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THE MODERATING ROLE OF BANK SIZE ON SOVEREIGN DEBT EXPOSURE AND FINANCIAL STABILITY OF COMMERCIAL BANKS IN KENYA

NJUGUNA JUDY WAMBUI

ADMISSION NO.085002

A Dissertation Submitted to Strathmore University in Partial Fulfilment of the Requirements of Master of Science in Development Finance

Strathmore Business School

Strathmore University

Nairobi, Kenya

June 2026

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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Director, Office of Graduate Studies

DEDICATION

I dedicate this dissertation to my family and friends for their endless encouragement, prayers and sacrifices. Your belief in me has been my greatest strength.

ACKNOWLEDGEMENTS

I am profoundly grateful to Almighty God for providing me with the strength and resilience to accomplish this work. My sincere appreciation goes to Strathmore Business School for providing an exceptional platform for academic excellence and growth. I am profoundly grateful to my supervisor, Dr. David Mathuva, for his invaluable guidance on dissertation writing and insightful contributions that significantly strengthened my dissertation. I also thank Dr. Muli Maingi and Dr Wanjala for their valuable comments and guidance on the initial proposal and suggestions on the re-organization and structure of this dissertation.

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DEFINITION OF TERMS

Sovereign Debt- "Is a debt issued by national governments, is an unusual sort of asset. In the context of the domestic financial system, it is often viewed as safe and liquid, safer and more liquid than privately issued debt. The deep reason for this is the sovereign's power to tax future income. Buying and selling sovereign debt help economic agents cope with liquidity shocks, smooth consumption, and realize investment opportunities", (Martinez et al., 2022).

Sovereign Debt Exposure is the degree to which financial institutions most notably commercial banks-hold debt instruments issued by a sovereign (national government) on their balance sheets. This exposure is typically measured as the share or absolute value of sovereign bonds or loans held by banks relative to their total assets or equity (Ariccia et al., 2018).

Bank Stability is the capacity of a bank or the banking sector to withstand internal and external shocks while maintaining its core functions, such as facilitating payments, providing credit, and safeguarding deposits, without triggering disruptions to the broader financial system or economy (Ballis et al., 2024).

Sovereign debt concentration denotes the degree to which commercial banks portfolios are heavily invested in government papers (BIS, 2018).

Capital Adequacy refers to the minimum capital reserves that commercial banks must hold relative to their risk-weighted assets, ensuring they can absorb financial shocks and maintain solvency (Mathuva, 2009).

ABBREVIATIONS AND ACRONYMS

Afrexim Bank:	African Export-Import Bank
ALSF:	Africa Legal Support Facility
ARDL:	Autoregressive Distributed Lag
BIS:	Bank for International Settlements
CAR:	Capital Adequacy Ratio
CCR:	Core Capital Requirement
CET1:	Common Equity Tier 1
CBK:	Central Bank of Kenya
CDS:	Credit Default Swaps
EMDEs:	Emerging and Developing Economies
GDP:	Gross Domestic Product
GFC:	Global Financial Crisis
GIS:	Generalized Least Squares
IMF:	International Monetary Fund
KBA:	Kenya Bankers of Association
KES:	Kenya Shilling
M&As:	Mergers and Acquisitions
NACOSTI:	National Commission for Science, Technology and Innovations
OECD:	Organization for Economic Co-operation and Development
ROA:	Return of Asset
ROE:	Return on Equity
USD:	United States Dollar
VIF:	Variance Inflation Factor
WCMSI:	Weighted composite market share index

ABSTRACT

The growing exposure of commercial banks to sovereign debt in developing economies has raised critical concerns regarding financial stability, particularly within the context of Kenya's evolving fiscal landscape. This study addressed this gap by examining the moderating role of bank size on the relationship between sovereign debt exposure and the stability of commercial banks in Kenya. The general objective was to determine how bank size conditions the effects of sovereign debt exposure on bank stability, while the specific objectives focused on sovereign debt concentration, crowding-out of private credit, and sovereign credit ratings. The study was anchored on the sovereign–bank nexus (doom loop) theory and moral hazard theory, which explain the interconnected risks between government debt and banking sector stability. A positivist research philosophy and an explanatory research design were adopted to facilitate objective hypothesis testing. The target population comprised 39 licensed commercial banks in Kenya, from which an unbalanced panel dataset of 507 observations covering the period 2010–2024 was constructed using secondary data obtained from audited financial statements and Central Bank of Kenya reports. The study employed panel data econometric techniques, specifically the Random Effects Generalized Least Squares (GLS) model. Bank stability was measured using the Z-score, while sovereign debt exposure was proxied through sovereign debt concentration, private sector loans to total assets, and sovereign credit ratings, with bank size introduced as a moderating variable. The findings revealed that sovereign debt concentration significantly reduces bank stability, while sovereign credit ratings and profitability enhance stability. Bank size exhibited a significant moderating effect, indicating that the impact of sovereign exposure varies across large, medium and small banks. The results also showed that asset quality deterioration weakens stability, while crowding-out effects were not statistically significant in the direct model. The study concluded that excessive sovereign debt exposure poses systemic risks to the banking sector, and that bank size plays a critical role in shaping resilience. Policy recommendations include strengthening macroprudential regulations to limit excessive sovereign exposure, enhancing capital requirements, and adopting differentiated regulatory frameworks that account for bank size heterogeneity.

