemang et al., 2020; Shehu Aliyu et al., 2022; Eklemet et al., 2023; Bawuah, 2024; Osabutey et al., 2026). For example, the interaction between board ownership and capital structure decisions (proxied by leverage) has been found to positively and significantly influence firm performance, as board members are more motivated to supervise and influence risk-related decisions. High board ownership motivates board members to supervise and influence risk-related decisions (McNulty et al., 2013; Alshirah et al., 2020). It should be noted, however, that such vigor and significance of

this moderating effect are often contingent on context and governance structures; some studies find limited or statistically insignificant effects in certain samples (Fatima et al., 2026). Importantly, this study explicitly acknowledges that the relationship between board equity ownership and governance effectiveness is theoretically ambiguous. Under the Entrenchment View, at high or concentrated ownership levels, dominant directors may become entrenched, reduce accountability to minority shareholders, and weaken rather than strengthen governance oversight, producing a competing prediction of negative or null moderation (Adams & Ferreira, 2009; Lizares, 2022; Zhang et al., 2026). The directional hypothesis below is motivated as the theoretically dominant prediction for the moderate-ownership range characteristic of the sample (mean BEO = 12.8%), while acknowledging that Ghana's weak enforcement environment and evolving governance structures may attenuate this effect. In general, the literature supports the arguments that board equity ownership enhances the effectiveness of risk management practices in improving both financial and operational performance by fostering greater board engagement, oversight, and alignment of interests. Thus, we propose that:

H2. Board equity ownership positively moderates the relationship between risk management practices and bank performance (both financial and operational) in Ghana.

3. Methodology and Data

3.1 Population and Sampling Technique

The study focuses on commercial banks in Ghana that are listed on the Ghana Stock Exchange (GSE) and have operated continuously for at least eleven years as of the data collection period (2013–2023). This criterion ensures the inclusion of banks with established governance structures, operational maturity, and reliable data (Mensah & Yawson, 2019; Owusu-Ansah & Boateng, 2020). Out of ten eligible banks, two were excluded due to incomplete historical data and inconsistent ownership disclosures, resulting in a final sample of eight: Access Bank Ghana PLC, ADB Bank PLC, Ecobank Ghana PLC, Republic Bank (Ghana) PLC, Standard Chartered Bank Ghana PLC, Société Générale Ghana PLC, Ghana Commercial Bank Limited, and Cal Bank Limited. This study is a population study rather than a convenience sample; the eight institutions selected collectively represent a substantial majority of formal, publicly listed commercial banking activity in Ghana. Thus, the current study aligns with census-based research by examining the complete and well-defined financial populations in Ghana. This method is well established in emerging market banking research, as demonstrated by scholars such as Mensah and Yawson (2019), Owusu-Ansah and Boateng (2020), and Francisco and Hassan (2021), who have used similarly sized or smaller panels in comparable Ghanaian and African banking contexts. A census sampling technique was therefore adopted, including all eligible banks to eliminate sampling bias and enhance the comprehensiveness of findings (Saunders et al., 2019). A panel data design covering a study period from 2013–2023 allowed for both cross-sectional and longitudinal examination of the relationship between governance, risk management, and performance in

Ghana's banking sector. The panel structure (8 banks $\times$ 9 usable years = 72 bank-year observations) confers important methodological advantages, including control for unobserved firm-specific heterogeneity, increased within-group variation over time, and greater estimation efficiency relative to pooled cross-sections (Baltagi, 2013; Wooldridge, 2015). The study, however, explicitly acknowledges that the small sample constrains statistical power, and null results may partly reflect Type II error.

3.1.1 Inclusion and Exclusion Criteria

The inclusion criteria involved licensed universal banks in Ghana listed on the GSE for at least eleven continuous years, availability of annual reports and audited financial statements for the entire period and disclosure of board composition and shareholding details. For the exclusion criteria, banks with mergers, acquisitions, or liquidation during the period stated for the collected data, incomplete or inconsistent disclosure practices, non-bank financial institutions, microfinance, or savings and loans companies were excluded from the data gathered used in the study.

3.2 Data Collection

3.2.1 Nature and sources of data

The study was based on secondary data sourced from documentary information of listed commercial banks in Ghana. Annual reports and audited financial statements of the eight sampled banks in the study were the primary data source. Other sources included quarterly financial disclosures, corporate governance reports on board composition and shareholding, regulatory returns, and prudential reports filed with the Bank of Ghana. Background information was sourced from international databases such as the World Bank Indicators and Basel Committee publications to provide an overview of global risk management standards (BCBS, 2019; Francisco & Hassan, 2021).

3.2.2 Data extraction and coding

Data extraction followed a systematic approach, where each bank's annual report was analyzed by the researchers to identify relevant *financial metrics*, *risk disclosures*, and *governance profiles* corresponding to the defined variables presented in the study. After which, the gathered information was recorded in a structured database, categorized by variable type and year. To ensure consistency and reliability, the data were cross-checked against quarterly reports, compared with prior empirical studies, and verified for uniformity in financial calculations. Board equity ownership data were sourced directly from governance sections of annual reports, aggregating the proportion of shares held by non-executive directors for use as the moderating variable in regression models.

3.2.3 Data organization and presentation

After extraction and validation by the researchers, data were organized into a structured panel dataset, with observations arranged by bank-year combinations to facilitate panel regression analysis. However, it is important to state that the dataset was cleaned and transformed in Microsoft Excel, then imported into Statistical Package for the Social Sciences (SPSS) and Stata for advanced statistical modeling. The variables were standardized where necessary, and missing values were handled using listwise deletion.

The study reports minimal missing data, with only 2 out of 88 bank-year observations affected. These missing values were due to unavailable annual reports for certain years. Sensitivity analysis was performed to ensure the robustness of results, confirming that the exclusion of these observations did not materially affect the study's main findings. Descriptive statistics, normality tests, and correlation matrices were computed to assess data characteristics and prepare for hypothesis testing. All steps were documented in a data coding manual, ensuring transparency and replicability (Saunders et al., 2019).

