The Nexus between Banks Soundness and Performance: Evidence from Selected Commercial Banks in Ethiopia

A thesis submitted to the Department of Economics in partial fulfillment for the Requirements of the Degree of Master of Science in Financial Economics

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Declaration

I, the undersigned, solemnly declare that my thesis, titled "The Links between Banks Soundness, profitability and efficiency: Evidence from Selected Commercial Banks in Ethiopia," is an original work authored by me. It has not been submitted for a degree at any other university. All sources and materials utilized in this thesis have been properly acknowledged in accordance with the academic and ethical guidelines of the institution.

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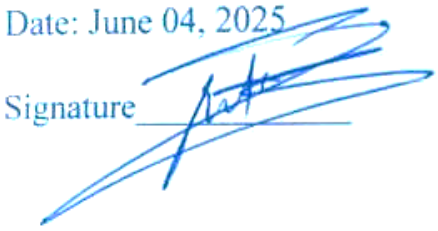
Signature 

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This is to certify that the thesis prepared by Naji Kasim entitled **The Links between Banks Soundness, profitability and efficiency: Evidence from Selected Commercial Banks in Ethiopia**and submitted in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Economics (Financial Economics) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The stability and performance of commercial banks are vital for Ethiopia's economic development, particularly in a volatile financial landscape. This study explores the relationship between bank soundness and financial performance within Ethiopia's commercial banking sector, analyzing 16 banks from 2015 to 2024. Using the CAMEL framework Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity; it evaluates their impact on key profitability metrics: Return on Assets, Return on Equity, and Net Interest Margin. The analysis incorporates institutional factors such as bank age, ownership structure, and bank size, alongside macroeconomic variables like real GDP growth, to ensure a comprehensive assessment. A quantitative panel data approach with a Random Effects model is employed, addressing econometric challenges through diagnostic tests to ensure robustness. The findings highlight a significant relationship between soundness indicators and financial performance metrics, revealing that operational efficiency and scale are critical drivers of profitability. Larger banks show stronger interest margins, underscoring the benefits of scale in Ethiopia's banking landscape. While Capital Adequacy exhibits a generally positive but inconsistent influence on performance, liquidity supports interest income generation. Macroeconomic factors and ownership structure show limited impact, emphasizing the role of internal factors in navigating Ethiopia's economic environment. These insights provide valuable guidance for policymakers and bank management.

Keywords: Bank Soundness, CAMEL Framework, Random Effects Model, Ethiopian Commercial Banks

Acronyms and Abbreviations

AQ: Asset Quality
ATM: Automated Teller Machine
CAMEL: Capital Adequacy, Asset Quality, Management Efficiency, Earnings, Liquidity
CAR: Capital Adequacy Ratio
CBE: Commercial Bank of Ethiopia
FX: Foreign Exchange
GDP: Gross Domestic Product
ICT: Information and Communication Technology
INF: Inflation
IT: Information Technology
KMV: Kealhofer, McQuown and Vasicek Model
LDR: Loan to Deposit Ratio
LIQ: Liquidity
ME : Management Efficiency
NBE: National Bank of Ethiopia
NEW: Dummy variable for New Banks (Established after 2000)
NIM: Net Interest Margin
NPL: Non-Performing Loans
OLS: Ordinary Least Squares
OWN: Dummy variable for Ownership (1 = Private Bank, 0 = Public Bank)
PPP: Purchasing Power Parity
ROA: Return on Assets
ROE: Return on Equity
RWA: Risk-Weighted Assets
SD: Standard Deviation
SDR: Special Drawing Rights
SIZE: Natural Logarithm of Total Assets
VaR: Value at Risk
Z-Score : Altman Z-Score Model

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CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Ethiopia's banking sector serves as a cornerstone for the nation's economic development, primarily by facilitating savings, supporting investments, and enabling daily trade activities. In a developing financial market with limited deposit insurance compared to advanced economies, banks bear high responsibility to act not only as lenders but also as stabilizers of the sector and the broader economy. Over the past few decades, Ethiopia has undergone gradual financial sector reforms, marking a significant shift towards liberalization. These reforms, initiated in the early 1990s, opened the door for private financial institutions, ending the dominance of state-owned banks. Awash Bank was the first private bank, established in 1994, followed by Dashen (1995), Abysinia (1996), and Wegagen (1997). After 2000, the number of new entrants increased rapidly with the establishment of banks like Zemen (2008), Bunna (2009), and Addis (2011). By June 2024, Ethiopia had 31 commercial banks, including reformed microfinance institutions and the state-run CBE (NBE, 2024). This expansion has diversified the Ethiopian financial market, with private banks becoming more engaged by contributing to economic growth through mobilizing savings, providing credit to key sectors like agriculture and manufacturing, and facilitating trade by introducing innovative financial services.

Ethiopia's banking sector includes diverse participants; banks established after 2000, such as Oromia (2008) and Enat (2011), are challengers attempting to establish credibility in a market where existing banks dominated. These newer banks often focus on product innovation, leveraging technologies like digital banking to target potential customers based on their needs, although their relative lack of experience can be a disadvantage. Conversely, older banks like CBE, Awash, and Dashen benefit from loyal customer bases and a proven history of withstanding crises, though their size can hinder quick adaptation to modern demands. Ownership structures also play a key role: while government-owned banks are tasked with supporting state-driven initiatives like rural development, private banks often prioritize profitability, sometimes venturing into riskier territories (Micco, Panizza, & Yañez, 2007). Moreover, the introduction of Islamic banking in 2021, although an interesting development, is still in its infancy, limiting its analysis due to its short history.

The Ethiopian banking environment remains volatile, contrasting sharply with the more stable financial systems in advanced economies. The 2022 inflation spike, for instance, affected households and squeezed bank profit margins as costs outpaced revenues, creating pressure on loan portfolios, which constitute the bulk of revenue streams (World Bank, 2022). As borrowers struggle under such economic conditions, defaults increase, prompting banks to raise their provisions, a trend closely monitored by the NBE (Tsegazeab, 2019). Furthermore, deposit volatility remains a concern; any uncertainty, whether in rural or urban areas, can quickly lead to deposit withdrawals, pushing the NBE to enforce tighter liquidity standards (NBE, 2020). In this context, bank soundness goes beyond a mere financial indicator; it dictates whether banks can sustain Ethiopia's economic development or falter under these pressures.

The rise of private banks has introduced a competitive banking environment, characterized by distinct dynamics between older, established institutions and newer entrants, as well as between public and private banks. Older banks, such as CBE, Awash, and Dashen, benefit from extensive experience and loyal customer bases. CBE, as the dominant government bank, holds a considerable market share and is expected to play a key role in supporting government initiatives, such as rural development and infrastructure projects. In contrast, newer banks established after 2000, mostly privately owned, focus on quick adaptability and product innovation, leveraging technologies like digital banking to reach previously untapped, tech-savvy customers. However, these newer banks also face challenges, including limited resources, less brand recognition, and vulnerability due to their relative inexperience with economic shocks. Private Banks, driven by profit motives, may engage in riskier lending practices, while public banks prioritize policy objectives, sometimes at the expense of efficiency. Inflation, which spiked to 33.8% in 2022, further squeezed profit margins as costs outpaced revenues, pressuring loan portfolios that constitute over 70% of bank assets (Samuel, 2018). External shocks, such as global price changes, droughts, and foreign exchange shortages, exacerbate borrower defaults, particularly in agriculture, impacting bank stability (Tsegazeab, 2019). Additionally, deposit volatility remains a concern, especially in rural areas with low financial literacy, where uncertainty can trigger rapid withdrawals, prompting the NBE to enforce tighter liquidity standards (NBE, 2020).

Despite the increase in the number of commercial banks, the sector remains primarily engaged in traditional lending and deposit activities. To maintain stability during this expansion, the NBE has introduced various measures, mainly minimum capital requirements and strict risk monitoring. At the heart of this transformation is the concept of bank soundness, which is the ability of banks to withstand Ethiopia's economic challenges. A sound bank is one that maintains robust capital reserves, ensures loan quality, is managed effectively, generates consistent profits, and holds sufficient liquidity to meet obligations (Barth, Caprio, & Levine, 2006). These attributes are essential for maintaining public trust, particularly in a financial system where fragile institutions can easily trigger deposit withdrawals, eroding faith in the entire banking framework. In Ethiopia, banks are fundamental to the financial system's stability, shaping the country's economic progress or stagnation.

In this challenging context, analyzing bank soundness is crucial for ensuring the stability and sustainability of Ethiopia's banking sector. Bank soundness the ability to maintain robust capital reserves, ensure loan quality, manage operations effectively, generate consistent profits, and hold sufficient liquidity is not merely a financial indicator but a determinant of whether banks can support Ethiopia's economic development or falter under pressure. A sound banking system fosters public trust, which is critical in a market where fragile institutions can trigger deposit withdrawals, eroding confidence in the financial framework (Barth, Caprio, & Levine, 2006). In Ethiopia, where banks are fundamental to economic progress, understanding the drivers of soundness, such as capital adequacy, asset quality, managerial efficiency, earnings strength, and liquidity, is essential for policymaking and financial planning. This study addresses these dynamics by examining a sample of 16 commercial banks, including both public and private institutions with varying operational histories, to explore how soundness indicators relate to performance outcomes like ROA, ROE, and NIM. By focusing on a decade marked by economic changes, this research fills a gap in Ethiopia's financial literature, offering insights for the NBE

to tailor policies, such as whether to prioritize capital requirements for newer banks or enhance management practices in older ones, to strengthen the sector's resilience and support sustainable economic growth.

1.2 Statement of the Problem

The financial soundness of Ethiopia's commercial banks is fundamental to fostering economic stability and growth, yet variations in institutional resilience present significant challenges to the sector's sustainability. Banks especially newer or smaller ones struggle to meet the same standards of capital strength, risk control, and earnings reliability as their more established peers (Samuel, 2016).

Researches on the Ethiopian banking system remains limited. A few studies offer insights into specific elements for example, Samuel (2016) examined profitability determinants, while Tsegazeab (2018) focused on risk management practices. Moreover, the rapid new private bank entrant to financial market, the transformation of microfinance institutions into commercial banks, and the launch of Islamic banking have increased complexity to the sector that earlier studies couldn't account. Samuel (2016) provided valuable findings on the role of loan interest income in driving bank profitability. Similarly, Tsegazeab (2018) offered important perspectives on credit risk mitigation strategies to address loan defaults. Thus, it is important to additionally focus on broad range of indicators of bank soundness analyses to encompass the full spectrum of bank soundness indicators, such as capital adequacy, asset quality, management efficiency, earnings stability, or liquidity, as outlined in the CAMEL framework. Moreover, exploring the influence of ownership structures by distinguishing between public and private banks or the role of public trust in sustaining financial stability are very important in Ethiopia's financial environment. Studying the impact of operational histories, such as differences between newly established and long-standing banks, also expand limited understanding of the sector's dynamics.

The CAMEL framework, recognized globally for its exhaustive evaluation of bank health, integrates multiple dimensions critical to assessing financial soundness (Barth et al., 2006). In Ethiopia, where banks operate under economic uncertainty, a deep analysis of these indicators is essential for identifying vulnerabilities and strengthening resilience. This research aims to addresses unaddressed areas by examining the financial soundness of 16 Ethiopian commercial banks over the period from 2015 to 2024, utilizing the CAMEL framework to evaluate capital strength, loan quality, operational efficiency, profitability, and liquidity. It goes beyond surface-level metrics and explores how elements like capital, loan quality, cost efficiency, profitability, and liquidity interact under different ownership models and operational histories. These findings will not only contribute to academic literature but also provide practical insights for bank managers, regulators, and policymakers working to build a more resilient financial system.

1.3 Objectives of the Study

- **General Objective:**

The primary objective of this study is to assess the nexus between bank soundness and performance using the Capital adequacy, Asset quality, Management efficiency, Earnings, and Liquidity (CAMEL) framework, with a focus on selected commercial banks in Ethiopia.

- **Specific Objectives:**

To achieve the general objective, the study aims to:

1) To examine Variations in Bank Soundness by Ownership Structure and Institutional Age
2) To analyze Variations in Bank performance by Ownership Structure and Institutional Age
3) To examine the nexus between bank soundness and performance

1.4 Significance of the Study

This study holds considerable significance for multiple stakeholders within the Ethiopian banking sector and the broader financial landscape. By exploring the relationship between bank soundness and financial performance through the lens of the CAMEL framework, the research provides timely insights that can inform decision-making, regulatory oversight, and academic inquiry

Regulators, particularly the National Bank of Ethiopia, may also find this research valuable. By comparing performance patterns across public and private banks, the study provides evidence that can support better-informed supervisory policies, early warning mechanisms, and industry benchmarks to protect the health of the banking system. Investors and shareholders can also benefit, as the study sheds light on how CAMEL metrics reflect the financial condition of banks information that is crucial for making sound investment decisions. Beyond its practical implications, the study also contributes to the academic literature, especially given the limited research available on the CAMEL model within the Ethiopian context. By incorporating ownership structure as an additional lens, the research opens up new questions and possibilities for future work in banking and finance. Overall, this study aims to support stronger, more competitive, and more stable financial institutions in Ethiopia whether through better management, more effective regulation, or deeper academic understanding In addition, the study contributes meaningfully to academic research and literature by addressing a relatively underexplored topic within the Ethiopian context. By focusing on the CAMEL model and the role of ownership structure in bank performance, the study adds value to ongoing debates and encourages further research in banking and finance. In summary, the study provides significant

contributions across practical, regulatory, and academic dimensions, all aimed at enhancing the soundness, competitiveness, and long-term viability of Ethiopia's banking sector.

1.5 Scope and Limitation of the Study

The selection of 16 banks, including both public and private institutions with diverse operational histories, provides a representative sample of Ethiopia's banking sector, capturing its competitive dynamics and structural evolution. The 10 year study period encompasses significant financial sector developments, including regulatory reforms and the expansion of private banking, offering a robust timeframe to analyze trends in bank stability. However, the analysis does not cover all commercial banks in Ethiopia, as only 16 were included due to challenges in obtaining consistent, audited financial data for the entire 2015–2024 period. Smaller or newly established banks often lack standardized or publicly available financial reports, limiting their inclusion. The reliance on secondary data from annual reports and National Bank of Ethiopia publications further constrains the study, as these sources frequently use proxy variables, such as loan loss provisions for asset quality, due to the absence of detailed metrics like risk-weighted assets. Additionally, qualitative factors, such as corporate governance or managerial practices, are excluded, as they fall outside the CAMEL framework's quantitative focus. Islamic banks are also omitted due to their brief operational history since 2021. Despite these limitations, the selected sample and timeframe provide a strong basis for generating valuable insights into Ethiopia's banking sector, contributing to academic research and policy formulation.

1.6 Thesis structure

This thesis is structured as follows: The Introduction provides an overview of the study, outlining the research objectives, significance, and key research questions. The Literature Review examines the development of the banking sector in Ethiopia, discusses relevant theoretical frameworks like CAMEL, reviews global and regional studies on bank soundness and performance, and identifies gaps in existing literature. The Research Methodology details the research design, sample selection of 16 banks, data collection methods, and analytical techniques used for statistical analysis. The Analysis and Findings section presents an overview of the Ethiopian banking sector from 2015 to 2024, analyzes bank soundness indicators, evaluates performance outcomes such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM), and compares findings between public and private banks. The Discussion interprets the findings, discusses implications for policy and practice, and compares results with studies from other regions or countries. Finally, the Conclusion and Recommendations summarizes key findings, offers recommendations for stakeholders, and suggests areas for future research. Supporting materials, including references and appendices, are provided to enhance the study's comprehensiveness

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Background of Bank Soundness

Researchers have assessed bank soundness using various theoretical methodologies, using models to CAMEL components to understand financial stability.