Key words: Sovereign debt exposure**,** sovereign debt concentration, Sovereign bank nexus, bank stability, bank size,

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Financial institutions such as banks serve as critical engines of economic development, channelling capital to productive enterprises and facilitating household financial inclusion (Bottero et al., 2020) . However, modern banking portfolios extend beyond traditional lending activities, with substantial allocations to government securities, real estate assets, and equity instruments (Zhang & Malikov, 2023). Bouis , (2019) posits that banks in global south are essential in funding public deficit through investing in government bonds.

In Kenya, the exposure of commercial banks to sovereign debt has become increasingly significant amid rising public debt levels (Odongo, 2025). By 2023, Kenya's public debt-to-GDP ratio had reached 68%, while commercial banks held approximately 46.9% of their total assets in government securities as of June 2024 (Africa Centre for people Institutions and Society, 2024). Although sovereign securities are generally treated as low-risk assets for regulatory purposes and are not subject to explicit exposure limits, such concentration signifies a strong sovereign-bank nexus (The World Bank , 2024). This growing interconnectedness between the banking sector and government finances heightens concerns about fiscal and financial sector vulnerabilities.

The IMF, through its debt sustainability analysis framework for low- and lower-middle-income countries, identifies a debt-to-GDP ratio of 50% as the upper threshold of fiscal prudence for economies with structural characteristics similar to Kenya's (IMF, 2021). Kenya's debt level of 68% significantly exceeds this benchmark, indicating elevated debt sustainability risks and contributing to the country's classification as being at a high risk of debt distress.

At the national level, the Public Finance Management Amendment Act of 2023 established a more accommodative public debt ceiling of 55% of GDP in present value terms. However, recent joint World Bank–IMF Debt Sustainability Analyses indicate that Kenya has breached several key debt sustainability thresholds under the baseline scenario. Notably, the present value of total public debt-to-GDP is projected to remain above the statutory 55% benchmark until at least 2029 (The Institute of Economic Affairs , 2026). These developments underscore persistent fiscal pressures and

reinforce concerns regarding the increasing concentration of commercial bank assets in government securities.

According to KBA (2023) report, the association between banks and the sovereign, often described as a "sovereign-bank nexus," is a mechanism that fiscal distress can quickly transmit to banks' balance sheets, threatening their stability. This close sovereign-bank nexus creates a dual-edged dynamic where government securities provide banks with a relatively safe and liquid asset class, yet they also expose banks to interest rate risk and fiscal vulnerabilities (Talam & Kiemo, 2024). These risks are not uniformly distributed across banks and may vary systematically with bank size. Large banks typically have greater balance sheet capacity, preferential access to primary government securities markets, and stronger incentives to hold sovereign debt due to liquidity regulation and market-making roles (Laeven et al., 2016). In contrast, smaller banks may rely on sovereign securities as a substitute for private sector lending due to higher credit risk and limited screening capacity, but their thinner capital buffers make them more vulnerable to valuation shocks and interest rate volatility (Pietrovito & Pozzolo , 2023). In Kenya, differences in bank size may therefore condition how sovereign debt exposure affects stability, with large banks potentially absorbing shocks more easily in the short run, while posing greater systemic risk under severe fiscal stress.