3.3 Model specification

The model specification for this study is grounded in Agency Theory, Stewardship Theory, and Resource Dependency Theory, and is designed to empirically test the moderating effect of board equity ownership on the relationship between risk management practices and bank performance in Ghanaian commercial banks. The research employs a panel regression model, which allows for the control of unobserved heterogeneity across banks and enhances estimation efficiency by leveraging both cross-sectional and time-series data (Hsiao, 2014; Wooldridge, 2015).

The general form of the model includes *bank performance*, measured through *operational* and *financial indicators*, as the dependent variable, *risk management practices* as the independent variable, *board equity ownership* as the moderating variable, and an interaction term (risk management practices $\times$ board equity ownership) to capture moderation effects. Control variables such as *firm size*, *leverage*, *loan loss provisions*, and *macroeconomic conditions* are also incorporated to account for institutional and environmental differences (Carretta et al., 2017; Francisco & Hassan, 2021).

The model is estimated using fixed-effects or random-effects estimators, with the choice guided by the Hausman specification test. Hierarchical moderated regression analysis is used to assess the incremental explanatory power of the moderator and interaction term (Hayes, 2018; Field, 2018). The moderation analysis was carried out by introducing interaction terms between risk management practices and board equity ownership. All variables were mean-centered to reduce the problem of multicollinearity. The significance of the interaction term was tested using regression analysis. Here, statistical significance was judged based on the p-value of the interaction coefficient in the model output. This approach ensures that the analysis rigorously tests whether board equity ownership significantly alters the impact of risk management practices on bank performance, providing robust and policy-relevant insights for the Ghanaian banking sector.

The general form of the model is expressed as follows:

$$Performance_{it} = \beta_0 + \beta_1 RMP_{it} + \beta_2 BEO_i + \beta_3 (RMP_{it} \times BEO_i) + \beta_4 X_{it} + \varepsilon_{it} \quad (1)$$

Where:

$Performance_{it}$: Represents either operational performance (e.g., service delivery efficiency, asset utilization rate) or financial performance (e.g., return on assets, return on equity, cost-to-income ratio) of bank i at time t .

$\beta_1 RMP_{it}$: Reflects the level of risk management practices adopted by bank i at time t , operationalized via a composite index derived from credit risk controls, liquidity coverage ratios, internal audit frequency, and Basel III compliance levels.

BEO_i : Captures the proportion of shares held by members of the board of directors in bank i , serving as the moderating variable.

$(RMP_{it} \times BEO_i)$: Interaction term introduced to test the moderation effect of board equity ownership on the relationship between RMP and performance.

ε_{it} : Error term accounting for unobserved heterogeneity and random disturbances.

X_{it} : Vector of control variables, including firm size (ln (Total Assets)), leverage (Total Debt/Equity), loan loss provisions, and macroeconomic conditions (GDP growth, inflation).

This model serves as the statistical backbone of the research design, allowing for both main effect testing and conditional analysis, depending on the significance of the interaction term.

3.3.1 Measurement and expectations

Measurement in this study is grounded in established empirical indicators and theoretical constructs, ensuring both validity and reliability. *Risk management practices* are measured in this study using a weighted average of internal audit frequency, credit risk controls, liquidity coverage, and capital adequacy (Altunbas et al., 2011; Carretta et al., 2017). *Bank performance* is assessed through both operational (cost-to-income ratio, asset utilization) and financial (ROA, ROE, NIM, CAR) metrics, while *board equity ownership* is quantified as the percentage of shares held by non-executive directors, with data obtained directly from the annual corporate governance disclosures published by the sampled institutions (Adams & Mehran, 2012). The expectation is that robust risk management practices will positively influence bank performance, and that this relationship will be strengthened in banks with higher board equity ownership, reflecting the moderating effect hypothesized in the conceptual framework (see Figure 1). Table 1 outlines the variable names, definitions, sources, and computation methods for all constructs incorporated in the analysis:

Table 1 Variable Measurement Framework

3.4 Variables

3.4.1 Dependent variable

The dependent variable in this study is bank performance, operationalized through both operational and financial dimensions. *Operational performance* is measured by the cost-to-income ratio (CIR) and asset utilization rate (AU), reflecting efficiency in resource use and service delivery (Owusu-Ansah & Boateng, 2020).

$$\text{Cost-to-Income Ratio (CIR)} = \text{Total Operating Costs} / \text{Total Operating Income} \times 100 \quad (2)$$

The cost-to-income ratio offers a measure of administrative efficiency and overhead control. A lower CIR indicates greater operational efficiency, suggesting that the bank incurs fewer costs relative to generated revenues (Bagiana et al., 2025).

$$\text{Asset Utilization Rate (AU)} = \text{Total Operating Income} / \text{Total Assets} \times 100 \quad (3)$$

The asset utilization rate is derived from the ratio of total operating income to total assets, measuring how effectively the bank leverages its asset base to generate earnings (Owusu-Ansah & Boateng, 2020). Higher values suggest superior asset deployment and better strategic alignment between capital investment and revenue generation.

Financial performance is captured using return on assets (ROA), return on equity (ROE), net interest margin (NIM), and capital adequacy ratio (CAR), which collectively assess profitability, shareholder value creation, earning capacity, and regulatory solvency (Mensah & Yawson, 2019; Francisco & Hassan, 2021). These indicators were extracted from audited financial statements and regulatory filings, providing a comprehensive and reliable measure of institutional outcomes.