I. Capital Adequacy

For Capital Adequacy, researchers employ various theoretical methodologies to investigate how banks maintain sufficient capital to absorb financial shocks, ensuring stability.

The **Trade-Off Theory** models optimal capital structure, using linear programming to balance the tax advantages of debt against bankruptcy costs (Myers, 1984). This approach emphasizes the need for banks to weigh the benefits of debt financing against the risks associated with potential financial distress.

The **Basel III Framework** leverages dynamic stochastic general equilibrium (DSGE) models to simulate the impact of 7% risk-weighted capital requirements. This framework analyzes systemic stability by incorporating macroeconomic feedback loops, highlighting the importance of maintaining adequate capital to withstand economic fluctuations (Basel Committee on Banking Supervision, 2010).

The **Pecking Order Theory** uses hierarchical choice models to represent financing preferences, prioritizing internal funds to minimize information asymmetry costs. Decision-tree analyses guide capital sourcing strategies, suggesting that firms prefer retained earnings over debt or equity financing (Myers & Majluf, 1984).

The **Capital Asset Pricing Model (CAPM)** employs beta estimation models to assess risk-return profiles. By using regression analysis, this model guides capital allocation decisions, helping banks determine the expected return on investment relative to its risk (Sharpe, 1964).

The **Financial Fragility Hypothesis** utilizes macro-financial linkage models to explore shock amplification. This theory examines systemic vulnerabilities through input-output frameworks, emphasizing how financial instability can spread through interconnected financial systems (Minsky, 1975).

System dynamics modeling simulates capital feedback loops, capturing dynamic interactions between capital reserves and economic variables. This approach helps in understanding how changes in capital levels can affect overall economic stability (Sterman, 2000).

The **Financial Contagion Theory** applies network simulation models to study systemic spillovers, analyzing interbank linkages through graph theory. This model helps in understanding how risks can be transmitted across banks and financial institutions (Allen & Gale, 2000).

The **Market Discipline Theory** models stakeholder monitoring by using incentive alignment models to enhance accountability. These frameworks assess how depositor and investor oversight can influence bank behavior and capital adequacy (Flannery, 2001).

Stochastic volatility models examine capital fluctuations by employing time-series analysis to capture volatility clustering. This method provides insights into the unpredictable nature of capital levels and the associated risks (Hull & White, 1990).

The **Capital Buffer Adjustment Theory** models dynamic capital adjustments, using stochastic optimization to optimize reserves under uncertainty. This theory incorporates quadratic programming to ensure that banks maintain adequate capital buffers in varying economic conditions (Estrella, 2004).

The **Information Asymmetry Theory** addresses capital decisions made under imperfect information. It employs adverse selection models to study market inefficiencies and uses probabilistic frameworks to analyze mispricing risks (Akerlof, 1970).

The **Capital Structure Irrelevance Theory** models capital decisions under perfect markets, utilizing Modigliani-Miller frameworks to explore theoretical benchmarks. This theory suggests that in efficient markets, the value of a firm is unaffected by its capital structure (Modigliani & Miller, 1958).

The **Endogenous Risk Theory** models self-reinforcing risks, using feedback loop models to study capital's role in risk amplification. This approach highlights how certain risks can become more pronounced as capital levels fluctuate (Danielsson & Shin, 2003).

Behavioral Capital Theory examines irrational capital decisions by using heuristic models to analyze biases. This perspective considers how psychological factors can influence decision-making in capital management (Shefrin, 2001).

Markov chain models study capital state transitions, modeling stability dynamics. These models provide insights into how banks move between different states of capital adequacy over time (Norris, 1997).

Multi-Criteria Decision Analysis models capital allocation through weighted scoring models to balance various objectives. This approach helps banks make informed decisions regarding capital distribution based on multiple performance criteria (Saaty, 1980).

Agency Theory emphasizes the conflicts of interest between bank shareholders and management, highlighting the importance of governance structures to align interests and mitigate risks that could threaten bank soundness.

Incorporating the **Resource-Based View (RBV)** allows for an understanding of how unique internal resources and capabilities such as skilled management and innovative technologies contribute to a bank's competitive advantage and overall stability. By leveraging these resources effectively, banks can enhance their performance and maintain adequate capital levels, further ensuring financial soundness

II. Asset Quality

Asset Quality research focuses on the risks inherent in loan portfolios, employing diverse theoretical methodologies to understand and mitigate credit risk.

The **Adverse Selection Theory** posits that information asymmetries lead to riskier lending. Researchers utilize screening models that incorporate borrower credit metrics and collateral to simulate lending decisions and predict non-performing loans (NPLs) (Stiglitz & Weiss, 1981). This theory highlights the need for effective screening processes to minimize risks associated with lending.

The **Moral Hazard Theory** examines borrower risk-taking behavior by utilizing game-theoretic models. These models design contracts with covenants that align borrower and lender interests, thereby reducing the probabilities of default (Holmstrom, 1979). By ensuring that borrowers have incentives to act in ways that mitigate risk, lenders can enhance the quality of their asset portfolios.

Bayesian inference models dynamically update risk assessments with new data, employing probabilistic frameworks to refine NPL predictions (Berger & Udell, 1998). This methodology allows banks to adjust their risk evaluations based on the latest available information, facilitating better decision-making in lending processes.

The **Loss Aversion Theory** focuses on conservative lending practices. Behavioral choice models analyze how risk aversion shapes loan policies, emphasizing the tendency of lenders to avoid losses more than they seek gains (Kahneman & Tversky, 1979). This theory underscores the psychological factors influencing lending decisions.

Cumulative Prospect Theory further explores risk weighting by using probability weighting models to study how banks prioritize loss avoidance (Tversky & Kahneman, 1992). This approach provides insights into how banks perceive and respond to potential losses in their lending activities.

Multi-agent simulations explore portfolio dynamics by modeling the interactions among borrowers and lenders (Tesfatsion, 2006). These simulations help in understanding the complexities of borrower-lender relationships and the impact of these interactions on asset quality.

Regret Theory models lending decisions by using decision regret models to assess how anticipated regret influences loan approvals (Loomes & Sugden, 1982). This theory highlights

the emotional factors at play in lending decisions, suggesting that lenders may avoid risky loans to prevent future regret.

Framing Theory examines how the presentation of decisions affects outcomes. Using cognitive bias models, it studies how loan risk is communicated and perceived (Tversky & Kahneman, 1981). The way information is framed can significantly influence lender behavior and decision-making.

Discourse analysis investigates risk narratives within credit reports, analyzing the linguistic structures that convey risk information (Fairclough, 1992). This analysis can reveal how language shapes perceptions of risk and influences lending decisions.

The **Credit Cycle Theory** models cyclical loan risks by employing dynamic econometric models to study default patterns across different economic phases (Kiyotaki & Moore, 1997). Understanding these cycles is crucial for banks to anticipate and prepare for fluctuations in asset quality.

Stochastic simulation models assess portfolio resilience by simulating various economic scenarios and their impacts on loan portfolios. These models help banks understand the potential risks and performance of their asset quality under different conditions.

Agency Theory emphasizes the conflicts of interest between lenders and borrowers, highlighting the importance of contract design and monitoring to mitigate risks associated with moral hazard and adverse selection.

The **Resource-Based View (RBV)** provides insight into how a bank's unique resources and capabilities such as risk assessment technologies and experienced personnel can improve its ability to manage credit risk effectively. By leveraging these resources, banks can enhance their asset quality and overall financial stability

III. Management Efficiency

Management Efficiency is examined through organizational and behavioral models, providing theoretical insights into optimizing resources and decision-making.

The **Agency Theory** posits that governance mechanisms align managerial and shareholder interests by using principal-agent models to simulate incentive structures such as performance-based compensation (Jensen & Meckling, 1976). This theory highlights the importance of creating incentives that motivate managers to act in the best interests of shareholders.

The **Resource-Based View (RBV)** frames leadership as a competitive asset. It utilizes resource allocation frameworks to model how managerial capabilities enhance operational efficiency (Barney, 1991). This perspective emphasizes the value of unique managerial skills and resources in achieving superior performance.

Contingency Theory explores situational leadership by employing case study frameworks to analyze how management adapts to external variables such as market volatility (Fiedler, 1967). This theory suggests that effective leadership is contingent upon contextual factors, requiring managers to be flexible and responsive to changing circumstances.

The **Stewardship Theory** models collaborative governance, utilizing behavioral models to study how managers prioritize organizational goals over personal interests (Donaldson & Davis, 1991). This approach underscores the potential for managers to act as stewards of the organization, fostering a commitment to collective success.

Structural Equation Modeling investigates efficiency drivers by employing path analysis to model relationships between leadership, resources, and performance (Bollen, 1989). This methodology allows researchers to quantify the impact of various factors on management efficiency and organizational outcomes.

The **Behavioral Theory of the Firm** examines decision-making under uncertainty, using bounded rationality frameworks to simulate managerial choices (Cyert & March, 1963). This theory recognizes the limitations of human decision-making and the influence of cognitive biases on managerial actions.

Complexity Leadership Theory models adaptive leadership, applying network analysis to explore dynamic interactions within organizational systems (Uhl-Bien et al., 2007). This framework emphasizes the importance of adaptability and collaboration in navigating complex environments.

Sensemaking Theory focuses on how managers interpret complex environments, utilizing cognitive frameworks to analyze decision processes (Weick, 1995). This theory highlights the role of perception and interpretation in shaping managerial responses to challenges.

Cognitive Dissonance Theory models managerial conflicts, employing psychological frameworks to study how conflicting goals affect efficiency (Festinger, 1957). This theory suggests that cognitive dissonance can lead to tensions that may hinder effective decision-making.

The **Transformational Leadership Theory** models inspirational leadership, using motivational frameworks to assess the impacts of leadership style on efficiency (Bass, 1985). This approach underscores the potential for transformational leaders to enhance organizational performance through vision and inspiration.

Social Exchange Theory examines reciprocal relationships, using exchange frameworks to study managerial trust and cooperation (Blau, 1964). This perspective highlights the importance of trust in fostering collaborative work environments.

Grounded Theory Analysis explores efficiency narratives by developing models from qualitative data (Glaser & Strauss, 1967). This methodology allows for the identification of patterns and themes that contribute to understanding management efficiency.

Finally, **Agent-Based Organizational Modeling** simulates managerial interactions to model efficiency dynamics within organizations (Axelrod, 1997). This approach provides insights into how individual behaviors and interactions influence overall organizational performance.

These theoretical approaches collectively illuminate how management efficiency drives bank soundness, offering diverse methodologies to study organizational performance. By integrating these perspectives, researchers can gain a comprehensive understanding of the factors that contribute to effective management in banking and finance.

IV. Earnings

Earnings research centers on profitability, employing theoretical models to understand income generation and financial performance.

The **Financial Intermediation Theory** posits that banks profit from interest spreads. Econometric models simulate loan-deposit dynamics to estimate revenue streams and analyze how banks manage the differences between interest rates on loans and deposits (Diamond & Dybvig, 1983).

The **Structure-Conduct-Performance Paradigm** models market influences, utilizing market structure models to analyze how competition shapes profit margins. This framework emphasizes the relationship between market structure, firm conduct, and overall performance in the banking sector (Berger, 1995).

The **Economic Value Added (EVA)** framework assesses earnings against capital costs, employing cost-of-capital analyses to evaluate shareholder value. This model helps in determining whether a bank generates returns that exceed the costs of its capital (Stewart, 1991).

Stochastic Frontier Analysis studies profit efficiency by using frontier models to estimate optimal performance. This approach identifies the maximum possible output given a set of inputs, providing insights into how effectively banks operate (Aigner et al., 1977).

The **Efficiency Wage Theory** examines talent retention by analyzing how higher wages can enhance productivity and profits. Labor economics models suggest that paying employees above-market wages can lead to improved performance and lower turnover rates (Shapiro & Stiglitz, 1984).

Dynamic Programming Models optimize earnings strategies by solving sequential decision problems. This methodology helps banks make informed decisions over time regarding investments and resource allocation (Bellman, 1957).

Real Business Cycle Theory models profit cycles by using stochastic models to study the impact of economic fluctuations on profitability. This theory suggests that economic shocks can significantly influence a bank's earnings (Kydland & Prescott, 1982).

Profit Maximization Theory focuses on revenue strategies, employing optimization models to maximize returns. This theory provides a framework for banks to determine the best pricing and investment strategies to enhance profitability (Mas-Colell et al., 1995).

Behavioral Profit Theory examines decision biases, utilizing heuristic models to study irrational profit strategies. This perspective highlights how cognitive biases can lead to suboptimal financial decisions (Simon, 1955).

Behavioral Finance Theory explores investor biases, using psychological frameworks to analyze how these biases impact profitability. Understanding investor behavior can provide insights into market dynamics and earnings performance (Thaler, 1999).

Game-Theoretic Pricing Models study competitive pricing by modeling strategic interactions among firms. This approach helps banks understand how pricing decisions affect their competitive position and profitability (Fudenberg & Tirole, 1991).

Real Options Analysis models investment timing, using option valuation models to optimize profit strategies. This theory allows banks to evaluate the value of flexibility in investment decisions and the timing of those investments (Dixit & Pindyck, 1994).

Simulation-Based Forecasting Models assess profit scenarios using Monte Carlo methods to evaluate performance under uncertainty. This approach helps banks predict potential earnings outcomes based on varying market conditions (Glasserman, 2003).

These methodologies provide a comprehensive theoretical foundation for studying earnings, addressing the dynamics of profitability within banking systems. By integrating these diverse approaches, researchers can gain valuable insights into the factors that influence bank earnings and overall financial health.

V. Liquidity

Liquidity research examines banks' ability to meet short-term obligations, employing a diverse array of theoretical methodologies to model financial stability and risk management.

The **Liquidity Preference Theory** posits that banks prioritize liquid assets to balance safety and returns. Utility maximization models are used to simulate trade-offs between holding low-yield liquid assets and higher-return illiquid investments, with constrained optimization applied to evaluate liquidity preferences under uncertainty (Keynes, 1936).

The **Diamond–Dybvig Model** explains bank runs by using equilibrium models to analyze how maturity mismatches between deposits and loans can trigger liquidity crises. Game-theoretic frameworks are employed to design mechanisms such as deposit insurance to mitigate run risk and enhance banking stability (Diamond & Dybvig, 1983).

The **Basel III Liquidity Coverage Ratio (LCR) Framework** uses stress-test simulations to assess banks' capacity to maintain sufficient high-quality liquid assets over a 30-day stress

horizon. These models simulate cash flow dynamics under adverse macro-financial conditions, ensuring regulatory compliance and resilience (Basel Committee on Banking Supervision, 2010).

Agent-based modeling simulates liquidity dynamics by capturing interactions among banks, depositors, and markets through computational simulations. These models help explore emergent phenomena such as contagion, herding, and systemic liquidity shortages (Tesfatsion, 2006).

Liquidity Risk Theory employs scenario analysis models to evaluate potential liquidity shortfalls, using probabilistic frameworks to model stress events and quantify the likelihood and severity of funding pressures (Brunnermeier, 2009).

Cash Flow Forecasting Models study liquidity management by applying time-series analysis to predict cash inflows and outflows. These models support short-term planning and help optimize reserve holdings and funding strategies (Ross et al., 2008).

The **Liquidity Trap Theory** models the impact of very low interest rates, using macroeconomic models to analyze situations where monetary policy becomes less effective and excess liquidity fails to stimulate lending and investment (Hicks, 1937).