Recent monetary policy developments further underscore this heterogeneity. For instance, the Central Bank of Kenya's monetary easing cycle, including the 25 basis-point reduction of the Central Bank Rate from 9.50 percent to 9.25 percent in October 2025 may engage banks in "reach-for-yield" behaviour and increase government bond holdings, affecting risk exposures and portfolio composition (Central Bank of Kenya, 2025), (Ochenge , 2025). Empirical evidence by Talam and Kiemo (2024) demonstrate that a 10% increase in sovereign debt exposure correlates with a 0.8% decline in banks' capital adequacy ratios during periods of monetary tightening. Additionally, banks with government securities portfolios exceeding 25% face significantly higher liquidity risks amid fiscal stress. Stress testing by the IMF (2024) further warns that adverse scenarios involving currency depreciation could push non-performing loans beyond regulatory thresholds, threatening overall banking sector stability.

1.1.1 Sovereign Debt Exposure

Talam and Kiemo, (2023) observe that sovereign debt exposure and its implications to global financial stability have gained significant attention amid rising public debt levels and evolving macroeconomic conditions. According to the OECD (2025), global sovereign bond issuance by 2025, the value is expected to reach a new high of $17 trillion. With outstanding debt expected to rise from USD 54 trillion in 2023 to nearly 59 trillion by 2025. This surge in government debt has far-reaching implications for financial systems worldwide, particularly through the "bank-sovereign nexus" mechanism, where governments with large debt accumulation have diminished capacity to support troubled banks, while banks holding substantial sovereign debt become more susceptible to a government financial crisis (Adrian, Gaspar, & Gourinchas, 2024).

In Africa, sovereign debt has grown, with the average debt to gross domestic product ratio in sub-Saharan Africa almost doubling from 30% at the end of 2013 to approximately 64% by the end of 2024 (ALSF, 2024). The report by ALSF (2024) further asserts that this rapid accumulation has been accompanied by a fundamental shift in the continent's debt landscape, characterized by increased external debt, greater reliance on commercial financing, and a more diverse creditor base including China and other non-traditional lenders. Sovereign default risks have escalated significantly, with recent defaults reaching high levels in thirty-year period at USD 149.4 billion in 2022, up from USD 112.2 billion in 2021 (Africa Export-Import Bank , 2024). See Figure 1.1 below showing the trends in Africa loan defaults (billion $US).

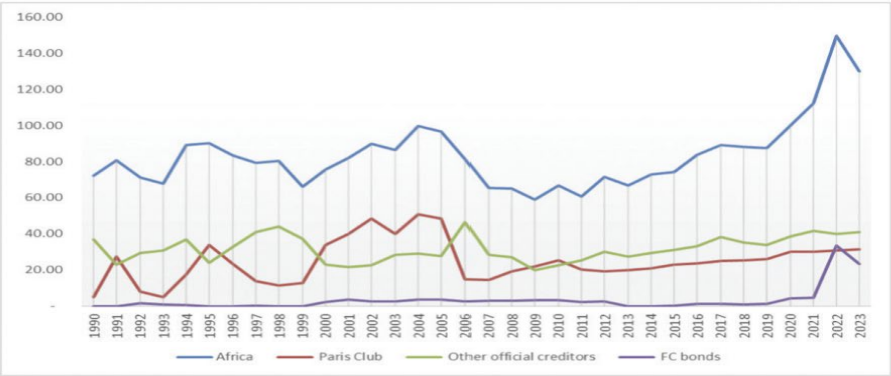


Figure 1.1 Trends in Africa Loan Defaults (billion $US)

Source (Africa Export-Import Bank, 2024)

Kenya's sovereign domestic debt trajectory mirrors the broader regional trend, with public debt growing significantly in recent years amid multiple worldwide disruptions,

including COVID-19 pandemic. While IMF has previously assessed Kenya's debt as sustainable, the country has experienced breaches in certain solvency and liquidity indicators, particularly the present value of public and publicly guaranteed external debt-to-export ratio and the debt-service-to-exports ratio (International Monetary Fund, 2021). As of June 2023, the Kenya debt to GDP stood at 70.8% see Figure 1.2 below showing % of debt to GDP and % of total debt service to revenue.