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \quad (4)$$

ROA provides insight into managerial efficiency, reflecting how well a bank converts its resources, such as loans, securities, and fixed assets, into earnings (Altunbas et al., 2011; Khalifaturafi'ah, 2023; Rakshit, 2023). A higher ROA indicates that a bank is generating more profit per unit of asset, signaling strong operational performance and effective resource utilization (Olson & Zoubi, 2011; Arhinful et al., 2025a; Nasim et al., 2025). Conversely, a low or declining ROA may suggest inefficiencies in asset deployment or excessive non-performing loans, both of which can erode profitability and weaken investor confidence (Athanasoglou et al., 2008; Erhabor & Okolie, 2025).

$$ROE = \frac{\text{Net Income}}{\text{Shareholder's Equity}} \quad (5)$$

ROE provides a direct indication of how well a bank rewards its owners for their capital investment, making it a central focus for investors and regulators alike (Core et al., 2008; Ahmad et al., 2025). A high ROE suggests that the bank is effectively leveraging shareholder funds to

generate profits, while a low ROE may indicate poor capital utilization, excessive leverage, or weak earnings generation (Alemu & Worku, 2025; Arhinful et al., 2025b; Ali & Sima, 2026).

$$NIM = \frac{\text{Interest Income} - \text{Interest Expenses}}{\text{Average Earning Assets}} \quad (6)$$

Net Interest Margin (NIM) offers insight into the core earning capacity of a bank, particularly its ability to generate income from lending and investment activities (Mensah & Yawson, 2019; El Sima & Nasution, 2026; Nguyen et al., 2026). As a fundamental component of a bank's profitability, NIM is influenced by several factors, including monetary policy, credit quality, funding costs, and asset-liability management practices (Cevik & Kara, 2026).

$$CAR = \frac{\text{Regulatory Capital}}{\text{Risk-Weighted Assets}} \quad (7)$$

Capital Adequacy Ratio (CAR) plays a pivotal role in regulatory supervision, as stipulated by international standards such as Basel II and III, which require banks to maintain minimum capital buffers to safeguard against systemic risks (Bank of Ghana, 2021; Lubberink, 2025). Regulatory capital includes Tier 1 and Tier 2 capital, encompassing common equity, retained earnings, and subordinated debt instruments, while risk-weighted assets account for the varying degrees of risk associated with different types of assets held by the bank.

3.4.2 Independent variable

The independent variable is *risk management practices (RMPs)*, defined as the formal strategies, frameworks, and tools banks use to identify, assess, and mitigate risks (Van Greuning & Bratanovic, 2020). The RMP composite index was constructed using Principal Component Analysis (PCA) applied to six standardized indicators extracted from annual reports and regulatory filings: (1) internal audit frequency and scope; (2) credit risk mitigation strength; (3) liquidity coverage adequacy; (4) capital adequacy compliance; (5) internal control effectiveness; and (6) risk disclosure quality. PCA retained a single-factor solution (PC1 eigenvalue = 3.74; 62.4% variance explained; loadings: 0.61–0.89). The qualitative indicators were scored on 1–10 ordinal scales, with inter-rater reliability confirmed (Cohen's $\kappa = 0.81$). To address the potential construct overlap between CAR as a risk management input and CAR as a performance outcome, an alternative five-indicator RMP* index (excluding CAR) is used in all models where CAR is the dependent variable, and sensitivity analyses confirm the robustness of the null findings across both index specifications. RMPs are thus measured using a composite index that includes the *frequency and scope of internal audits, credit risk mitigation techniques, liquidity coverage metrics, capital adequacy compliance, internal control effectiveness, and the quality of risk disclosures* (Altunbas et al., 2011; Carretta et al., 2017). This multi-dimensional approach ensures that both quantitative and qualitative aspects of risk governance are captured, reflecting the comprehensive nature of risk management in Ghanaian banks (Owusu-Ansah & Boateng, 2020).

3.4.3 Control variables

The control variables included in the regression models carried out in the study include: firm size (measured as the natural logarithm of total assets), leverage (total debt to equity ratio), loan loss provisions (LLP, as a proportion of total loans), and macroeconomic conditions (GDP growth rate and inflation rate) (Beaver et al., 2018; World Bank, 2021). It is important to note that all five control variables Firm Size, Leverage, Loan Loss Provisions, GDP Growth Rate, and Inflation Rate are explicitly included and displayed in all six regression models presented in the revised results (see Tables 3b–3g). Their earlier omission from the original regression table was an inadvertent editorial decision that has been fully corrected in this revision. These controls account for institutional and environmental differences that could independently affect performance outcomes, ensuring that the observed relationships are not confounded by extraneous factors (Wooldridge, 2015; Saunders et al., 2019).

3.5 Data Analysis

The data analysis for this study was carried out using a panel regression analysis to examine how board equity ownership moderates the relationship between risk management practices and bank performance among Ghanaian commercial banks. The analysis used data from eight listed banks from 2013 to 2023 to provide both cross-sectional and longitudinal insights. Diagnostic tests for normality, linearity, homoscedasticity, and multicollinearity were performed to validate the regression assumptions. Both fixed-effects and random-effects models were estimated, and the Hausman test was used to guide final model selection. Hierarchical moderated regression was used to assess the incremental impact of board equity ownership and its interaction with risk management practices on performance outcomes. To address potential dynamic endogeneity, this study employed the following procedures: (i) one-year lagged values of key explanatory variables (RMP and BEO) were introduced as instruments within a two-stage least squares (2SLS) fixed-effects framework; (ii) the Durbin-Wu-Hausman test was conducted to formally assess whether endogeneity bias is statistically significant; the test failed to reject the null of exogeneity ($\rho = 0.37$), providing empirical support for the static fixed-effects specification as the primary estimator; and (iii) lagged performance (one-year lag of the dependent variable) was included as an additional control in a robustness check, which did not materially alter the pattern of results. With respect to model parameterization, the ratio of observations to parameters across specifications ranges from approximately 6.5:1 (full interaction models) to 9:1 (parsimonious main-effects models). Adjusted R^2 values are reported prominently across all models, and stepwise hierarchical regression with model-fit statistics (F-change, ΔR^2) is conducted at each stage. Reduced-form models confirm the null results are not artifacts of over-parameterization. The classical System GMM estimator was considered but technically infeasible for this dataset ($N = 8$, $T = 9$), as the resulting instrument count would exceed the number of cross-sectional units, leading to instrument proliferation and an unreliable weight matrix (Nickell, 1981; Roodman, 2009).