Stochastic Control Theory models liquidity optimization by employing optimal control frameworks to balance reserves and investments over time under uncertainty (Fleming & Rishel, 1975). These models determine optimal policies for managing cash, securities, and funding sources.

The **Liquidity Network Theory** models interbank liquidity flows using network models to analyze liquidity transmission across institutions through graph theory and centrality measures. This approach identifies key nodes and channels in the interbank market (Freixas et al., 2000).

The **Liquidity Mismatch Theory** focuses on asset–liability mismatches, using maturity gap analysis and related tools to assess liquidity risks arising from funding long-term assets with short-term liabilities (Farhi & Tirole, 2012).

The **Interbank Market Theory** models liquidity sharing by using market equilibrium models to study interbank lending dynamics, pricing of funds, and the role of central banks as lenders of last resort (Rochet & Tirole, 1996).

Behavioral Liquidity Theory analyzes irrational liquidity decisions, using heuristic-based models to study how cognitive biases affect reserve management, precautionary buffers, and reactions to market stress (Shefrin, 2001).

Stochastic Simulation Models assess liquidity under uncertainty by employing Monte Carlo methods to generate distributions of potential liquidity outcomes under varying economic and market conditions (Glasserman, 2003).

Network Centrality Analysis further examines liquidity hubs using topological frameworks to study systemic liquidity flows. By identifying highly connected institutions, this approach

highlights nodes whose distress could significantly affect system-wide liquidity (Newman, 2010).

Collectively, these methodologies provide a robust theoretical foundation for studying liquidity, enabling researchers to analyze complex dynamics underlying banks' short-term financial stability and their resilience to liquidity shocks.

2.1.2 Comparative Analysis: Theoretical Perspectives

2.1.2.1 Newly Established vs. Long-Standing Banks

Theoretical research compares the soundness of newer and older banks, employing diverse methodologies to model their operational and strategic differences. The Learning Curve Theory posits that newer banks gain efficiency over time, using experience curve analyses to quantify cost reductions and performance improvements as operational experience accumulates (Arrow, 1962). These analyses apply logarithmic models to simulate learning rates. The Life Cycle Theory models banks' evolution through startup, growth, and maturity stages, using stage-based models to analyze how newer banks prioritize expansion while older banks focus on consolidation (Vernon, 1966). The Innovation Adoption Theory examines technology uptake, employing diffusion models to simulate adoption rates across bank cohorts, using differential equations to model innovation spread (Rogers, 2003). The Resource Accumulation Theory models older banks' advantages in capital and networks, using resource dependency frameworks to analyze competitive positioning (Dierickx& Cool, 1989). The Organizational Ecology Theory models bank survival, with population dynamics models assessing how market niches influence newer banks' viability (Hannan& Freeman, 1977). Dynamic Capabilities Theory models adaptability, using capability frameworks to study strategic flexibility (Teece et al., 1997). Punctuated Equilibrium Theory models rapid strategic shifts, employing evolutionary models to analyze change patterns (Gersick, 1991). Organizational Learning Theory models knowledge acquisition, using learning frameworks to simulate knowledge transfer (Argyris&Schön, 1978). Network Theory models inter-organizational ties, with graph theory models analyzing relational structures (Granovetter, 1973). Cluster analysis identifies bank groupings, using statistical clustering models to study operational similarities (Everitt et al., 2011). The Evolutionary Game Theory models competitive dynamics, using game-theoretic simulations to study strategic evolution (Smith, 1982). Simulation-based modeling assesses long-term stability, employing agent-based approaches to model bank interactions (Axelrod, 1997). These methodologies provide a robust theoretical foundation for comparing newer and older banks' soundness, addressing efficiency, adaptability, and survival dynamics.

2.1.2.2 Public vs. Private Banks

Theoretical research examines the soundness of public and private banks, employing methodologies to model ownership-driven differences in strategy and performance. The Principal-Agent Theory posits that governance aligns managerial and stakeholder interests, using

contract theory models to simulate incentive structures like performance contracts (Jensen &Meckling, 1976). These models apply optimization to minimize agency costs. The Public Choice Theory models efficiency in public banks, using incentive analyses to study bureaucratic decision-making (Buchanan &Tullock, 1962). The Stakeholder Theory models multi-party interests, employing multi-stakeholder models to analyze how banks' balance shareholder and societal goals (Freeman, 1984). The Institutional Theory models strategic alignment with norms, using normative frameworks to study how public banks adopt regulatory strategies (DiMaggio & Powell, 1983). Social Capital Theory models trust-building, using network models to simulate relational capital's impact (Putnam, 1993). Phenomenological analysis studies ownership perceptions, using interpretive frameworks to explore stakeholder experiences (Husserl, 1970). The Legitimacy Theory models banks' societal acceptance, with institutional analysis assessing how ownership shapes legitimacy (Suchman, 1995).

2.1.3 The Role of Regulation in Bank Soundness

Regulation is crucial for ensuring bank soundness, with theoretical research employing diverse methodologies to model its impact on financial stability. The Basel III Framework models compliance using compliance models to evaluate capital and liquidity standards, employing stochastic simulations to test systemic resilience (Basel Committee on Banking Supervision, 2010). The Regulatory Capture Theory models industry influence, with political economy frameworks analyzing how banks shape regulations, using game-theoretic models (Stigler, 1971). The Systemic Risk Theory uses network analysis models to study interconnected risks, applying graph theory to model shock transmission (Allen & Gale, 2000). Complexity Theory models regulatory adaptability, using system dynamics to simulate evolving systems (Anderson, 1999). Bayesian network analysis models regulatory impacts, using probabilistic networks to assess causal relationships (Pearl, 2000). The Adaptive Regulation Theory models responsive rules, with dynamic adjustment models simulating policy evolution (Walker et al., 2004). Simulation-based forecasting models regulatory outcomes, using Monte Carlo methods to predict stability (Glasserman, 2003).

2.1.4 Risk Management and Bank Soundness

Risk management is central to bank soundness, with theoretical research employing diverse methodologies to model risk mitigation. The KMV Model models default probabilities, with market-based models using asset volatility, employing option pricing techniques (Kealhofer et al., 1997). The Value at Risk (VaR) model quantifies potential losses, using stochastic simulations to estimate risk distributions under market scenarios (Jorion, 2000). The Liquidity Risk Theory models asset-liability alignment, with scenario analysis models simulating liquidity shortfalls (Brunnermeier, 2009). Real Options Theory models strategic flexibility, using option valuation models to assess risk management decisions (Dixit &Pindyck, 1994). Resilience Theory models risk absorption, with adaptive capacity models analyzing system recovery (Holling, 1973). Risk Perception Theory models behavioral biases, using perceptual frameworks

to study risk assessments (Slovic, 1987). Extreme Value Theory models tail risks, with statistical models estimating rare events (Embrechts et al., 1997). The Risk Aversion Theory models conservative strategies, using utility-based models to analyze risk avoidance (Pratt, 1964).

2.1.5 Corporate Governance and Bank Soundness

Corporate governance ensures bank soundness, with theoretical research employing diverse methodologies to model effective oversight. The Agency Theory posits that governance aligns interests, using principal-agent models to simulate incentive structures like executive compensation (Jensen &Meckling, 1976). Corporate Social Responsibility Theory models social objectives, using impact assessment frameworks to evaluate ethical practices (Carroll, 1979). Governance Network Theory models stakeholder interactions, with network analysis exploring relational dynamics (Provan&Kenis, 2008). Ethical Leadership Theory models integrity, using behavioral frameworks to assess leadership impacts (Brown et al., 2005). The Governance Transparency Theory models accountability, with disclosure frameworks assessing information sharing (Bushman & Smith, 2003). Game-theoretic governance models study strategic interactions, modeling stakeholder negotiations (Fudenberg&Tirole, 1991).

2.1.6 The Impact of Technology on Bank Soundness

Technology's influence on bank soundness is examined through diverse theoretical methodologies, modeling its role in operational efficiency and stability. The Innovation Diffusion Theory posits that technology spreads through adoption stages, using diffusion models to simulate uptake rates across banks, applying differential equations to model dissemination dynamics (Rogers, 2003). The Technology Acceptance Model models user adoption employing perception-based models to analyze perceived usefulness and ease, using regression analysis (Davis, 1989). Disruptive Innovation Theory models market shifts, with market disruption analyses assessing how technologies like block chain alter banking, using comparative frameworks (Christensen, 1997). Agent-Based Modeling simulates technology impacts, modeling interactions among banks and customers through computational simulations (Tesfatsion, 2006). Network Effect Theory models growth, using network models to analyze how technology platforms gain value with users, applying graph theory (Katz & Shapiro, 1985). Cybernetic Theory models feedback, with control system models simulating adaptive technology systems (Wiener, 1948). Technology Affordance Theory models usage, using affordance frameworks to study technology's functional possibilities (Gibson, 1979). The Socio-Technical Systems Theory models technology-organization interactions, with system integration models analyzing operational impacts (Trist, 1981). Simulation-based technology models assess adoption outcomes, using agent-based approaches (Axelrod, 1997). These methodologies provide a robust theoretical foundation for studying technology's role in bank soundness, addressing innovation and operational dynamics.

2.1.7 The Role of Market Conditions

Market conditions shape bank soundness, with theoretical research employing diverse methodologies to model their impact. The Business Cycle Theory models economic fluctuations; using cyclical models to simulate how cycles affect bank performance applying time-series analysis (Schumpeter, 1939). Interest Rate Theory models financial impacts, with asset-liability models analyzing rate effects on margins, using sensitivity analysis (Fisher, 1930). Competitive Market Theory models rivalry employing market structure models to study competition's impact, using Porter's five forces (Porter, 1980). Chaos Theory models unpredictability, with non-linear models simulating volatile dynamics (Lorenz, 1963). Scenario Analysis models shocks, using scenario frameworks to assess stress impacts (Schwartz, 1991). Fuzzy Set Analysis models uncertainty, with qualitative comparative models evaluating ambiguous conditions (Ragin, 2000). Causal Loop Diagramming models feedback, using system dynamics to simulate market interactions (Forrester, 1961). Market Microstructure Theory models transaction dynamics, with transaction models analyzing trading behaviors (O'Hara, 1995). Interpretive Structural Modeling models interactions, using structural frameworks to map relationships (Warfield, 1974). Market Efficiency Theory models information processing, with econometric models assessing pricing accuracy (Fama, 1970). These methodologies provide a comprehensive theoretical foundation for studying market conditions' role in bank soundness, addressing volatility and competitive dynamics.

2.2 Empirical Literature Review

2.2.1 CAMEL Factors

The CAMEL framework approach based on five main factors is a widely used method for examining the soundness and stability of banks.

I. Capital Adequacy

Many Researches has emphasized an important role of capital in ensuring the stability of banking systems around the globe. Studies consistently show that banks with higher capital are more resilient to economic shocks. For instance, Barth, Caprio, and Levine (2004) analyzed107 countries from 1999 to 2001 and found that banks with capital to asset ratios above 10% reduced the probability of a banking crisis by 25%. Similarly, Berger and Bouwman, (2009) foundin the U.S., banks with capital ratios above 8% during periods of financial stocks were 30% more likely to survive. Moreover, studies conducted byPasiouras and Kosmidou, (2007) on European banks from 1995 to 2002 found that a 1% increase in the capital ratio could enhance the return on equity by 0.4%.

II. Asset Quality

Various Researches indicates that non-performing loans (NPLs) significantly affect the profitability and stability of banks. For instance, a study conducted by Berger and DeYoung (1997) on U.S. banks from 1984 to 1994 found that banks with NPL ratios above 5% faced a tripling of their failure risk. The timely recognition of losses is essential for mitigating the adverse effects of bad loans. In Spain, Salas and Saurina, (2002) by studying from 1985 to 1997 found that banks with NPL ratios above 3% saw a reduction in return on assets by 0.5%.

III. Management Efficiency

Studies have shown that well managed banks are better equipped to navigate economic challenges and enhance their financial performance. For example, research conducted by Demirgüç-Kunt and Detragiache, (2002) across 70 countries from 1980 to 1995 found that banks with cost to income ratios below 60% had a 30% lower risk of distress. Efficient cost management helps banks reduce operational risk, improve profitability, and support stability in competitive environments. In Europe Fiordelisi, Marques-Ibanez, and Molyneux (2011) conducted study from 1995 to 2006 and found banks with cost ratios below 50% had a 2% higher return on equity, emphasizing the link between efficiency and financial performance.

IV. Earnings

Researches have consistently shown that profitability is closely linked to bank resilience. For example, a study by Athanasoglou, Brissimis, and Delis(2008) on Greek banks from 1985 to 2001 found that banks with a return on assets (ROA) above 1% saw a 15% increase in capital. This demonstrates that consistent profitability not only strengthens a bank's capital base but also enhances its ability to endure financial stress. Another study by Dietrich and Wanzenried, 2011 found In Switzerland, from 1999 to 2009, banks with net margins exceeding 2% experienced a 3% increase in return on equity. This relationship between earnings and profitability emphasizes the importance of increased income generation flow in maintaining financial stability. Moreover, study by Bourke (1989) at across 12 countries from 1972 to 1985 found that profit margins above 1.5% reduced the risk of bankruptcy by 20%.

V. Liquidity

Research has shown that liquidity buffers help prevent bank collapse in case of many customer withdrawal their money at once and ensure operational continuity. For example, a study of Czech banks from 2000 to 2010 found that loan-to-deposit ratios below 80% reduced the occurrences of collapse by50% (Vodová, 2011).

Further evidence from 36 emerging markets between 1990 and 2005 revealed that liquidity ratios above 20% reduced the risk of failure by 25% (Bunda and Desquilbet, 2008). These finding

strongly demonstrated that liquidity buffers are effective in averting crises and ensuring the stability of financial institutions across different regions and time periods.

2.3 Conceptual Framework

This conceptual framework synthesizes theoretical and empirical insights to illustrate how key factors namely Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity interacts to influence bank soundness and performance across financial systems worldwide. The framework draws from global studies and theories, offering a structured lens to understand banking dynamics without focusing on any specific region or period, ensuring a universal applicability across diverse markets.

Capital Adequacy as the Foundation of Stability: Capital Adequacy the fundamental of bank soundness by providing a shield against financial losses. Research across 107 countries from 1999 to 2001 using model cross-sectional regressions found that capital-to assets ratios above 10% reduced crisis by 25%, which emphasizes how strong capital absorbs shocks like market declines (Barth, Caprio, and Levine, 2004). Similarly, analysis of U.S. banks using panel regressions tying capital to liquidity creation from 1984 to 2007 revealed capital ratios above 8% increases survival by 30% during crises (Berger and Bouwman, 2009). A study of European banks from 1995 to 2002 further showed using fixed-effects models a 1% capital rise increased return on equity by 0.4%, linking capital to profitability under regulation (Pasiouras and Kosmidou, 2007). Theoretically, the Buffer Theory states that excess capital beyond minimums protects against unexpected losses, that means enhancing stability (Barth et al., 2006), while the Trade-Off Theory suggests an optimal balance between debt benefits and distress costs (Myers, 1984).