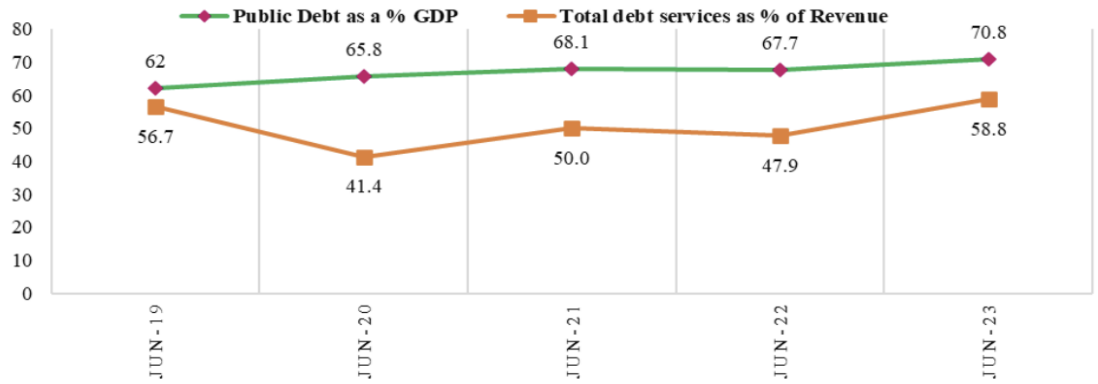


Figure 1.2 Percentage of Debt to GDP and Percentage of Total Debt Service to Revenue

Source (The National Treasury, 2024)

The sovereign debt dynamic has direct implications for Kenya's financial system, as commercial banks have accumulated more of government bonds to historically high levels. This rapid accumulation of government debt has led commercial banks to allocate a growing share of their assets to government securities, with banks now holding nearly half of the country's domestic debt stock. While this strategy offers liquidity and steady returns, it also amplifies banks' vulnerability to fiscal shocks and policy changes. Figure 1.3 shows a representation of outstanding domestic debt holders from June 2020 to June 2024. Kenya Commercial banks hold 46.9 percent of the domestic debt to total domestic debt which is almost 50 percentage of the total domestic debt.

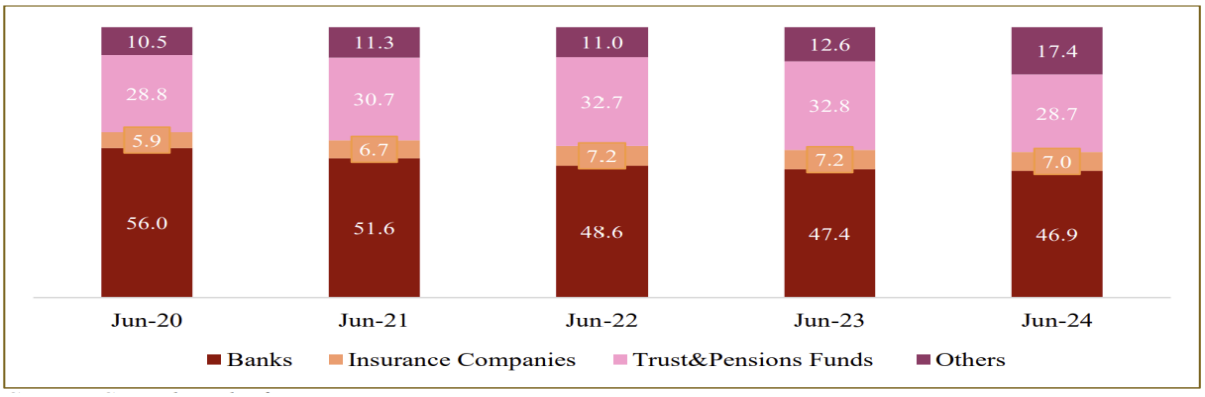


Figure 1.3 Outstanding Domestic Debt Stock by Holders as a Percentage of Total Domestic Debt

Source (The National Treasury, 2024)

In a regional comparison of five Sub-Saharan African economies, Kenya exhibites the highest sovereign debt-to-asset ratio in its banking sector, reporting at 31.5% as of September 2024 (S&P Global Markets Intelligence, 2025).

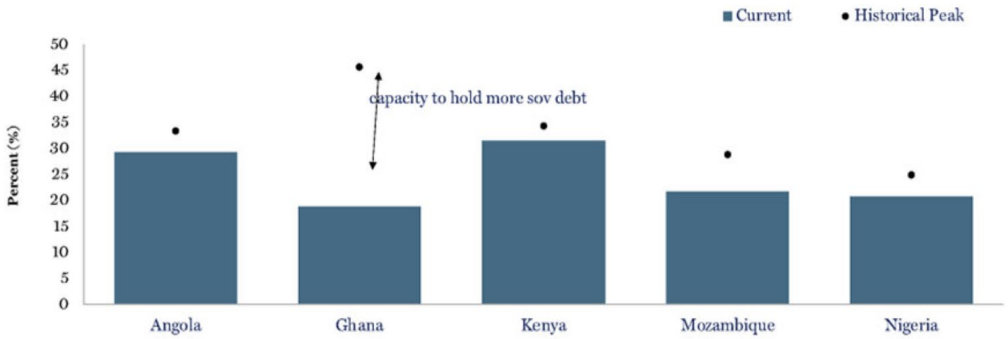


Figure 1.4 Sovereign Debt Holdings to Total Banking Assets

Source (S&P Global Markets Intelligence, 2025)