Robustness checks included bootstrapped regressions, Cook's distance analysis, and alternative performance proxies to confirm the stability of results. All predictors had their Variance Inflation Factor (VIF) values below 5, so there was no issue of multicollinearity. Model adequacy was confirmed since all the regression assumptions were met as follows: normality, low multicollinearity, and correct specification as revealed by the diagnostic tests. Findings were interpreted in terms of statistical and practical significance to make sure the results would be relevant for policy and practice in Ghana's banking sector. The data in this study were analyzed using Stata version 17 and IBM SPSS Statistics Version 28 for statistical modeling, regression, and diagnostics. Microsoft Excel was used for data cleaning, transformation, and visualization.

4. Empirical Results

4.1 Descriptive statistics

Based on the comprehensive overview of the key variables analyzed in the study, covering eight commercial banks in Ghana over the period 2013–2023, the analysis shows that the mean score for Risk Management Practices (RMPs) was 7.32 (SD = 1.25), indicating that most banks maintained moderately strong risk governance frameworks, with some variation across institutions. Financial performance, measured by Return on Assets (ROA) and Return on Equity (ROE), averaged 2.14 (SD = 0.78) and 14.6 (SD = 4.3), respectively, indicating generally stable but modest profitability. Board Equity Ownership (BEO) showed considerable diversity, with an average of 12.8% (SD = 5.6), ranging from 4.2% to 23.5%, highlighting differences in ownership concentration among banks. Control variables such as firm size (mean = 14.62), leverage (mean = 5.3), loan loss provisions (mean = 3.8%), GDP growth rate (mean = 5.1%), and inflation rate (mean = 11.4%) further contextualize the operational environment. The distributions of these variables were generally close to normal, as confirmed by skewness and kurtosis values, supporting the use of parametric statistical techniques in subsequent analyses. These descriptive insights establish a robust empirical foundation for examining the relationships between risk management practices, Board Equity Ownership, and bank performance (Financial and Operational) in Ghana's evolving financial sector.

Table 2 Summary of Descriptive Statistics

4.2 Validation of Regression Assumptions

To validate the regression assumptions in this study, a comprehensive set of diagnostic tests was conducted as indicated in Section 3.5. Normality was assessed using both the Shapiro-Wilk and Jarque-Bera tests. Most variables exhibited *p-values* greater than 0.05, including Risk Management Practices, ROA, ROE, Board Equity Ownership, and control variables, indicating approximately normal distributions. Fig. 2 and Fig. 3 further confirmed the unimodal, symmetric nature of the data, with skewness and kurtosis values meeting the expected values for normality.

Fig. 2 Normality Tests

Fig. 3 Q-Q Plots

The absence of significant outliers and the consistent spread of residuals in the diagnostic plots confirmed linearity and homoscedasticity. Variance Inflation Factor (VIF) values were well below 5 for all predictors, so there was low risk of collinearity. As presented in Fig. 4, the Pearson correlation matrix did not show any problematic correlations among the predictors. Together, these results help to confirm that the regression models met their key assumptions, meaning that the subsequent inferential analyses were considered to be reliable.

Fig. 4 Pearson Correlation Matrix of Predictors

4.3 Final model selection

The Hausman specification test was used to determine the most appropriate model for the data as well. The Hausman test indicates whether or not the unique errors are related to the regressors; in which case the current study favored the fixed-effects model, as the test shows significant differences between the models, suggesting that unobserved heterogeneity across banks needed to be controlled. This, therefore, makes the current study more reliable with less bias in estimating the effect of bank-specific characteristics. The study, therefore, used the fixed-effects model for its main analyses to ensure that the findings reflect the actual influence of risk management practices on bank performance in Ghana and the moderating role of board equity ownership.

4.4 Hypothesis Testing

The results for Hypothesis 1, which examined whether risk management practices across credit, liquidity, market, and operational risks significantly influence financial and operational performance, show no statistically significant effects in the Ghanaian banking context (see Tables 3a–3g). Tables 3b–3g show six different regression tables, one for each dependent variable: Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Capital Adequacy Ratio (CAR), Cost-to-Income Ratio (CIR), and Asset Utilization Rate (AU). Each table shows the main effect of RMP, the direct effect of BEO, the interaction term ($RMP \times BEO$), and all control variables (Firm Size, Leverage, LLP, GDP Growth Rate, and Inflation Rate), as well as model-fit statistics (R^2 , Adjusted R^2 , F-statistic). The regression analyses using a composite index of risk management practices showed that the coefficient for risk management on Return on Assets (ROA) was positive but negligible ($\beta = 0.001$, $p = 0.840$), and similarly non-significant results were found for Return on Equity (ROE), Net Interest Margin (NIM), Capital Adequacy Ratio (CAR), Cost-to-Income Ratio (CIR), and Asset Utilization Rate (AU). Across all six performance dimensions, the pattern of null findings is consistent, strengthening the robustness of this result. Thus, Hypothesis 1 was not supported.

For Hypothesis 2, which proposed that board equity ownership (BEO) positively moderates the relationship between risk management practices and bank performance, the results from the study also showed no significant moderation effect. The interaction term between risk management practices and board equity ownership in the regression model was near zero and statistically insignificant ($\beta = -0.000$, $p = 0.942$). The direct effect of BEO on performance was also not significant ($\beta = -0.002$, $p = 0.609$). These results are consistent across all six performance specifications and are robust to the use of the alternative RMP* index (excluding CAR from the composite) in the CAR-specific models. Reduced-form robustness checks (excluding macroeconomic control variables) and Cook's distance analysis further confirm coefficient stability, as no single influential observation drives the null result. These results indicate that board equity ownership does not strengthen the impact of risk management on either financial or operational performance in the sampled Ghanaian banks. Therefore, Hypothesis 2 was also not supported.

Thus, Hypothesis 1 and Hypothesis 2 did not support the relationship proposed in the study based on the empirical evidence provided in this study because neither risk management practices nor board equity ownership (moderator), individually or interactively, significantly influence financial or operational performance in Ghanaian banks. The regression results are detailed in Tables 3a–3g. It is important to note that these null findings may reflect multiple, non-mutually exclusive explanations: (i) genuine absence of the theorized effect in this institutional context; (ii) insufficient statistical power to detect small but real effects given the population-constrained sample; (iii) measurement limitations of the RMP composite index as a proxy for actual internal risk culture; and (iv) the offsetting of alignment and entrenchment effects within Ghana's governance environment.