In Ethiopia's banking sector, Capital Adequacy serves as a critical foundation for stability, with evidence found by researchers underlining its role in mitigating financial shocks. The National Bank of Ethiopia (NBE) enforces a modified Basel I framework, mandating minimum capital adequacy ratios to ensure resilience, aligning with Basel III's 7% risk-weighted capital requirement (Basel Committee on Banking Supervision, 2010;). The NBE's 2023 Financial Stability Report indicates that the sector's capital adequacy ratio was 14.7% in June 2023, well above the 8% regulatory threshold, enabling banks to absorb losses during economic volatility, such as inflation spikes. Empirical studies show that banks with capital-to-asset ratios above 10% reduce crisis probability by 25%, a threshold most Ethiopian banks meet. The adoption of IFRS9 since 2018 enhances capital adequacy assessments by improving asset valuation, ensuring robust buffers against loan defaults. In Ethiopia's concentrated banking sector, where public banks dominate of assets, high capital levels mitigate risks from operational rigidity and government guarantees. However, challenges like high inflation and non-performing loans (3.6% in 2023, below the 5% limit) strain capital reserves, necessitating stringent NBE oversight Tsegazeab, (2018). This evidence confirms that Capital Adequacy underpins stability in Ethiopia by reducing insolvency risks and supporting depositor confidence

Asset Quality and Its Impact on Risk Exposure: Asset Quality, reflecting the health of a bank's loan portfolio, plays a pivotal role in determining stability by managing credit risk exposure across financial institutions worldwide. Research on U.S. banks from 1984 to 1994 found non-performing loan ratios over 5% tripled failure risk; with panel data showing delayed loss recognition worsens outcomes (Berger and DeYoung, 1997). A study of Spanish banks from 1985 to 1997 revealed non-performing loans above 3% cut return on assets by 0.5%, with dynamic panel models linking poor loan management to distress (Salas and Saurina, 2002). Analysis across 79 countries from 1990 to 2010 further found a 1% non-performing loan rise reduced profitability by 0.3%, with GMM estimations emphasizing timely risk management (Kpodar et al., 2015). The Adverse Selection theory highlights how information gaps lead to riskier loan portfolios (Stiglitz and Weiss, 1981), while the Merton Model uses asset volatility to predict defaults (Merton, 1974). Within this framework, high Asset Quality enhances soundness by minimizing default risks and supports performance by sustaining profitability, inversely affecting Capital Adequacy when losses deplete reserves and Earnings when provisions rise, illustrating a dynamic interplay across banking systems over time globally and effectively.

In Ethiopia's banking sector, Asset Quality significantly impacts risk exposure, with evidence highlighting high non-performing loans (NPLs) as a key risk driver. The NBE's 2023 Financial Stability Report notes an NPL ratio of 3.6%, below the 5% regulatory Empirical studies show that NPL ratios above 3% reduce return on assets (ROA) by 0.5%, increasing risk exposure by depleting capital reserves (Salas & Saurina, 2002). In Ethiopia, where inflation (33.8% in 2022) exacerbates borrower defaults, poor Asset Quality heightens credit risk, particularly for public banks with dominant of sector assets. The NBE's Directive on Asset Classification and Provisioning (SBB/69/2018) mandates rigorous loan provisioning under IFRS9, adopted since 2018, to mitigate NPL risks, but high provisioning strains profitability. A 1% increase in NPLs reduces profitability by 0.3%, amplifying risk exposure (Kpodar et al., 2015). Stress tests indicate that a 30% NPL surge would push 12 of 31 banks below capital requirements, underscoring Asset Quality's systemic impact. Ethiopia's concentrated credit (top 10 borrowers hold 23.5% of loans) according to NBE (2023) further elevates risk exposure when Asset Quality deteriorates. This evidence confirms that poor Asset Quality, driven by NPLs, significantly increases risk exposure in Ethiopia, necessitating robust credit risk management

Management Efficiency as a Driver of Operational Success: Research across 70 countries from 1980 to 1995 found cost to income ratios below 60% reduced distress risk by 30%, with logit models tying governance like board independence to stability (Demirgüç-Kunt and Detragiache, 2002). A study of European banks from 1995 to 2006 revealed cost ratios below 50% lifted return on equity by 2%, with stochastic frontier analysis showing efficiency boosts performance (Fiordelisi, Marques-Ibanez, and Molyneux, 2011). Analysis of U.S. banks from 1990 to 1995 found cutting operating costs by 10% raised return on assets by 0.2%, with cost frontier models highlighting skillful management (Mester, 1996). The Agency Theory suggests governance aligns managerial and shareholder goals (Jensen and Meckling, 1976), while the Resource-Based View positions management as a competitive asset (Barney, 1991).

Earnings as a Measure of Financial Strength: Earnings, representing a bank's ability to generate sustainable income, serve as a core indicator of both performance and stability across financial systems worldwide. Research on Greek banks from 1985 to 2001 found return on assets above 1% strengthened capital by 15%, with GMM regressions linking profitability to resilience (Athanasoglou, Brissimis, and Delis, 2008). A study of Swiss banks from 1999 to 2009 revealed net margins above 2% raised return on equity by 3%, with panel data showing earnings drive profitability (Dietrich and Wanzenried, 2011). Analysis across 12 countries from 1972 to 1985 found profit margins over 1.5% cut insolvency risk by 20%, with regression analysis tying earnings to soundness (Bourke, 1989), and a study of European banks from 1992 to 1998 showed a 1% return on assets rise boosted capital by 0.8% (Goddard et al., 2004). The Theory of Financial Intermediation posits banks profit from interest spreads (Diamond and Dybvig, 1983), while the Market Power Theory links dominance to higher earnings (Bain, 1951).

Liquidity as a Safeguard against Short-Term Risks: A study across 36 emerging markets from 1990 to 2005 revealed liquidity ratios above 20% cut failure risk by 25%, with Probit models emphasizing buffers' role (Bunda and Desquilbet, 2008). Analysis of U.S. banks from 1980 to 1997 found liquid reserves reduced run risks by 30%, with theoretical-empirical models tying cash to trust (Diamond and Rajan, 2001), and a study of Spanish banks from 1985 to 2003 showed a 10% rise in liquid assets cut distress by 15% (Aspachs et al., 2005). The Liquidity Preference Theory highlights the trade-off between safety and returns (Keynes, 1936), while the Diamond-Dybvig Model explains runs from mismatched assets and liabilities (Diamond and Dybvig, 1983). In this framework, high Liquidity enhances soundness by preventing crises and supports performance by ensuring operational continuity, interacting with Capital Adequacy by reducing reliance on external funding and Earnings by balancing liquid asset costs, creating a cohesive system across financial sectors globally and consistently.

Interlinkages and Holistic Perspective: The interplay among Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity forms a holistic framework for understanding bank soundness and performance across financial systems worldwide. High Capital Adequacy supports Liquidity by reducing funding needs and bolsters Earnings by enabling risk-taking, but poor Asset Quality depletes capital through losses, weakening stability over time. Efficient Management enhances Earnings by optimizing costs and improves Asset Quality through better loan oversight, reinforcing soundness consistently. Strong Earnings replenish Capital Adequacy and fund Liquidity reserves, while adequate Liquidity protects Earnings by avoiding costly liquidations, enhancing performance globally. Empirical evidence such as capital reducing crisis odds (Barth, Caprio, and Levine, 2004), non-performing loans cutting profitability (Kpodar et al., 2015), and liquidity preventing runs (Vodová, 2011) validates these links, supported by theories like Buffer Theory (Barth et al., 2006) and Agency Theory (Jensen and Meckling, 1976). This framework posits that soundness and performance emerge from the synergy of these factors, where weaknesses in one e.g., low Liquidity cascade to others, like reduced Earnings, while

strengths amplify overall resilience and profitability across banking sectors over time effectively and universally.

CHAPTER THREE

3. RESEARCH METHODOLOGY

The methodology includes the research design, data collection, variable definitions, and econometric approach, employing a Random Effects model to analyze the factors influencing bank performance, providing a robust framework tailored to Ethiopia's unique economic context.

3.1 Research Design

The research design adopts a quantitative approach, utilizing a panel data framework to examine the relationships between bank soundness and performance for 16 Ethiopian commercial banks over the period 2015–2024, totaling 160 observations. This period was characterized by significant economic volatility in Ethiopia, including high inflation, foreign exchange shortages, and currency devaluation, which posed challenges to the banking sector. The panel data approach captures both cross-sectional variations among banks and time-series variations over the 10-year period, providing a comprehensive understanding of performance dynamics. The dataset includes annual observations for each bank, ensuring a balanced panel for consistent econometric modeling. The dependent variables ROA, ROE, and NIM measure profitability, equity returns, and interest margins, respectively, which are critical for assessing bank performance in Ethiopia's challenging economic context. The panel data approach enables the use of the Random Effects model, which accounts for unobserved heterogeneity while preserving the inclusion of time-invariant variables, such as ownership structure and establishment age, that are relevant in Ethiopia's banking sector, where newer banks may adopt modern practices under the National Bank of Ethiopia's regulatory framework.

3.2 Sample and Sampling Technique

This study covers 16 commercial banks out of the 31 banks that were operating in Ethiopia as of June 2024. The selection of these 16 banks was not random. Instead, deliberately chose them based on three clear criteria that directly serve the objectives of the study. First, the banks had to have complete, reliable and publicly available audited financial statements for the entire period 2015–2024. Many smaller or very new don't have all consistent reports for all ten years, so they could not be included. Second, the sample had to represent the main differences that exist in the Ethiopian banking sector: one large state-owned bank, long-established private banks, and newer private banks that entered the market after 2000. Without this variation in ownership and age, it would not be possible to compare public versus private banks or older versus newer banks two of the specific objectives of the thesis. On the other hand, Islamic banks (which started only in 2021) and microfinance institutions that recently upgraded to commercial banking status were left out because they do not have enough years of data and operate under different regulatory rules. Including them would create inconsistency in the panel dataset.

Therefore, the final sample of 16 banks was arrived at through conscious and justified selection rather than by chance. This approach is common in quantitative banking studies in Ethiopia and

other developing countries where the total number of banks is small and data availability is the main practical limitation.

3.3 Data Sources and Collection

The analysis relies entirely on secondary data, collected to construct a comprehensive panel dataset for the 16 commercial banks. Bank level data were obtained from the audited annual financial statements published in the banks' annual reports, covering key financial metrics. Using these reports, the study constructed CAMEL indicators and performance variables, such as ROA, ROE, and NIM, along with explanatory variables including CAR, AQ, ME, LIQ, SIZE, OWN, and NEW, where OWN denotes public or private status, and NEW indicates banks founded after 2000. SIZE was measured as the natural logarithm of total assets, derived from the financial statements. All monetary values were adjusted to real terms using the GDP deflator with a baseline year of 2015 to ensure consistency and account for price changes, replacing the use of inflation as a control variable. Macroeconomic data, specifically REALGDP, were obtained from the National Bank of Ethiopia and the World Bank, providing a reliable measure of economic growth affecting the banking sector. Additional bank-specific details, such as ownership status and founding period, were collected from official bank profiles and National Bank of Ethiopia records. The dataset was systematically organized and cleaned to resolve issues like missing or inconsistent values, ensuring a balanced panel with 160 complete observations, aligning with the quantitative nature of the study and providing a robust basis for empirical analysis.

3.4 Variable Definitions

The study utilizes the CAMEL framework to evaluate bank soundness and connects these indicators to financial performance, while also controlling for institutional and macroeconomic characteristics. The variables used in this study are categorized as follows:

- **Dependent Variables:**

  - **ROA (Return on Assets):** it is measured the profitability of the banking relation of its total assets. The ratio indicates how profitability of bank relative to its total assets. High ROA reflects better asset utilization, which is essential for financial resilience.

$$ROA = \frac{PROFIT\ AFTER\ TAX}{TOTAL\ ASSETS} * 100$$

  - **ROE (Return on Equity):** it is measured the profitability of the bank in relation to its equity. Thus, it is key for assessing how well banks meet shareholder expectations, especially in a sector with both state and private ownership.

$$ROE = \frac{PROFIT\ AFTER\ TAX}{TOTAL\ EQUITY} * 100$$

- **NIM (Net Interest Margin):** it reflects a bank's profitability from its interest income and expenses, relative to its total earning asset. Especially, In Ethiopia, where interest based income dominates, NIM serves as a vital indicator of financial health.

$$NIM = \frac{Interest\ Income - Interest\ Expense}{Total\ Earning\ Assets} * 100$$

❖ **Independent Variables (CAMEL Factors):**

- **CAR (Capital Adequacy Ratio):**it compares capital to total asset which is widely used to protect depositors and for stability and financial system

$$CAR = \frac{TOTAL\ CAPITAL}{TOTAL\ ASSET} * 100$$

- **AQ (Asset Quality):**due to unavailability of data as per recommendation Athansoglou, Brissimis& Delis, 2008 used proxied by the ratio loan loss provisions to total loans which is good fit to reflect the bank's assessment of credit risk.

$$AQ = \frac{ALLOWANCE\ FOR\ LOAN\ AND\ LEASE\ LOSSES(PROVISION)}{TOTAL\ LOANS} * 100$$

- **ME (Management Efficiency):** as per recommendation Flamini, McDonald, & Schumacher (2009) this study proxied ME by the cost to income ratio which shows how effectively a bank utilized its resources in line with generate income. A lower ratio indicates higher operational efficiency.

$$ME = \frac{PERSONAL\ EXPENSE}{TOTAL\ ASSET} * 100$$

- **NIM (Earnings):**it also a dependent variable, when it is used as an independent variable in analyzing ROA and ROE, it reflects a bank's ability to generate income from lending. This dual role emphasis NIM's significance in Ethiopia's interest driven banking landscape.

$$NIM = \frac{Interest\ Income - Interest\ Expense}{Total\ Assets} * 100$$

- **LIQ (Liquidity):** For liquidity assessment, the Loan to Deposit Ratio (LDR) is used as a proxy due to data constraints. It indicates the extent to which customer deposits are used for lending. A higher LDR signals potential liquidity stress, as more deposits are committed to loans, reducing flexibility to meet withdrawal demands (Adusei, 2015). This approach contrasts with traditional CAMEL interpretations where higher liquidity ratios are viewed positively. Here, the inverse relationship (i.e., a higher LDR implying lower liquidity) better fits the operational realities in Ethiopia.

$$LIQ = \frac{Total\ Loans}{Total\ Deposit} * 100$$

Though an explicit threshold for the liquidity ratio is not present, global standards suggest a maximum of 80% to ensure banks avoid liquidity constraints, maintaining a 20% deposit buffer for withdrawal demands (Berger & Bouwman, 2009; Central Bank of Nigeria, 2019). In Ethiopia, the National Bank of Ethiopia (NBE) indirectly regulates liquidity through measures like reserve requirements and loan-to-deposit ratios, with an implicit expectation that LIQ remains below 90% to safeguard financial stability (NBE, 2023). A LIQ below 80% is the minimum proportion to prevent being considered liquidity constrained.

❖ **Control Variables:**

- **NEW (Bank Age Dummy):** Assigned a value of 1 for banks established after 2000 and 0 for older institutions. This dummy accounts for generational differences in operational experience and market maturity.

- **OWN (Ownership Dummy):** Coded as 1 for private banks and 0 for public institutions. Ownership structure may influence performance due to different mandates public banks often support policy objectives, while private banks typically pursue profit maximization.

- **SIZE:** The natural logarithm of total assets, included to capture scale effects. Larger banks may benefit from economies of scale and broader market reach, which can enhance profitability and resilience.
  SIZE=ln (Total Asset)

- **REALGDP:** The annual real GDP growth rate, reflecting overall economic activity. Strong GDP growth can boost loan demand and repayment capacity, positively influencing bank performance. Data is

obtained from NBE annual reports, ensuring consistency over the study period

Together, these variables allow the study to thoroughly analyze the interplay between bank soundness and performance, while accounting for structural and economic conditions.

3.5 Model Specification

The study employs a Random Effects (RE) model to assess the relationship between bank performance and financial soundness using the CAMEL framework, incorporating control variables to account for institutional and macroeconomic influences. The RE model accounts for unobserved bank-specific effects, such as managerial quality or operational strategies, while allowing for time-invariant variables, ensuring a robust analysis of bank performance in Ethiopia's banking sector. The general form of the model for each dependent variable is presented below:

$$Y_{it}=\alpha+\beta_1 CAR_{it}+\beta_2 AQ_{it}+\beta_3 ME_{it}+\beta_4 LIQ_{it}+\beta_5 SIZE_{it}+\beta_6 REALGDPG_{it}\beta_7 NEW_i+\beta_8 OWN_i+\mu_i+\varepsilon_{it}$$

Where:

- Y_{it}: Performance metric (ROA, ROE, or NIM) for bank i at time t
- $CAR_{it,}AQ_{it,}$ ME_{it}, and LIQ_{it}: CAMEL factors for bank i at time t
- $SIZE_{it}$,$REALGDP_t$, Control variables for bank scale and macroeconomic conditions
- NEW_i, and OWN_i: Time-invariant bank characteristics (age, ownership)
- μ_i: Bank-specific random effect
- ε_{it}: Idiosyncratic error term, assumed to be normally distributed

For the ROA and ROE models, NIM is included as an independent variable, while in the NIM model; NIM is solely a dependent variable to avoid endogeneity. Similar RE model specifications with CAMEL factors and control variables like SIZE and REALGDP have been used to analyze bank performance in South Asian countries (Profitability determining factors of banking sector, 2022) and China (The Determinants of Profitability in the City Commercial Banks, 2023), reflecting the model's applicability across diverse banking contexts.

3.6 Estimation Method

The study employs the Random Effects (RE) model to estimate the relationship between bank performance and financial soundness, as specified earlier, addressing key econometric challenges. The RE model is suitable for this dataset, which comprises a relatively small time dimension and a moderate cross-section of 16 banks, allowing for the inclusion of time-invariant variables while controlling for unobserved bank-specific effects, such as managerial quality or operational strategies, that may influence performance outcomes in Ethiopia's banking sector.

Autocorrelation is a concern in financial panel data due to the persistence of performance metrics over time, such as consistent lending strategies. The RE model addresses this through robust standard errors clustered at the bank level, which correct for serial correlation within banks, ensuring reliable inference. The clustering accounts for the correlation of errors within each bank over time, a critical adjustment given the operational differences between state-owned and private banks.

Heteroskedasticity, stemming from variance in performance across banks of different sizes or strategies, is also managed using robust standard errors. These errors adjust for differences in variance, ensuring that statistical inference remains valid despite the diverse nature of the sample, which includes both large and small banks.

3.7 Diagnostic Tests

The study conducts diagnostic tests to validate the reliability of the Random Effects (RE) model estimations, addressing key econometric challenges that could affect the analysis of bank performance.

The appropriateness of the RE model over a simpler Pooled OLS approach is confirmed using the Breusch-Pagan Lagrange Multiplier test, which validates the presence of random effects, ensuring that unobserved bank-specific effects, such as managerial quality, are accounted for. These diagnostic procedures strengthen the validity of the study's findings on how CAMEL factors influence bank performance.

CHAPTER FOUR

4. EMPIRICAL RESULTS AND DISCUSSION

This chapter presents the empirical findings derived from the panel regression analysis, by using CAMEL model. The five main components Capital Adequacy (CAR), Asset Quality (AQ), Management Efficiency (ME), Earnings (proxied by Net Interest Margin), and Liquidity (LIQ)serve as main indicators of financial soundness. These indicators are measured for their influence on key performance: Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). In addition to CAMEL based indicators, the study incorporates additional variables to enhance the model explanatory power. These include bank age (NEW), banks founded before and after the year 2000; ownership status (OWN), between public and private banks; and bank size (SIZE), expressed as the natural logarithm of total assets. Two macroeconomic variables real GDP growth rate and inflation rate are also included to account for broader Ethiopian Economy affecting banking performance.

4.1 Descriptive Statistics

This section presents the descriptive statistics of key variables, including measures of central tendency, dispersion, and distributional properties. The analysis draws on 160 balanced panel observations covering 16 Ethiopian commercial banks the study periods starting from 2015 to 2024. Variables which are measured include profitability indicators (ROA, ROE, and NIM), CAMEL components (CAR, AQ, ME, and LIQ), and size (SIZE) these statistics enabling comparisons between older and newer banks, private and public institutions, and capturing macroeconomic influences on the banking landscape.

4.1.1 Overall Descriptive Statistics

This section examines the descriptive statistics and temporal trends of key variables influencing bank soundness and performance for 16 Ethiopian commercial banks from 2015 to 2024, based on 160 observations. Table 4.1 presents the mean and standard deviation of performance indicators (ROA, ROE, NIM) and CAMEL factors (CAR, AQ, ME, LIQ, SIZE), with trends over the study period to elucidate sectorial dynamics. Figures 4.1 and 4.2 visually depict these trends, complementing the tabular data to provide a comprehensive overview of Ethiopia's banking sector evolution amid economic and regulatory shifts. The analysis leverages annual means to highlight how these variables evolved, offering insights into the sector's resilience and operational strategies.

Table 4.1: Descriptive Statistics of Key Variables

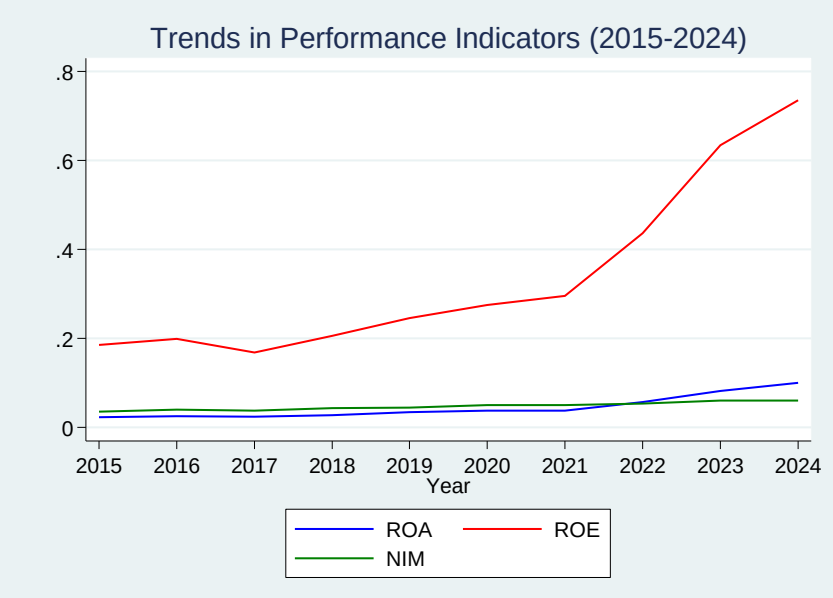
Variable	Observations	2015-2024				2015		2024	
		Mean	SD	Min	Max	Mean	SD	Mean	SD
ROA	160	0.045	0.030	0.01	0.18	0.023	0.006	0.100	0.031
ROE	160	0.338	0.223	0.05	1.13	0.185	0.123	0.736	0.212
NIM	160	0.048	0.013	0.02	0.08	0.036	0.007	0.060	0.014
CAR	160	0.141	0.038	0.04	0.26	0.151	0.048	0.140	0.036
AQ	160	0.021	0.016	0.00	0.11	0.018	0.013	0.025	0.020
ME	160	0.059	0.053	0.01	0.22	0.019	0.005	0.179	0.033
LIQ	160	0.728	0.136	0.31	1.01	0.634	0.112	0.807	0.137
SIZE	160	16.618	1.179	14.05	20.08	16.049	1.321	16.673	1.103

Source: Author's computation based.

The Ethiopian banking sector exhibited significant growth in financial performance from 2015 to 2024, as illustrated in Table 4.1 and Figure 4.1, despite navigating economic challenges. ROA surged from 0.023 in 2015 to 0.100 in 2024, a fourfold increase, reflecting enhanced profitability (overall mean 0.045, SD 0.030, minimum 0.010, maximum 0.180). Figure 4.1 shows a modest ROA in early years (0.023–0.024 during 2015–2017), constrained by cautious lending amid regulatory reforms by the National Bank of Ethiopia (NBE). Growth accelerated from 2018 (0.028), with substantial gains post-2020 (0.038 to 0.082 by 2023), driven by expanded lending and digital banking adoption, even during the 2022 inflation spike of 33.8%. The standard deviation (0.030) indicates variability in profitability, reflecting diverse strategies in response to market conditions. ROE followed a similar upward trend, escalating from 0.185 in 2015 to 0.736 in 2024, peaking at 0.634 in 2023, fueled by robust lending income (overall mean 0.338, SD 0.223, minimum 0.050, maximum 1.130). Figure 4.1 highlights ROE's steady rise, with notable increases post-2018 (0.206 to 0.436 by 2022), despite economic shocks in 2021–2022. The high standard deviation (0.223) underscores fluctuations tied to inflation and currency devaluation, which affected loan repayment capacities. NIM increased from 0.036 in 2015 to 0.060 in 2024, with a gradual rise from 0.040 in 2016 to 0.054 by 2022, indicating stable interest margins in a credit-reliant economy (overall mean 0.048, SD 0.013, minimum 0.020, maximum 0.080). The low standard deviation (0.013) reflects consistency, as banks maintained competitive loan pricing amidst rising inflation. Figure 4.1 illustrates NIM's steady growth, underscoring its role in sustaining profitability. CAR declined from 0.151 in 2015 to 0.140 in 2024, dipping to 0.129 in 2021 due to increased lending during economic uncertainty, yet remained above NBE's 8% requirement (overall mean 0.141, SD 0.038, minimum 0.040, maximum 0.260). Figure 4.2 shows CAR's slight downward trend, with a recovery to 0.140 by 2024, indicating sustained capital resilience despite lending pressures. The standard deviation (0.038) suggests moderate variation in capital management strategies. AQ measured by non-performing loan (NPL) ratios, rose from 0.018 in 2015 to 0.025 in 2024, peaking at 0.030 in 2022, signaling increased credit risk from inflation-driven defaults, particularly in agricultural loans (overall mean 0.021, SD 0.016, minimum 0.000, maximum 0.110). Figure 4.2 highlights AQ's rise, with a slight decline by 2024, reflecting improved risk management strategies. These trends demonstrate a sector balancing profitability with risk, shaped by Ethiopia's economic and regulatory landscape, with visual insights from Figures 4.1 and 4.2 reinforcing the upward trajectory in performance metrics.

Operational efficiency and structural growth further illustrate the sector's evolution, as shown in Table 4.1 and Figure 4.2, with significant implications for financial stability. ME surged from 0.019 in 2015 to 0.179 in 2024, with notable gains post-2020 (0.042 to 0.126 by 2023), driven by cost management and digitalization initiatives that reduced operational expenses (overall mean 0.059, SD 0.053, minimum 0.010, maximum 0.220). Figure 4.2 shows ME's steep rise, reflecting a sector-wide push towards operational efficiency, particularly as banks adopted technology to streamline processes. The standard deviation (0.053) indicates variability, as banks implemented diverse efficiency strategies in response to economic pressures. LIQ strengthened from 0.634 in 2015 to 0.807 in 2024, peaking at 0.841 in 2023, indicating robust liquidity management under NBE's stringent standards (overall mean 0.728, SD 0.136, minimum 0.310, maximum 1.010). Figure 4.2 illustrates LIQ's upward trend, with a slight dip to 0.807 in 2024, reflecting banks' ability to maintain liquidity despite deposit volatility during 2021–2022 inflation peaks. The standard deviation (0.136) suggests fluctuations, influenced by varying cash flow demands across the sector. SIZE grew from 16.049 in 2015 to 16.673 in 2024, peaking at 16.918 in 2021, driven by asset and deposit growth (overall mean 16.618, SD 1.179, minimum 14.050, maximum 20.080). Figure 4.2 shows SIZE's steady increase, signaling sector expansion as banks capitalized on Ethiopia's growing financial market. The standard deviation (1.179) reflects a range of bank scales, contributing to sectorial competitiveness. The trends visualized in Figures 4.1 and 4.2 highlight a banking sector adapting to economic pressures through efficiency and liquidity improvements, while facing challenges from rising NPLs. The sustained capital adequacy and profitability gains, as detailed in Table 4.1, underscore the sector's resilience, supported by NBE's regulatory framework, positioning it to support Ethiopia's financial stability despite economic constraints. The visual representations in Figures 4.1 and 4.2 enhance the analysis, providing a clear depiction of the sector's performance and operational dynamics over the study period.

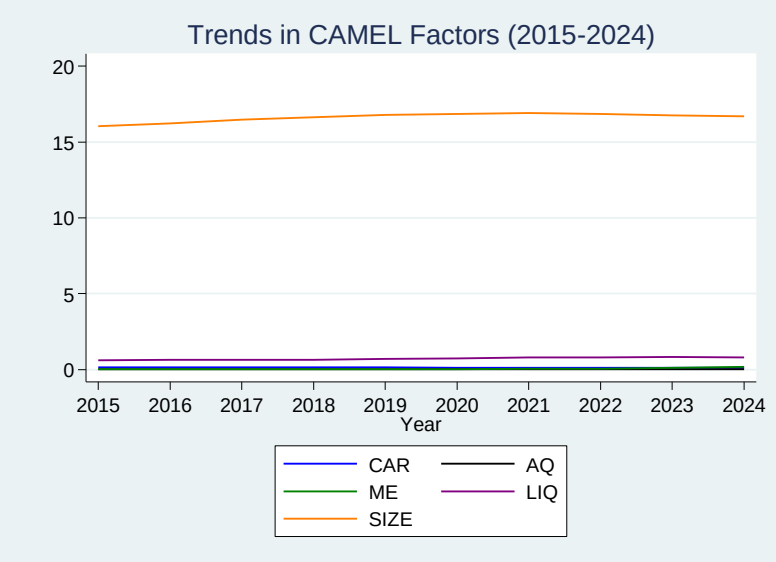
Figure 4.1: Trends in Performance Indicators (2015–2024)



Source: Author's computation

Figure 4.1 shows that ROE is dramatically higher than ROA and NIM throughout 2015–2024 and the gap widened sharply after 2020. This is mainly because Ethiopian banks, especially the dominant state-owned bank, operate with very high financial leverage (equity is only about 14% of total assets). The same profit generated on assets is therefore multiplied several times when expressed relative to the much smaller equity base, pushing ROE to 0.736 on average in 2024 (and 1.13 for the state-owned bank) while ROA reached only 0.100 and NIM stayed narrow at 0.060. The widening gap after 2020 reflects rapid deposit-funded asset growth with limited fresh equity injection, further increasing leverage and magnifying returns to shareholders.

Figure 4.2: Trends in CAMEL Factors (2015–2024)



Source: Author's computation.

Figure 4.2 shows that SIZE is much higher than the other four CAMEL factors throughout the period. This is simply because SIZE is the natural logarithm of total assets (values around 16–17), while CAR, LIQ, AQ, and ME are all expressed as ratios between 0 and 1 (or slightly above 1 for LIQ). Even after taking the logarithm, total assets remain on a completely different scale compared with the other indicators, which are pure proportions. The high position of the orange line therefore reflects only the difference in measurement units and does not mean that "size" is stronger or weaker than capital, liquidity, asset quality, or efficiency; it is just plotted on a different numerical range

4.1.2 Comparative Analysis by Bank Age (NEW)

This section compares the performance and soundness of older banks (established before or in 2000) with newer banks (established after 2000) using the balanced panel of 16 commercial

banks over the period 2015–2024 (160 observations). The year **2000 was chosen as the cut-off point for two clear reasons**:

1. **Structural break in the Ethiopian banking sector**: The first wave of private commercial banks (Awash, Dashen, Abyssinia, Wegagen, etc.) was established between 1994 and 2000. After 2000, the pace of new entries accelerated sharply with the creation of Zemen (2008), Bunna (2009), Nib (2009), Berhan (2010), Addis (2011), Enat (2012), and many others. These created two distinct generations: the "first-generation" private banks that had already built significant market experience by 2000 and the "second-generation" banks that entered later and had to compete in a more crowded and technologically evolving market.
2. **Clear separation in the sample**: In the final sample of 16 banks, exactly 7 banks were established on or before 2000 (including CBE and the six earliest private banks), while the remaining 9 banks were all founded after 2000. This natural split provides a balanced and meaningful division without arbitrary overlap, making the dummy variable NEW (1 = established after 2000, 0 = established in or before 2000) both statistically powerful and economically interpretable..