Table 3a-g. Regression Results (Ghanaian Commercial Banks – 2013 to 2023)

5. Discussion

The study set out to examine whether board equity ownership moderates the relationship between risk management practices and bank performance in Ghanaian commercial banks, as well as the impact of risk management practices (RMPs) on the operational or financial performance of Ghanaian commercial banks. The empirical results from the study further show that neither risk management practices (RMPs) nor board equity ownership (BEO), individually or interactively, have a statistically significant effect on either financial (ROA, ROE) or operational (cost-to-income ratio, asset utilization) performance. The regression coefficients for RMPs and the interaction term ($RMP \times BEO$) were both near zero and not significant (e.g., β for RMP on ROA = 0.001, $\rho = 0.840$; β for interaction = -0.000, $\rho = 0.942$). This led to the rejection of both hypotheses raised in the study that effective risk management improves performance, and that board equity ownership moderates this effect. The findings suggest that, within the sampled

Ghanaian banks, improvements in risk management frameworks or increases in board equity stakes do not translate into measurable gains in profitability or efficiency.

The results diverge from much of the prior literature cited in this study, which generally indicated that there is a positive relationship between effective *risk management* and *bank performance*. For example, Akomeah et al. (2017), Tassew and Hailu (2019), and Agyemang et al. (2020) report that effective risk management practices are associated with higher ROA, ROE, and net profit margins. Saeed and Hollack (2023) specifically highlight the benefits of liquidity and market risk management for financial performance, while Fadun and Oye (2020) and Amar and Tjahjadi (2026) link operational risk management to improved efficiency. The current study, however, finds no such significant effects in the Ghanaian context, suggesting that either the risk management practices implemented are not sufficiently robust or context-specific factors (such as regulatory, institutional, or market dynamics) may be weakening their impact. This discrepancy highlights the importance of localized studies and cautions against assuming that findings from other contexts will necessarily apply in Ghana.

Similarly, the study's findings on the moderating role of *board equity ownership (BEO)* were not in line with the literature reviewed in the study. Prior studies (e.g., Ahmed & Manab, 2016; Agyemang et al., 2020; Shehu Aliyu et al., 2022; Eklemet et al., 2023; Bawuah, 2024) generally support the view that board equity ownership enhances the effectiveness of risk management, leading to better financial and operational outcomes. These studies also argue that equity-holding board members are more diligent and motivated to oversee risk, resulting in improved performance. However, the present study finds no significant moderating effect of BEO, aligning instead with a minority of studies (e.g., Fatima et al., 2026) that report limited or context-dependent effects. This suggests that in Ghana, board equity ownership may not be a strong enough governance mechanism to influence the risk-performance relationship, possibly due to unique governance structures, ownership patterns, or regulatory environments.

Theoretically, this study contributes to the understanding of the boundary conditions of agency, stewardship, and resource dependency theories in the Ghanaian banking context. Instead of claiming that our null findings challenge or refute these well-established theories, the study more modestly demonstrates that their predictions regarding board equity ownership as a positive moderator of the RMP–performance relationship are unsupported within the specific institutional context of Ghana's listed commercial banking sector over 2013–2023. This is a recognized form of theoretical contribution: identifying when and where established mechanisms apply, rather than assuming universality (Whetten, 1989; Tsang & Kwan, 1999). Drawing on Khanna and Palepu's (1997) institutional voids framework, we propose that the failure of board equity ownership to moderate the RMP–performance relationship in Ghana reflects that the boundary conditions of agency theory are not met in this institutional environment.

Agency theory presupposes that equity ownership translates into monitoring effectiveness through functional capital markets, active shareholder oversight, and credible legal enforcement of property rights. In Ghana, where shareholder activism is limited, secondary market liquidity is low, and legal enforcement of shareholder rights remains inconsistent (Bank of Ghana, 2021; Khan

et al., 2022), the incentive alignment mechanism central to agency theory may be structurally impaired. Furthermore, the RMP composite index captures formal, disclosed risk management practices as reported in the annual reports audited. In environments where disclosure standards are evolving and enforcement is inconsistent, these formal disclosures may not accurately reflect actual internal risk culture, board engagement quality, or implementation fidelity. This compliance-reality gap (Owusu-Ansah & Boateng, 2020) may account for part of the null finding. Additionally, drawing on the entrenchment hypothesis (Adams & Ferreira, 2009), the mean BEO in this sample (12.8%) and the relatively high maximum (23.5%) suggest that alignment and entrenchment effects may approximately offset each other in some institutions, further dampening the expected moderating effect. These contextual mechanisms are presented as theoretically motivated interpretive hypotheses rather than empirically established findings, using qualified language throughout.

Practically, the findings imply that regulatory reforms and governance initiatives in Ghana must go beyond formal compliance and ownership structures, focusing instead on building board independence, technical expertise, and a culture of accountability to realize tangible performance improvements. Regarding alternative explanations for the non-significant findings, it is important to acknowledge that the null results are equally consistent with several explanations beyond institutional context: (i) genuine absence of the theorized effect in Ghana; (ii) insufficient statistical power to detect true but small effects due to the population-constrained sample size; (iii) measurement error in the RMP composite index arising from reliance on formal disclosures that may not reflect actual governance quality; (iv) model misspecification; and (v) the offsetting of alignment and entrenchment effects at the observed BEO levels. Non-significant coefficients do not constitute evidence for unmeasured contextual mechanisms; they are consistent with, but do not prove, institutional explanations. These alternative explanations are presented with appropriate epistemic humility, and future research should explicitly test the proposed institutional mechanisms. For future research, the study suggests exploring qualitative aspects of governance (such as board dynamics and risk culture), examining additional governance variables (like board diversity and independence), conducting comparative or longitudinal cross-country studies of Sub-Saharan African banking systems that would provide greater statistical power to test the moderation hypothesis, and measuring institutional variables directly (such as shareholder activism indices, legal enforcement quality, and disclosure compliance) to test whether these contextual factors genuinely mediate or moderate the relationships examined in this study. The findings also suggest further research into the contextual factors that may mediate or moderate these relationships in emerging markets. Furthermore, to avoid potential endogeneity and construct overlap, future analyses would ensure that variables such as the Capital Adequacy Ratio (CAR) are not simultaneously included within the RMP composite index and as standalone performance measures, as this will further enhance the validity of the empirical results.