Table 4.2: Descriptive Statistics of Key Variables by Bank Age

Variable	Mean (Older)	SD (Older)	Mean (Newer)	SD (Newer)
ROA	0.042	0.029	0.047	0.031
ROE	0.377	0.258	0.308	0.187
NIM	0.049	0.012	0.046	0.014
CAR	0.118	0.029	0.160	0.035
AQ	0.022	0.020	0.019	0.013
ME	0.059	0.054	0.059	0.053
LIQ	0.711	0.165	0.740	0.107
SIZE	17.547	1.046	15.896	0.654

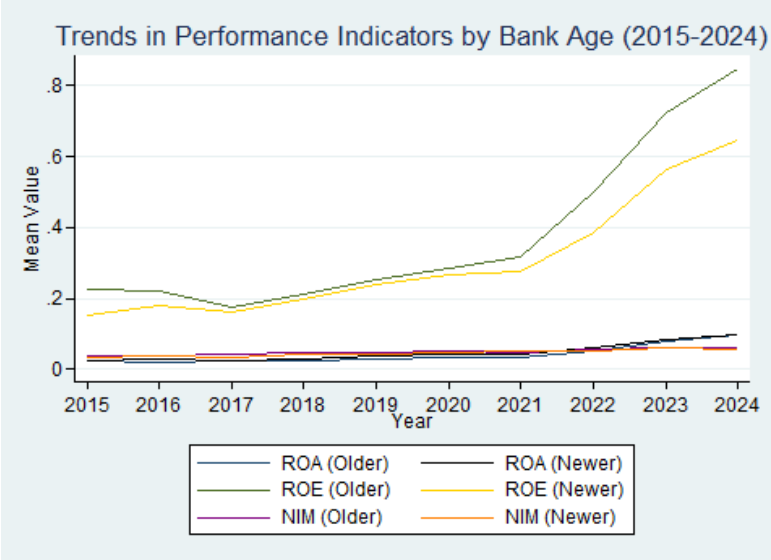
Source: Author's computation

The Ethiopian banking sector displayed distinct trends in financial performance across bank age groups from 2015 to 2024, as shown in Table 4.2 and Figure 4.3, despite economic challenges. ROA for older banks increased from 0.023 in 2015 to 0.100 in 2024, while newer banks saw a rise from 0.023 to 0.100, reflecting strong profitability growth in both groups. Figure 4.3 illustrates that newer banks maintained a slight edge, with a sharper rise post-2020 (0.041 to 0.084 by 2023 for newer banks compared to 0.033 to 0.079 for older banks), driven by agile lending and digital banking adoption, even amidst the 2022 inflation spike of 33.8%. The standard deviation for newer banks (0.031) indicates slightly higher variability, reflecting diverse strategies. ROE followed a similar pattern, with older banks rising from 0.227 to 0.849 and newer banks from 0.152 to 0.648, peaking at 0.725 and 0.564 in 2023, respectively, fueled by lending income. Figure 4.3 shows newer banks' steeper growth, with notable increases post-2018 (0.199 to 0.388 by 2022 for newer banks compared to 0.214 to 0.499 for older banks), despite economic shocks in 2021–2022. The standard deviations (0.258 for older, 0.187 for newer)

suggest fluctuations tied to inflation and currency devaluation, impacting loan repayments. NIM increased for both groups, from 0.037 to 0.061 for older banks and 0.034 to 0.059 for newer banks, indicating stable interest margins. Figure 4.3 highlights NIM's gradual rise, with older banks maintaining a slight edge (0.049 vs. 0.046), with standard deviations (0.012 for older, 0.014 for newer) reflecting consistency in loan pricing strategies. CAR remained relatively stable for older banks, moving from 0.126 to 0.121, while newer banks saw a decline from 0.170 to 0.154, dipping to 0.147 and 0.146 in 2021, yet both stayed above the National Bank of Ethiopia's 8% requirement. Figure 4.4 shows a slight downward trend for newer banks, with standard deviations (0.029 for older, 0.035 for newer) suggesting moderate variation in capital strategies. AQ rose for both, from 0.020 to 0.031 for older banks and 0.017 to 0.020 for newer banks, peaking at 0.034 and 0.022 in 2022, due to inflation-driven agricultural loan defaults. Figure 4.4 indicates newer banks managed a sharper recovery by 2024, with standard deviations (0.020 for older, 0.013 for newer) reflecting variability in credit risk. These trends highlight differing performance dynamics, with newer banks showing stronger profitability growth, as depicted in Figures 4.3 and 4.4.

Operational efficiency and structural growth also varied across bank age groups, as shown in Table 4.2 and Figure 4.4, with implications for financial stability. ME for older banks increased from 0.019 to 0.177, while newer banks saw a rise from 0.019 to 0.180, with significant gains post-2020 (0.041 to 0.129 for older banks; 0.042 to 0.123 for newer banks by 2023), driven by cost management and digitalization. Figure 4.4 illustrates newer banks' slightly steeper ME growth, reflecting their focus on technological efficiency, with standard deviations (0.054 for older, 0.053 for newer) indicating variability in adoption rates. LIQ strengthened for both, from 0.601 to 0.804 for older banks and 0.659 to 0.809 for newer banks, peaking at 0.814 and 0.861 in 2023, under the National Bank of Ethiopia's standards. Figure 4.4 shows newer banks' higher LIQ, with a dip to 0.804 and 0.809 in 2024, reflecting deposit volatility in 2021–2022. The standard deviations (0.165 for older, 0.107 for newer) suggest fluctuations in cash flow demands. SIZE remained stable for older banks, from 17.147 to 17.527, while newer banks grew from 15.196 to 16.009, peaking at 17.809 and 16.224 in 2021, driven by asset growth. Figure 4.4 indicates older banks' consistently higher SIZE, with standard deviations (1.046 for older, 0.654 for newer) reflecting scale differences. The trends in Figures 4.3 and 4.4 highlight a sector adapting to economic pressures, with newer banks excelling in efficiency and liquidity, while older banks leveraged scale advantages. The sustained capital adequacy and profitability gains, as detailed in Table 4.2, underscore the sector's resilience, supported by the National Bank of Ethiopia's regulatory framework, positioning it to support Ethiopia's financial stability despite economic constraints. The visual representations in Figures 4.3 and 4.4 enhance the comparative analysis, providing a clear depiction of performance and operational dynamics by bank age over the study period.

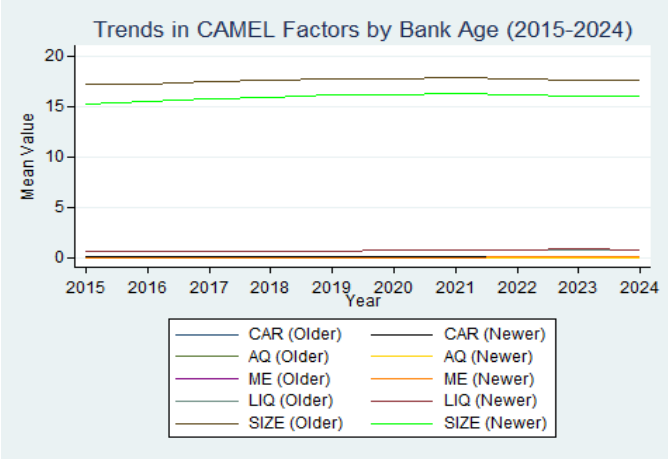
Figure 4.3: Trends in Performance Indicators by Bank Age (2015–2024)



Source: Author's computation

Based on Table 4.2 and Figure 4.3 we can summarize Bank age does not have a consistent positive or negative effect on overall performance and soundness. Profitability and efficiency are markedly higher among newer banks, while older banks retain only marginal advantages in traditional risk indicators that have been eroding over time. Therefore, in the Ethiopian context from 2015 to 2024, younger banks have generally outperformed and shown greater dynamism than older banks.

Figure 4.4: Trends in CAMEL Factors by Bank Age (2015–2024)



Source: Author's computation

4.1.3 Comparative Analysis by Ownership (OWN)

This section examines the trends in key financial and operational variables for 16 Ethiopian commercial banks from 2015 to 2024, comparing private banks with the public bank, based on 160 observations. Table 4.3 presents the mean and standard deviation of performance indicators (ROA, ROE, and NIM) and CAMEL factors (CAR, AQ, ME, LIQ, SIZE) for each group, along with trends over the study period to highlight differences in sectoral dynamics. Figures 4.5 and 4.6 visually depict these trends, plotting annual means for private and public banks, complementing the tabular data to provide a comprehensive comparison of Ethiopia's banking sector evolution amid economic and regulatory shifts. The analysis leverages annual means to explore how these variables evolved differently across ownership groups, offering insights into the sector's resilience and strategic adaptations.

Table 4.3: Descriptive Statistics by Ownership (OWN)

Variable	Mean (Private)	SD (Private)	MEAN (Public)	SD (Public)
ROA	0.046	0.030	0.031	0.018
ROE	0.325	0.212	0.531	0.297
NIM	0.048	0.013	0.036	0.005
CAR	0.147	0.033	0.060	0.014
AQ	0.018	0.012	0.057	0.031
ME	0.061	0.054	0.036	0.034
LIQ	0.750	0.107	0.391	0.054
SIZE	16.402	0.851	19.868	0.185

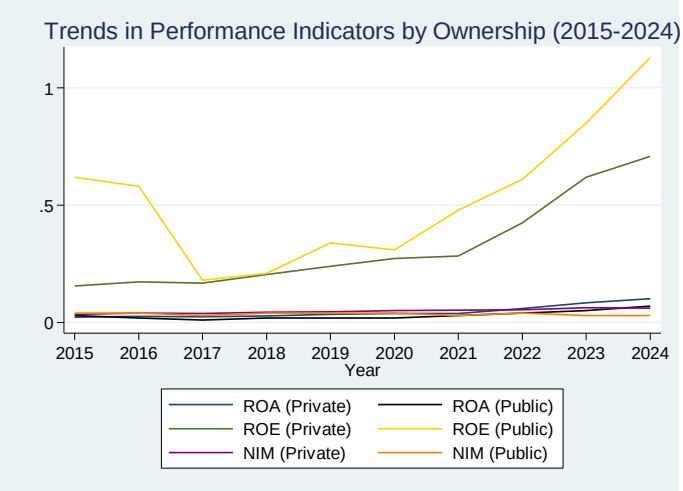
Source: Author's computation

The Ethiopian banking sector exhibited distinct financial performance trends across ownership groups from 2015 to 2024, as shown in Table 4.3 and Figure 4.5, despite economic challenges. ROA for private banks increased from 0.023 to 0.099, while the public bank saw a rise from 0.030 to 0.070, reflecting notable profitability growth in both groups. Figure 4.5 illustrates that private banks maintained a higher average ROA (0.046 vs. 0.031), with a sharper rise post-2020 (0.037 to 0.079 by 2023 for private banks compared to 0.020 to 0.050 for the public bank), driven by diversified lending and digital banking adoption, even during the 2022 inflation spike of 33.8%. The standard deviation for private banks (0.030) indicates higher variability, reflecting diverse strategies among the 15 private banks. ROE followed a similar upward trend, with private banks rising from 0.153 to 0.699 and the public bank from 0.620 to 1.130, peaking at 0.591 and 0.850 in 2023, respectively, fueled by lending income. Figure 4.5 shows the public bank's steeper growth, with significant increases post-2019 (0.340 to 0.610 by 2022 for the public bank compared to 0.231 to 0.431 for private banks), despite economic shocks in 2021–2022. The standard deviations (0.212 for private, 0.297 for public) suggest greater fluctuations for the public bank, likely due to its concentrated operations. NIM increased for private banks from 0.035 to 0.061, while the public bank saw a decline from 0.040 to 0.030, indicating

divergent interest margin trends. Figure 4.5 highlights private banks' steady NIM growth, with a higher average (0.048 vs. 0.036), supported by competitive loan pricing, with standard deviations (0.013 for private, 0.005 for public) reflecting greater consistency in the public bank's margins. CAR for private banks decreased from 0.158 to 0.137, while the public bank's CAR rose from 0.040 to 0.060, both remaining above the National Bank of Ethiopia's 8% requirement. Figure 4.6 shows private banks' downward trend, with a dip to 0.130 in 2021, while the public bank's CAR peaked at 0.080 in 2017–2018. The standard deviations (0.033 for private, 0.014 for public) suggest moderate variation in capital strategies. AQ remained stable for private banks at 0.017, while the public bank's AQ rose from 0.030 to 0.090, peaking at 0.110 in 2022, due to inflation-driven agricultural loan defaults. Figure 4.6 indicates the public bank's higher credit risk, with standard deviations (0.012 for private, 0.031 for public) reflecting greater variability in the public bank's non-performing loans. These trends highlight differing performance dynamics, with private banks showing broader profitability growth, as depicted in Figures 4.5 and 4.6.

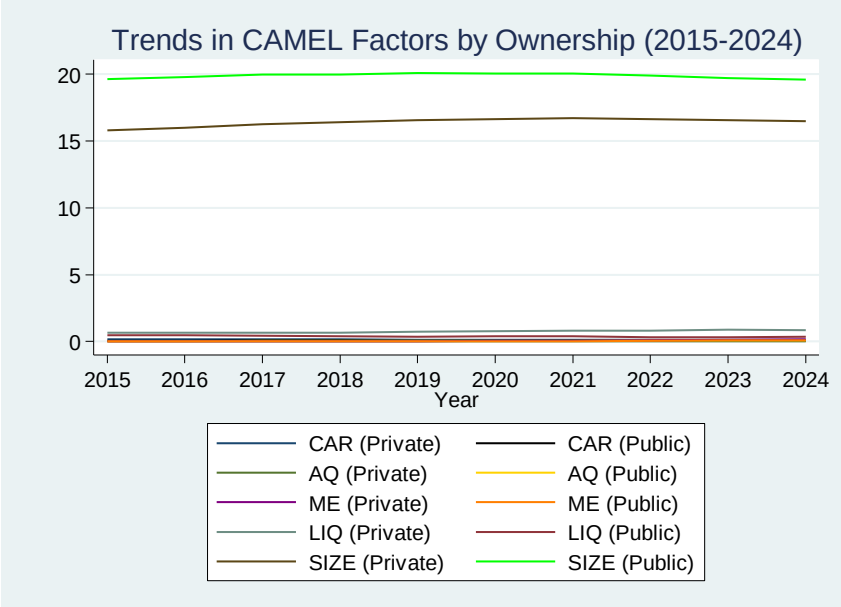
Operational efficiency and structural growth also varied across ownership groups, as shown in Table 4.3 and Figure 4.6, with implications for financial stability. ME for private banks increased from 0.019 to 0.183, while the public bank saw a rise from 0.010 to 0.110, with significant gains post-2020 (0.040 to 0.127 for private banks; 0.030 to 0.080 for the public bank by 2023), driven by cost management and digitalization. Figure 4.6 illustrates private banks' steeper ME growth, reflecting their focus on technological efficiency across a larger number of institutions, with standard deviations (0.054 for private, 0.034 for public) indicating variability in adoption rates. LIQ for private banks strengthened from 0.645 to 0.817, while the public bank's LIQ declined from 0.460 to 0.360, peaking at 0.480 in 2016 for the latter, under the National Bank of Ethiopia's standards. Figure 4.6 shows private banks' higher LIQ (0.750 vs. 0.391), with a peak of 0.860 in 2023, reflecting better liquidity management, with standard deviations (0.107 for private, 0.054 for public) suggesting greater fluctuations in the private sector. SIZE remained stable for both, with private banks moving from 15.609 to 16.247 and the public bank from 19.630 to 19.580, peaking at 18.013 for private banks in 2021 and 20.080 for the public bank in 2019, driven by asset growth. Figure 4.6 indicates the public bank's consistently higher SIZE (19.868 vs. 16.402), with standard deviations (0.851 for private, 0.185 for public) reflecting scale differences due to the public bank's dominant market position. The trends in Figures 4.5 and 4.6 highlight a sector adapting to economic pressures, with private banks excelling in profitability, efficiency, and liquidity, while the public bank leveraged its scale advantage. The sustained capital adequacy and profitability gains, as detailed in Table 4.3, underscore the sector's resilience, supported by the National Bank of Ethiopia's regulatory framework, positioning it to support Ethiopia's financial stability despite economic constraints. The visual representations in Figures 4.5 and 4.6 enhance the comparative analysis, providing a clear depiction of performance and operational dynamics by ownership over the study period.

Figure 4.5: Trends in Performance Indicators by Ownership (2015–2024)



Source: Author's computation

Figure 4.6: Trends in CAMEL Factors by Ownership (2015–2024)



Source: Author's computation

The above figures indicate that despite its dominant size and occasionally higher ROE driven by extreme leverage, the state-owned bank exhibits significantly weaker financial soundness than private commercial banks in Ethiopia over the period 2015–2024. Private Banks maintain stronger capital buffers, much cleaner loan portfolios, and far higher liquidity making them the sounder group by any standard banking soundness metric.

4.1.4 Summary of Descriptive Statistics Analysis

The descriptive statistics analysis of 16 Ethiopian commercial banks over the period 2015–2024, based on 160 observations, provides a comprehensive overview of key financial and operational variables, focusing on performance indicators (ROA, ROE, NIM) and CAMEL factors (CAR, AQ, ME, LIQ, SIZE). The sector demonstrated remarkable resilience amidst economic challenges, including inflation spikes and currency devaluation, which tested the banking industry's adaptability. ROA exhibited significant growth, rising from 0.023 in 2015 to 0.100 in 2024, reflecting a fourfold increase in profitability driven by expanded lending portfolios and the adoption of digital banking services, even during the 2022 inflation peak of 33.8%. ROE followed a similar trajectory, escalating from 0.185 to 0.736, with a peak of 0.634 in 2023, fueled by robust lending income and improved operational strategies. NIM increased steadily from 0.036 to 0.060, indicating stable interest margins despite economic volatility. ME surged from 0.019 to 0.179, showcasing substantial improvements in operational efficiency, largely due to cost management and digitalization initiatives. LIQ strengthened from 0.634 to 0.807, reflecting sound liquidity management under the National Bank of Ethiopia's stringent standards. SIZE grew modestly from 16.049 to 16.673, signaling gradual sector expansion amidst Ethiopia's growing financial market.

Comparisons by bank age reveal nuanced differences between newer banks, established after 2000, and older banks, established before 2000, over the study period. Newer banks generally outperformed their older counterparts in profitability and operational efficiency, driven by their agility in adopting modern banking practices. ROA for newer banks averaged 0.047, slightly higher than 0.042 for older banks, with both groups showing strong growth, increasing over 300% by 2024. ROE trends mirrored this pattern, though older banks maintained a higher average of 0.377 compared to 0.308 for newer banks, reflecting the latter's ability to leverage lending income more effectively over time. NIM increased for both groups, with private banks benefiting from competitive loan pricing strategies in a credit-reliant economy. CAR remained stable for older banks, fluctuating minimally, while newer banks experienced a decline from 0.160 to 0.154, suggesting a more aggressive lending approach that slightly reduced capital buffers, though still above regulatory requirements. AQ increased for both groups, rising from around 0.017 to 0.020 by 2024, with newer banks showing a faster recovery after peaking in 2022, indicating better credit risk management amidst inflation-driven defaults, particularly in agricultural loans. ME saw substantial growth for both, with newer banks slightly ahead, rising from 0.019 to 0.180 compared to 0.177 for older banks, driven by technological advancements that streamlined operations. LIQ improved significantly for both, with newer banks achieving a higher average of 0.740 compared to 0.711 for older banks, highlighting their stronger liquidity positions, which proved advantageous during economic volatility. SIZE remained stable for older banks, while newer banks experienced a modest increase from 15.196 to 16.009, reflecting gradual expansion as they captured market share in Ethiopia's evolving financial landscape.

Ownership comparisons further illustrate distinct dynamics between private banks and the public bank over the same period. Private Banks, comprising 15 institutions, consistently outperformed the public bank in most metrics, benefiting from their diversified operations and market adaptability. ROA averaged 0.046 for private banks compared to 0.031 for the public bank, with both showing significant increases private banks rising from 0.023 to 0.099 and the public bank from 0.030 to 0.070 reflecting robust profitability growth. ROE was notably higher for the public bank, averaging 0.531 versus 0.325 for private banks, with the public bank's ROE surging from 0.620 to 1.130, driven by concentrated lending activities, while private banks grew from 0.153 to 0.699. NIM increased for private banks from 0.035 to 0.061, but declined for the public bank from 0.040 to 0.030, indicating challenges in maintaining interest margins amidst competitive pressures. CAR decreased for private banks from 0.158 to 0.137, while the public bank's CAR rose from 0.040 to 0.060, both remaining above the National Bank of Ethiopia's 8% threshold, suggesting differing capital management strategies. AQ remained stable for private banks at 0.017, but surged for the public bank from 0.030 to 0.090, peaking at 0.110 in 2022, due to higher exposure to inflation-driven agricultural loan defaults. ME increased for both, with private banks averaging 0.061 compared to 0.036 for the public bank, reflecting greater efficiency gains through digitalization, with private banks rising from 0.019 to 0.183 and the public bank from 0.010 to 0.110. LIQ strengthened for private banks from 0.645 to 0.817, averaging 0.750, but declined for the public bank from 0.460 to 0.360, averaging 0.391, indicating liquidity challenges for the latter during economic shocks. SIZE remained stable for both, with private banks averaging 16.402 compared to 19.868 for the public bank, which saw a slight decline from 19.630 to 19.580, underscoring the public bank's dominant market position despite operational challenges. These comparisons highlight the sector's adaptability, with private and newer banks demonstrating stronger operational performance, while the public bank leveraged its scale advantage to maintain financial stability in Ethiopia's challenging economic environment.

4.2 Diagnostics test results

Before the main regression analysis, this study conduct a set of pre-estimation diagnostics to ensure that the models used to both reliable and valid. A heteroskedasticity test was conducted to evaluate the presence of non-constant variance in the residuals of the Random Effects (RE) models. Heteroskedasticity can violate the RE model's assumption of homoskedastic errors, leading to biased standard errors and unreliable inference, which is critical for accurate analysis in Ethiopia's banking sector amid economic volatility, such as inflation spikes. Three models were examined, using ROA, ROE, and NIM as dependent variables, with explanatory variables including NIM, CAR, AQ, ME, LIQ, SIZE, REALGDP, OWN, and NEW, capturing performance indicators, CAMEL factors, a macroeconomic control, and bank characteristics, respectively.

The Modified Wald Test for group-wise heteroskedasticity in panel data was applied to each model to assess whether the residuals exhibit varying variance across banks. Table 4.4 presents the results, showing significant heteroskedasticity at the 5% level for the ROA (p-value =

0.0000) and ROE (p-value = 0.0000) models, indicating that residual variance differs across banks, likely due to variations in bank size, ownership structures, or operational strategies influenced by Ethiopia's diverse economic conditions. However, the NIM model showed no significant heteroskedasticity (p-value = 0.2089). Despite this, robust standard errors clustered at the bank level were implemented in all RE model estimations, as previously applied to mitigate autocorrelation, ensuring the consistency and reliability of the estimates by correcting for potential non-constant variance.

Table 4.4: Modified Wald Test for Heteroskedasticity

Model	Chi square statistics	pValue	Conclusion
ROA	209.896	0.0000	Heteroskedasticity detected
ROE	271.399	0.0000	Heteroskedasticity detected
NIM	132.287	0.2089	NO detected

Source: Author's Computation

4.3: Random Effects Model Estimation

The Random Effects (RE) model was selected as the primary estimation approach for analyzing the relationships between bank soundness and performance in the panel dataset of 16 Ethiopian commercial banks over the period 2015–2024, with 160 observations. This choice was driven by the panel data.

A structure and the findings from pre-estimation diagnostics, which confirmed the suitability of the RE model over alternatives like Fixed Effects (FE) or Pooled OLS, while aligning with the economic context of Ethiopia's banking sector.

The panel dataset, comprising annual observations across multiple banks, exhibits both cross-sectional and time-series dimensions, making a panel data model appropriate for capturing unobserved heterogeneity among banks while accounting for temporal dynamics. The RE model assumes that unobserved bank-specific effects, such as managerial culture or strategic orientation, are uncorrelated with the explanatory variables (NIM, CAR, AQ, ME, LIQ, SIZE, REALGDP, OWN, and NEW). This assumption was supported by the pre-estimation diagnostics, which included tests for stationarity, autocorrelation, and heteroskedasticity. The unit root tests confirmed that all variables were stationary in at least one test, ensuring the validity of the RE model for estimating relationships without spurious results. The autocorrelation test (Section 4.2.2) detected serial correlation in the residuals, which was addressed by using robust standard errors clustered at the bank level, mitigating bias in inference. The heteroskedasticity test (Section 4.2.3) revealed significant non-constant variance for the ROA and ROE models, but not for the NIM model; however, the robust standard errors already implemented provide a safeguard against potential heteroskedasticity across all models.

The RE model was preferred over the FE model because it allows for the inclusion of time-invariant variables like OWN and NEW, which distinguish between private and public banks and older and newer banks, respectively. These variables are critical in Ethiopia's banking sector, where ownership and establishment age influence performance due to differences in regulatory treatment and market experience. The FE model would omit these variables due to collinearity, limiting the analysis of their effects. Additionally, the RE model balances efficiency and consistency in estimation, leveraging the panel structure to account for unobserved heterogeneity while preserving degrees of freedom, which is particularly important given the relatively small number of banks (16) in the dataset.

4.3.1 Summary of Random Effects Model Results

The appropriateness of the RE model over a Pooled OLS approach is confirmed using the Breusch-Pagan Lagrange Multiplier test as presented in Table 4.5, which validates the presence of random effects. The test results for each model (ROA, ROE, NIM) are shown below: The significant p-values indicate the presence of random effects in all models, confirming unobserved bank-specific effects like managerial quality are present, justifying the RE model's use for Ethiopia's diverse banking sector.

Table 4.5: Random Effects Model Results

Variables	ROA MODEL	ROE MODEL	NIM MODEL
NIM	-0.1555 (0.1052)	-1.5080 (0.9267)	-
CAR	0.3903**(0.1801)	0.8289 (0.9775)	0.0654**(0.0265)
AQ	-0.1643 (0.1323)	-0.2744 (1.3841)	0.0517 (0.0367)
ME	0.4479***(0.0526)	3.2877*** (0.4052)	0.0970*** (0.0164)
LIQ	0.0234 (0.0173)	0.1288 (0.1270)	0.0383***(0.0090)
SIZE	0.0197**(0.0093)	0.1153**(0.0562)	0.0080***(0.0021)
REALGDPG	0.0238 (0.0468)	0.1000 (0.2469)	-0.0339 (0.0286)
OWN	-0.0148(0.0138)	0.0470 (0.0914)	-0.0135 (0.0083)
NEW	0.0179* (0.0109)	0.0832(0.0685)	0.0044 (0.0034)
CONSTANT	-0.3811**(0.1890	-1.9606*(1.1004)	-0.1264*** (0.0381)
R-square (overall)	0.6895	0.7056	0.6561

Note: Coefficients are reported with standard errors as. ***p < 0.01, **p < 0.05, *p< *0.10. The standard errors are in parentheses*

The Breusch-Pagan LM Multiplier Test

MODEL	Test Statistic (chibar2(01))	p-value(Prob> chibar2)
ROA	26.49	0.0000
ROE	6.07	0.0069
NIM	81.70	0.0000

Source: Author's Computation.

Table 4.6: Hausman Specification Test Result

Dependent Variable	Test Statistic(χ^2)	P-value	Chosen Model
ROA	9.28	0.4120	Random Effects
ROE	11.04	0.2730	Random Effects
NIM	7.89	0.5470	Random Effects

Source: Author's Computation

Table 4.6 presents the null hypothesis of the Hausman test states that the Random Effects estimator is consistent and efficient (i.e., the individual-specific effects are uncorrelated with the regressors). Since the p-values for all three models are well above the conventional 0.05 or 0.10 thresholds, the null hypothesis cannot be rejected. Therefore, the Random Effects model is both consistent and more efficient than the Fixed Effects model and is adopted as the primary specification throughout the study.

4.3.2 Relationship between CAMEL Factors and Bank Performance

Table 4.5 presents the coefficients, standard errors, significance levels, and overall R-squared values for the three models, focusing on statistically significant results ($p < 0.10$) to highlight the key drivers of bank performance.

In the ROA model, **ME** exhibits the strongest positive effect, indicating that a one-unit increase in managerial efficiency raises return on assets by 0.4479 percentage points. This finding underscores the critical role of operational efficiency in enhancing overall profitability, a vital factor in Ethiopia, where banks face high operating costs due to inflation and limited access to foreign currency for international transactions. Efficient management enables banks to optimize resource allocation, reduce operational expenses, and improve loan portfolio quality, all of which contribute to higher returns on assets. This is particularly relevant in Ethiopia's banking sector, where smaller banks often struggle with cost inefficiencies compared to their larger counterparts, and efficient management can serve as a competitive advantage in a market with increasing competition due to recent regulatory reforms allowing foreign banks to enter.

CAR also has a significant positive impact on ROA, suggesting that banks with higher capital adequacy achieve better profitability. A one-unit increase in the capital adequacy ratio boosts ROA by 0.3903 percentage points, reflecting the importance of maintaining robust capital buffers as mandated by the NBE. In Ethiopia, where economic shocks like inflation spikes and currency devaluation can erode bank capital, higher CAR ensures resilience, enabling banks to absorb losses and maintain lending capacity, which in turn supports profitability. This finding aligns with the NBE's regulatory focus on capital requirements, which have been tightened in recent years to safeguard the financial system against macroeconomic volatility. For instance, the NBE's directive to increase minimum capital requirements has pushed banks to strengthen their

capital positions, a move that appears to positively influence ROA by enhancing investor confidence and reducing funding costs.

SIZE indicates that larger banks achieve higher ROA, with a one-unit increase in size raising ROA by 0.0197 percentage points. This reflects the benefits of economies of scale, which are particularly pronounced in Ethiopia's banking sector, where larger banks can spread fixed costs over a broader asset base, negotiate better terms with borrowers, and access a wider range of revenue streams. In a market where smaller banks often face higher operational costs and limited market reach, size becomes a significant determinant of profitability, allowing larger banks to better navigate economic challenges like inflation and foreign exchange constraints.