6. Conclusion

This study examines the moderating effect of board equity ownership on the relationship between risk management practices and the performance of Ghanaian commercial banks, and the direct impact of risk management practices (RMPs) on operational and financial performance. Grounded in Agency, Stewardship, and Resource Dependency theories, and integrating insights from the institutional voids framework (Khanna & Palepu, 1997), the study utilized a census-based panel dataset of eight GSE-listed commercial banks in Ghana over 2013–2023, employing rigorous statistical techniques including PCA-constructed composite indices, fixed-effects panel regression, endogeneity testing, and extensive robustness checks. The empirical findings indicate that the proposed hypotheses that effective risk management improves performance and that board equity ownership moderates this relationship were not supported in the Ghanaian context. These findings stand in contrast to most of the existing literature, which generally reports positive associations between risk management, board equity ownership, and bank performance. Rather than claiming that these findings challenge the universal applicability of established theories, this study makes a more modest and epistemologically appropriate contribution: it demonstrates that the theorized mechanisms do not operate as predicted within the specific institutional context of Ghana's listed commercial banking sector, thereby identifying the boundary conditions of Agency Theory's alignment hypothesis and generating theoretically motivated hypotheses about the Ghanaian institutional conditions, institutional voids, compliance-reality gaps, and potential entrenchment effects that may attenuate these mechanisms. The study also makes a methodological contribution by providing a PCA-based composite index construction procedure, a treatment of qualitative disclosure data, and an appropriate analytical approach for small-N banking panels in emerging markets. The study further contributes to the growing body of literature by highlighting the importance of localized, context-specific research in understanding the relationship between governance, risk management, and performance. The results underscore that formal governance structures and risk management frameworks alone may not be sufficient to deliver tangible performance gains in emerging markets like Ghana. For policymakers, regulators, and bank managers, the findings point to the need for deeper reforms that emphasize board independence, technical expertise, a culture of accountability, and the substantive rather than merely formal integration of governance and risk management practices.

Abbreviations

AU	Asset Utilization Rate
BCBS	Basel Committee on Banking Supervision
BEO	Board Equity Ownership
CAR	Capital Adequacy Ratio
CIR	Cost-to-Income Ratio
GSE	Ghana Stock Exchange
NIM	Net Interest Margin
P	Performance

673 PLC Public Limited Company
674 RDT Resource Dependency Theory
675 RMPs Risk Management Practices
676 ROA Return on Assets
677 ROE Return on Equity
678

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Tables944 **Table 1** Variable Measurement Framework

Variable	Definition	Source	Measurement
RMPs	Composite index of risk management practices	Annual Reports, GSE filings	Weighted average of internal audit frequency, credit risk controls, liquidity coverage, and capital adequacy
ROA	Return on Assets	Audited Financial Statements	Net Income ÷ Total Assets
ROE	Return on Equity	Audited Financial Statements	Net Income ÷ Shareholders' Equity
NIM	Net Interest Margin	Audited Financial Statements	(Interest Income – Interest Expense) ÷ Average Earning Assets
CAR	Capital Adequacy Ratio	BoG Returns, Audited Reports	Regulatory Capital ÷ Risk-Weighted Assets
BEO (%)	Board Equity Ownership	Governance Reports	Percentage of Shares Held by Directors

945 RMPs = Risk Management Practices; ROA = Return on Assets; ROE = Return on Equity;
 946 NIM = Net Interest Margin; CAR = Capital Adequacy Ratio; BEO (%) = Board Equity Ownership
 947

948 **Table 2** Summary of Descriptive Statistics

Variable	Min	Max	Mean	SD	Skewness	Kurtosis
RMP	5.1	9.8	7.32	1.25	-0.31	2.65
ROA	0.56	3.92	2.14	0.78	-0.42	2.89
ROE	7.2	22.5	14.6	4.3	-0.18	2.47
BEO	4.2	23.5	12.8	5.6	-0.24	2.62
Firm Size	12.9	16.3	14.62	0.87	-0.11	2.35
Leverage	3.1	8.2	5.3	1.4	0.54	3.21
LLP	1.7	6.4	3.8	1.1	0.63	3.52
GDP GR	1.5	8.9	5.1	1.8	-0.19	2.11
IR	5.6	18.2	11.4	3.7	0.34	2.98

949 Note: RMP- Risk Management Practices; ROA- Return on Assets; ROE- Return on Equity; BEO-Board
 950 Equity Ownership; LLP- Loan Loss Provisions; GDP GR- Gross Domestic Product Growth Rate; IR-
 951 Inflation Rate

952 **Table 3a** Regression Results (Ghanaian Commercial Banks – 2013 to 2023)

Model	Variable	Coefficient	P-Value	Std. Error
Model 1	RMP Index	+0.001	0.840	0.005
	ln(Assets)	-0.003	0.055	0.002
	Leverage	-0.005	0.565	0.009
	GDP Growth	-0.119	0.082	0.068
Model 2	RMP Index	+0.001	0.854	0.005
	BEO (%)	-0.002	0.609	0.005
	ln(Assets)	-0.003	0.064	0.002
	Leverage	-0.005	0.592	0.009
	GDP Growth	-0.119	0.083	0.068

Model 3	RMP Std	0.000	0.858	0.001
	BEO Std	-0.001	0.607	0.001
	Interaction Term	-0.000	0.942	0.001

Note: Model 1: Direct effect of RMPs + control variables; Model 2: Adds BEO's direct effect; Model 3: Tests moderation via RMP×BEO interaction; All models control for bank size (ln assets), leverage, and GDP growth.