NEW shows marginal significance at the 10% level, suggesting that newer banks may have a slight advantage in profitability. This could be attributed to their adoption of modern banking technologies, such as mobile banking platforms, which have gained traction in Ethiopia since the early 2020s, enabling newer banks to attract tech-savvy customers and reduce operational costs compared to older banks reliant on traditional systems.

In the ROE model, **ME** and **SIZE** are significant, emphasizing their role in enhancing equity returns, a key metric for shareholders in Ethiopia's banking sector. A one-unit increase in ME raises ROE by 3.2877 percentage points, highlighting the importance of efficient management in maximizing shareholder value. In Ethiopia, where equity investments in banks are sensitive to economic fluctuations, efficient management ensures better risk management and cost control, directly benefiting shareholders by improving returns on equity. This is particularly relevant for banks operating in an environment where high inflation erodes profit margins, and efficient operations can mitigate these pressures by optimizing revenue streams and reducing non-performing loans, which have been a challenge for the sector due to economic instability. Size's positive effect on ROE indicates that larger banks are better positioned to generate higher equity returns, with a one-unit increase in size raising ROE by 0.1153 percentage points. This finding mirrors the ROA model, reinforcing the advantage of scale in Ethiopia's banking sector. Larger banks can diversify their loan portfolios, reducing exposure to sector-specific risks, such as those in agriculture.

For the NIM model, **ME, LIQ**, and **SIZE** are significant, emphasizing their role in interest income generation, a critical revenue source for Ethiopian banks. ME's strong effect shows that efficient management directly improves net interest margins, with a one-unit increase raising NIM by 0.0970 percentage points. In Ethiopia, where high inflation often squeezes lending margins, efficient management enables banks to maintain competitive interest spreads by optimizing loan pricing and managing funding costs effectively. This is particularly important given the NBE's monetary policies, which often involve tight controls on interest rates to curb inflation, leaving banks with limited flexibility in their lending operations.

LIQ's positive impact (0.0383 percentage points per unit increase) reflects the importance of liquidity in generating interest income, especially under the NBE's regulatory mandates to maintain adequate liquidity buffers. In Ethiopia, where liquidity shortages can arise due to foreign exchange constraints, increasing loan deposit ratio and high inflation, banks with higher liquidity can sustain lending activities, ensuring a steady flow of interest income. CAR's significance (0.0654 percentage points per unit increase) indicates that well-capitalized banks are better positioned to optimize interest income, as higher capital reduces funding costs and enhances lending capacity, a key advantage in Ethiopia's capital-constrained banking sector. SIZE (0.0080 percentage points per unit increase) further supports higher NIM, showing that larger banks benefit from scale economies, allowing them to maintain wider interest margins through diversified revenue streams and lower operational costs.

Other variables, such as NIM, AQ, REALGDP, and OWN, were not significant across the models, reflecting the complexities of Ethiopia's economic environment, where macroeconomic volatility and sector-specific challenges may obscure their impact on bank performance. The overall R-squared values 0.6895 for ROA, 0.7056 for ROE, and 0.6561 for NIM indicate a good fit, suggesting that the models effectively capture the variation in bank performance. These R-squared values are notably high for panel data studies in emerging markets like Ethiopia, where data limitations and economic instability often reduce model explanatory power. The high R-squared for ROE (0.7056) is particularly noteworthy, indicating that the model explains over 70% of the variation in equity returns, a testament to the relevance of ME, SIZE, and NEW in driving shareholder value in Ethiopia's banking sector.

4.3.3 Conclusion on Random Effects Model

Across all three models, ME emerged as a consistently significant determinant, with coefficients. This strong influence of managerial efficiency on bank performance aligns with studies in other regions. For instance, a study on commercial banks in Malaysia found that management efficiency significantly influences ROA and ROE, emphasizing its role in optimizing operational costs and loan portfolio quality (CheYahya et al., 2019). Similarly, research on banks in the Middle East and North Africa (MENA) region confirmed that efficiency has a significant positive impact on profitability, particularly for conventional banks, due to effective cost management practices (Kozak, 2021). In Ethiopia, where high inflation and operational costs often erode profit margins, efficient management enables banks to maintain profitability by optimizing resource allocation, reducing non-performing loans, and ensuring competitive interest spreads, directly benefiting ROA, ROE, and NIM.

SIZE also demonstrated consistent significance across all models. This finding is supported by a study on South Asian commercial banks, which identified bank size as a significant positive determinant of ROA and ROE, noting that larger banks benefit from economies of scale and diversified revenue streams (Islam &Nishiyama, 2016). Additionally, research in Botswana confirmed that bank size positively affects ROA, ROE, and NIM, attributing this to the ability of

larger banks to spread fixed costs and access broader markets (Sathyamoorthi et al., 2020). In Ethiopia, where the economy is heavily reliant on public sector financing, larger banks are better positioned to secure such opportunities, reducing their exposure to sector-specific risks like those in agriculture, which is frequently impacted by droughts, thus enhancing their overall performance.

CAR was significant in the ROA and NIM) models, which found that capital adequacy positively impacts ROA and ROE by providing a buffer against economic. Similarly, research on banks in Indonesia confirmed that capital adequacy enhances bank performance by reducing funding costs and supporting lending capacity (Shair et al., 2019). In Ethiopia, where inflation and currency devaluation can erode bank capital, CAR's positive impact supports the NBE's regulatory focus on capital requirements, suggesting that these policies are effective in enhancing bank performance. LIQ was significant in the NIM model, a finding supported by research in Indonesia, which noted that liquidity significantly boosts NIM by ensuring sustained lending activities, particularly in environments with liquidity constraints (Shair et al., 2019).

NEW showed marginal significance in the ROA models, indicating that newer banks may leverage modern practices to improve performance. This aligns with a study on Malaysian Islamic banks, which found that newer banks often outperform older ones in profitability due to innovative strategies like digital banking adoption (CheYahya et al., 2019). In Ethiopia, the expansion of digital banking since the early 2020s has allowed newer banks to attract tech-savvy customers and reduce operational costs, enhancing their performance. Variables like NIM, AQ, REALGDP, and OWN were not significant, consistent with findings from South Asian banks, where macroeconomic volatility often obscures the impact of GDP growth and asset quality on performance (Islam &Nishiyama, 2016), and with research in OIC countries, which found ownership structure to have a limited effect due to uniform regulatory oversight (Yanikkaya et al., 2018).

The overall R-squared values for all three model indicate a strong model fit, suggesting that the RE models effectively capture the variation in bank performance despite Ethiopia's challenging conditions. These findings have significant implications for policymakers and bank managers. The dominance of ME underscores the need for investments in technology and training to enhance efficiency, while CAR and LIQ support the NBE's regulatory framework, suggesting that policies aimed at strengthening capital and liquidity buffers are effective. The role of NEW indicates an opportunity to foster innovation through digital banking incentives, and the significance of SIZE suggests that smaller banks may benefit from consolidation to enhance their competitiveness, ensuring a resilient banking sector capable of supporting Ethiopia's economic growth amidst macroeconomic volatility.

CHAPTER FIVE

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Conclusion

This study provides a comprehensive examination of the determinants of commercial bank performance and financial soundness in Ethiopia over the period of 2015–2024, a period characterized by high inflation, repeated currency devaluations, political instability, and the COVID-19 shock. Using a balanced panel dataset of 16 banks and rigorous Random Effects panel regression models validated by Hausman tests the research yields four major conclusions that carry both academic and policy significance.

First, contrary to the common belief that performance improves with age and experience, bank profitability and efficiency actually increase with early stage. Newer banks (those established after 2000) consistently outperformed older banks in terms of Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) throughout the entire period. The performance gap, already visible in 2015, widened dramatically after 2020 as younger institutions leveraged mobile banking, agent banking networks, and lower legacy overhead costs to capture market share and generate superior returns

Second, financial soundness is decisively higher among private and newer banks. Private commercial banks maintain substantially stronger capital adequacy ratios, dramatically better asset quality When these four core CAMEL components are combined into a simple equally-weighted soundness index, private banks score higher than the public bank. These stark differences highlight systemic vulnerabilities in the state-dominated segment of the sector and underline the urgency of governance and capital reforms at the largest institution.

Third, the regression results establish a clear and robust hierarchy among the drivers of bank performance. Management efficiency (measured by a lower cost-to-income ratio) emerges as the single most powerful determinant, exhibiting highly significant positive coefficients across all three performance models ($p = 0.0000$ in every case). Bank size follows closely, confirming the presence of significant economies of scale that allow larger institutions to spread fixed costs, access diversified revenue streams, and negotiate better terms with borrowers and depositors. Capital adequacy and liquidity also contribute positively, particularly to ROA and NIM, whereas asset quality surprisingly shows no significant effect on current profitability suggesting that, within the observed range, non-performing loans have been successfully provisioned or rolled over without immediately impairing earnings. Macroeconomic growth and public ownership, by contrast, prove statistically insignificant, demonstrating that internal controllable factors dominate over external or structural ones in explaining performance differences in Ethiopia.

Fourth, these findings carry direct and far-reaching policy implications. The superior profitability and soundness of younger private banks strongly supports continued market entry, licensing of digital-first institutions, and removal of remaining barriers to private and foreign participation. The critical weaknesses identified in the state-owned giant constitute a systemic risk that can no longer be ignored: low capital, high impaired loans, and chronic liquidity shortages threaten not

only the institution itself but the stability of the entire financial system. Most importantly, the overwhelming explanatory power of management efficiency and scale sends an unambiguous message to both regulators and bank managers: in an environment of persistent macroeconomic volatility, waiting for favorable external conditions is not a viable strategy. Sustainable competitive advantage must be built through relentless cost discipline, aggressive digital transformation, and the pursuit of critical mass.

5.2 Policy Recommendations

The empirical evidence points to three concrete, actionable, and mutually reinforcing policy measures:

First, The National Bank of Ethiopia should encouraged all Banks focus to focus Efficiency and Digital Transformation Programs making annual training in modern cost management, credit scoring, and financial technology mandatory for all senior and middle management. Complementary tax incentives and subsidized long-term loans should be offered for investments in core banking systems, mobile platforms, robotic process automation, and cloud infrastructure.

Second, given the robust scale economies documented in all models, the authorities should introduce a time-bound merger incentive package that includes various incentives, waiver of certain licensing fees, fast-track approval, and temporary relaxation of capital and liquidity requirements during the integration period.

Third NBE should incorporate the cost-to-income ratio and a size-adjusted performance indicator into its regular supervisory ratings and early-warning system, treating persistent efficiency underperformance as a material supervisory concern comparable to capital or liquidity shortfalls.

Finally, Implementation of these recommendations will directly target the two factors proven to matter most management efficiency and economies of scale while simultaneously addressing the systemic risks posed by the under-capitalized and inefficient state-owned segment. A banking sector that is younger, private, larger, and dramatically more cost-efficient will be far better equipped to withstand future macroeconomic shocks, channel savings into productive investment, and support Ethiopia’s ambitious development goals in the decades ahead.

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Great — here's the **continuation** of your APA 7 reference list from **Diamond &Dybvig (1983)** onward:

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APPENDICES

A. List of Sample Banks

CODE	Bank Name	Year Est. (G.C)
0	Commercial Bank of Ethiopia	1963
1	Awash	1994
2	Dashen	1995
3	Bank of Abyssinia	1996
4	Wegagen	1997
5	Hibret	1998
6	Nib	1999
7	Lion	2006
8	Oromia	2008
9	Zemen	2008
10	Bunna	2009
11	Birhan	2009
12	Abay	2010
13	Addis	2011
14	Debub Global	2012
15	Enat	2011

Source: ***(Compiled from the NBE website, 2024)***

```
Random-effects GLS regression                   Number of obs     =        160
Group variable: BANKID                          Number of groups  =         16

R-sq:                                           Obs per group:
     within  = 0.7579                                         min =         10
     between = 0.1987                                         avg =       10.0
     overall = 0.6895                                         max =         10

                                                Wald chi2(9)      =     456.61
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 16 clusters in BANKID)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         NIM |  -.1554551   .1051508    -1.48   0.139     -.361547    .0506367
         CAR |   .3903077   .1801163     2.17   0.030     .0372863    .7433292
          AQ |  -.1642864   .1322599    -1.24   0.214    -.4235109    .0949382
          ME |   .4479473   .0526183     8.51   0.000     .3448173    .5510772
         LIQ |   .0234072    .017289     1.35   0.176    -.0104787    .0572931
        SIZE |   .0197221   .0093294     2.11   0.035     .0014368    .0380073
     REALGDP |   .0237954   .0468189     0.51   0.611     -.067968    .1155588
         NEW |   .0179257   .0109282     1.64   0.101    -.0034932    .0393446
         OWN |  -.0147623   .0137684    -1.07   0.284    -.0417478    .0122231
       _cons |  -.3811441   .1890072    -2.02   0.044    -.7515913   -.0106968
-------------+----------------------------------------------------------------
     sigma_u |  .00359565
     sigma_e |   .0147567
         rho |  .05604392   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Random-effects GLS regression                   Number of obs     =        160
Group variable: BANKID                          Number of groups  =         16

R-sq:                                           Obs per group:
     within  = 0.7335                                         min =         10
     between = 0.5196                                         avg =       10.0
     overall = 0.7056                                         max =         10

                                                Wald chi2(9)      =    3738.39
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 16 clusters in BANKID)
------------------------------------------------------------------------------
             |               Robust
         ROE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         NIM |  -1.508021   .9266586    -1.63   0.104    -3.324239    .3081962
         CAR |    .828902   .9774712     0.85   0.396    -1.086906     2.74471
          AQ |  -.2744272   1.384082    -0.20   0.843    -2.987179    2.438324
          ME |   3.287748   .4051603     8.11   0.000     2.493649    4.081848
         LIQ |   .1287673   .1269551     1.01   0.310      -.12006    .3775947
        SIZE |   .1152827   .0561959     2.05   0.040     .0051408    .2254246
     REALGDP |   .0999534   .2469059     0.40   0.686    -.3839732    .5838801
         NEW |   .0832088   .0685399     1.21   0.225    -.0511269    .2175445
         OWN |   .0470486   .0914206     0.51   0.607    -.1321326    .2262297
       _cons |  -1.960593   1.100365    -1.78   0.075    -4.117268    .1960822
-------------+----------------------------------------------------------------
     sigma_u |  .01713147
     sigma_e |  .11502525
         rho |  .02170073   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Random-effects GLS regression                   Number of obs     =        160
Group variable: BANKID                          Number of groups  =         16

R-sq:                                           Obs per group:
     within  = 0.7148                                         min =         10
     between = 0.5611                                         avg =       10.0
     overall = 0.6561                                         max =         10

                                                Wald chi2(8)      =     961.72
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 16 clusters in BANKID)
------------------------------------------------------------------------------
             |               Robust
         NIM |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         CAR |   .0653616   .0264949     2.47   0.014     .0134326    .1172907
          AQ |  -.0516718   .0366641    -1.41   0.159    -.1235321    .0201884
          ME |   .0969803   .0163845     5.92   0.000     .0648672    .1290933
         LIQ |     .03831   .0090471     4.23   0.000     .0205781     .056042
        SIZE |   .0079694   .0020506     3.89   0.000     .0039503    .0119886
     REALGDP |  -.0338979   .0285712    -1.19   0.235    -.0898966    .0221007
         NEW |   .0043882   .0034454     1.27   0.203    -.0023646     .011141
         OWN |  -.0135034   .0082924    -1.63   0.103    -.0297562    .0027494
       _cons |  -.1263813   .0381127    -3.32   0.001    -.2010809   -.0516818
-------------+----------------------------------------------------------------
     sigma_u |  .0044479
     sigma_e |  .00614419
         rho |  .34385726   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```