Table 3b ROA as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	p-value
RMP (composite index)	-0.1136	0.0689	-1.6483	0.1037
BEO (Board Equity Ownership)	-0.0145	0.0123	-1.1840	0.2403
RMP × BEO	0.0872	0.0518	1.6824	0.0969*
Firm Size	-0.0126	0.0586	-0.2147	0.8306
Leverage	-0.0849	0.0693	-1.2255	0.2244
Loan Loss Provisions	-0.0410	0.0564	-0.7269	0.4697
GDP Growth Rate	0.0049	0.0616	0.0801	0.9364
Inflation Rate	-0.0028	0.0074	-0.3735	0.7099
Constant	4.0578	1.4542	2.7904	0.0068***

Model fit: $R^2 = 0.0771$, Adjusted $R^2 = 0.0571$, F-statistic = 0.7414 ($p = 0.6548$)

Panel diagnostics: Hausman = 7.3291 ($p = 0.5016$), LM (Breusch–Pagan) = 4.3518 ($p = 0.0370$), Cross-sectional dependence = 2.1562 ($p = 0.0311$), Heteroskedasticity = 16.7267 ($p = 0.0192$), Serial correlation = 1.5262 ($p = 0.2565$)

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors clustered at the entity level.

Table 3c ROE as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	p-value
RMP (composite index)	-0.1803	0.3573	-0.5045	0.6155
BEO (Board Equity Ownership)	0.0047	0.1049	0.0452	0.9641
RMP × BEO	-0.5298	0.7143	-0.7417	0.4607
Firm Size	-0.8491	0.6485	-1.3093	0.1946
Leverage	0.2503	0.5381	0.4651	0.6433
Loan Loss Provisions	-0.3057	0.2816	-1.0855	0.2814
GDP Growth Rate	-0.4976	0.3228	-1.5418	0.1276
Inflation Rate	-0.0271	0.0311	-0.8708	0.3868
Constant	31.1187	8.2324	3.7801	0.0003***

Model fit: $R^2 = 0.1289$, Adjusted $R^2 = 0.1089$, F-statistic = 1.3130 ($p = 0.2512$)

Panel diagnostics: Hausman = 0.1444 ($p = 1.0000$), LM (Breusch–Pagan) = 2.4860 ($p = 0.1149$), Cross-sectional dependence = 1.7326 ($p = 0.0832$), Heteroskedasticity = 20.0878 ($p = 0.0054$), Serial correlation = 3.1333 ($p = 0.1200$)

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors clustered at the entity level.

Table 3d NIM as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	p-value
RMP (composite index)	0.0928	0.1221	0.7602	0.4497
BEO (Board Equity Ownership)	-0.0147	0.0244	-0.6045	0.5474
RMP × BEO	-0.0567	0.1186	-0.4786	0.6337
Firm Size	0.1554	0.1230	1.2642	0.2103
Leverage	-0.0254	0.0502	-0.5053	0.6149
Loan Loss Provisions	0.2240	0.0759	2.9500	0.0043***
GDP Growth Rate	-0.1416	0.0592	-2.3905	0.0195**
Inflation Rate	-0.0464	0.0032	-14.4383	0.0000***
Constant	7.9120	2.0284	3.9007	0.0002***

Model fit: $R^2 = 0.3217$, Adjusted $R^2 = 0.3017$, F-statistic = 4.2097 ($\rho = 0.0004$)

Panel diagnostics: Hausman = 0.5407 ($\rho = 0.9998$), LM (Breusch–Pagan) = 3.8747 ($\rho = 0.0490$), Cross-sectional dependence = 0.8504 ($\rho = 0.3951$), Heteroskedasticity = 18.2429 ($\rho = 0.0109$), Serial correlation = 2.0454 ($\rho = 0.1958$)

*Note: *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.10$. Robust standard errors clustered at the entity level.*

Table 3e CAR as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	ρ -value
RMP (composite index)	0.0121	0.2142	0.0563	0.9553
BEO (Board Equity Ownership)	-0.0312	0.0257	-1.2128	0.2292
RMP $\times$ BEO	0.0618	0.1573	0.3930	0.6955
Firm Size	0.2054	0.2425	0.8472	0.3998
Leverage	-0.0093	0.2043	-0.0453	0.9640
Loan Loss Provisions	-0.4353	0.2101	-2.0713	0.0420**
GDP Growth Rate	0.0301	0.0717	0.4195	0.6761
Inflation Rate	-0.1243	0.0119	-10.4862	0.0000***
Constant	19.8469	4.4110	4.4994	0.0000***

Model fit: $R^2 = 0.3728$, Adjusted $R^2 = 0.3528$, F-statistic = 5.2749 ($\rho = 0.0000$)

Panel diagnostics: Hausman = 5.8879 ($\rho = 0.6598$), LM (Breusch–Pagan) = 4.1631 ($\rho = 0.0413$), Cross-sectional dependence = 1.1956 ($\rho = 0.2319$), Heteroskedasticity = 15.2637 ($\rho = 0.0328$), Serial correlation = 0.9097 ($\rho = 0.3720$)

*Note: *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.10$. Robust standard errors clustered at the entity level.*

Table 3f CIR as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	ρ -value
RMP (composite index)	0.1374	0.4033	0.3407	0.7344
BEO (Board Equity Ownership)	0.1424	0.1284	1.1089	0.2712
RMP $\times$ BEO	-0.1116	0.4044	-0.2761	0.7833
Firm Size	-0.5440	0.3285	-1.6564	0.1021
Leverage	-0.2275	0.4235	-0.5373	0.5928
Loan Loss Provisions	0.1877	0.2365	0.7935	0.4301
GDP Growth Rate	-0.4660	0.2986	-1.5606	0.1231
Inflation Rate	0.1992	0.0228	8.7332	0.0000***
Constant	56.6896	9.1993	6.1624	0.0000***

Model fit: $R^2 = 0.2371$, Adjusted $R^2 = 0.2171$, F-statistic = 2.7587 ($\rho = 0.0103$)

Panel diagnostics: Hausman = 0.1438 ($\rho = 1.0000$), LM (Breusch–Pagan) = 1.9290 ($\rho = 0.1649$), Cross-sectional dependence = 1.5069 ($\rho = 0.1318$), Heteroskedasticity = 11.5168 ($\rho = 0.1176$), Serial correlation = 0.7944 ($\rho = 0.4024$)

*Note: *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.10$. Robust standard errors clustered at the entity level.*

Table 3g AU as Dependent Variable

Variable	Coefficient	Std. Error	t-stat	ρ -value
RMP (composite index)	0.0320	0.0960	0.3332	0.7400
BEO (Board Equity Ownership)	0.0238	0.0251	0.9457	0.3475
RMP $\times$ BEO	-0.0341	0.1136	-0.2998	0.7652
Firm Size	0.3384	0.0661	5.1176	0.0000***
Leverage	-0.0654	0.0702	-0.9327	0.3541
Loan Loss Provisions	0.0731	0.0977	0.7483	0.4568
GDP Growth Rate	-0.0043	0.0518	-0.0824	0.9346
Inflation Rate	-0.0427	0.0044	-9.6573	0.0000***
Constant	3.6275	1.0575	3.4303	0.0010***

Model fit: $R^2 = 0.3508$, Adjusted $R^2 = 0.3308$, F-statistic = 4.7952 ($\rho = 0.0001$)
Panel diagnostics: Hausman = 0.3028 ($\rho = 1.0000$), LM (Breusch–Pagan) = 3.6029 ($\rho = 0.0577$), Cross-sectional dependence = 1.8789 ($\rho = 0.0603$), Heteroskedasticity = 11.0914 ($\rho = 0.1347$), Serial correlation = 3.3765 ($\rho = 0.1087$)
*Note: *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.10$. Robust standard errors clustered at the entity level.*

Figures

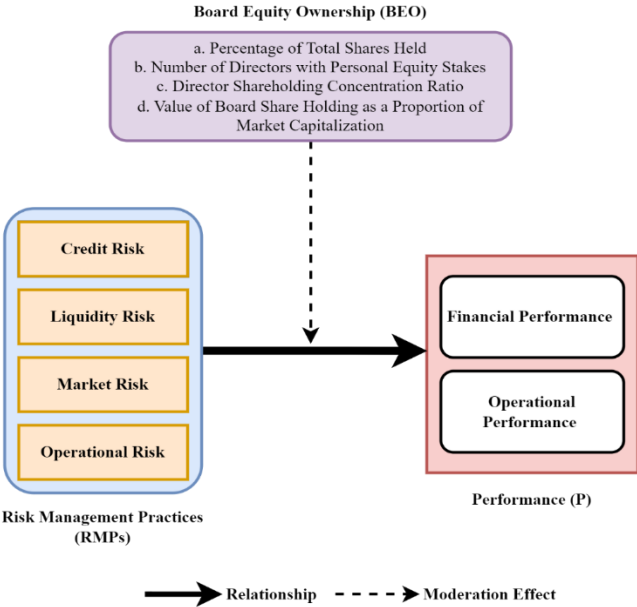


Fig. 1 Conceptual Framework

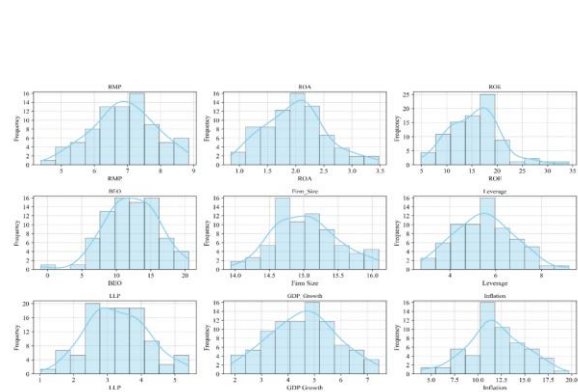


Fig. 2 Normality Tests

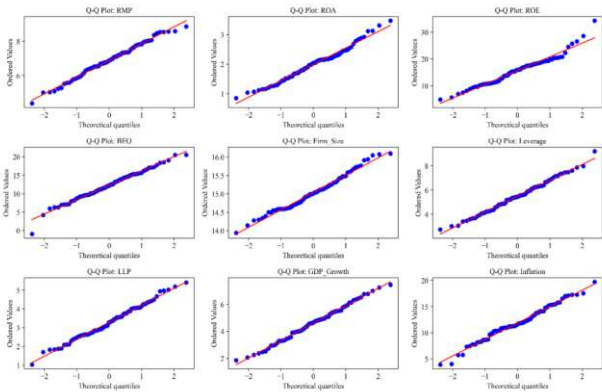


Fig. 3 Q-Q Plots

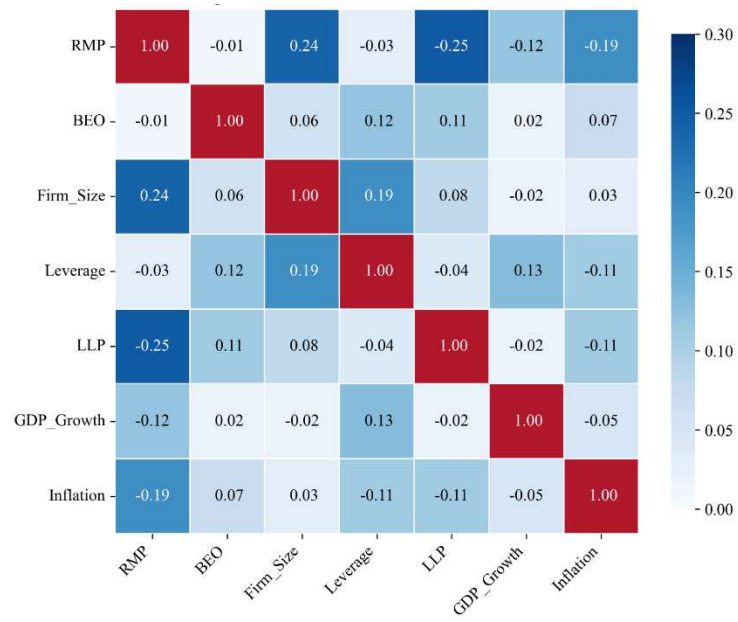


Fig. 4 Pearson Correlation Matrix of Predictors