Why is there increased appetite to hold sovereign debt securities by commercial banks? Crosignani, (2021) highlights that bank's appetite for government securities is driven by a combination of regulatory drivers, strategic and liquidity needs. The sovereign debt securities are an attractive class of asset that satisfies bank's liquidity requirements. Banks operate with significant leverage and therefore must hold a reserve of liquid assets to cover short-term obligations and unexpected withdrawals. According to Dell'Ariccia et al. (2018), the high liquidity of government assets such as bonds makes them especially appealing to the banks. Regarding the strategic drivers to bank's high appetite for sovereign debt securities , (Buljan, Škrbić, and Dumicic (2020) argue that banks will sometimes engage in high yield strategic investments in particular

during periods of monetary easing by the central banks. Banks will invest in high-risk sovereign bonds that offer a higher yield as compared to other assets (Bank for International Settlements, 2018).

Another key factor driving banks' willingness to hold sovereign debt is the basel regulatory framework. The framework stipulates capital requirements for banks while assigning sovereign debt a zero-risk weight (Bonner, 2014). This provision incentivizes banks specifically those with limited capital buffers to expand their government bond holdings. According to Horvath et al.(2015) such regulatory arbitrage fosters a preference for sovereign securities over alternative assets, thereby deepening the interdependence between banks and their government. The way in which sovereign debt exposure impacts commercial bank stability can be explained using a interconnected channels . Below is Figure 1.5 showing the soverign bank adverse feedback Loop.

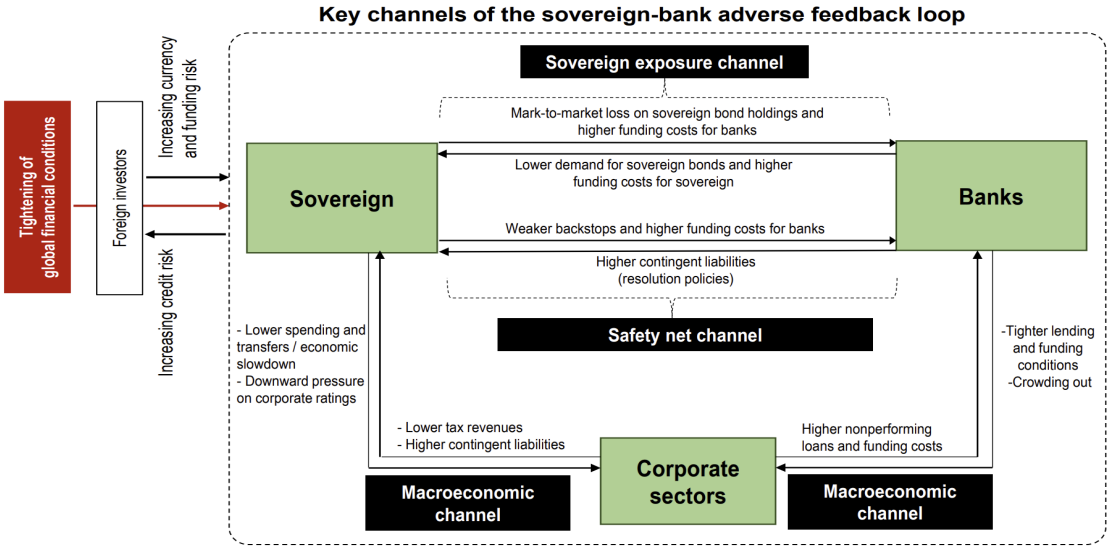


Figure 1.5 Sovereign Bank Adverse Feedback Loop

Source (International Monetary Fund, 2022)

As informed by the sovereign bank adverse feedback loop, banks holding government bonds face mark-to-market losses during fiscal distress, raising their funding costs; simultaneously, declining sovereign creditworthiness reduces demand for these bonds, further increasing borrowing costs for both the government and banks (Deghi, et al., 2022). Additionally, the "macroeconomic channel" transmits fiscal stress to the corporate sector through reduced government spending and higher corporate borrowing costs, leading to increased non-performing loans for banks. These dynamics are

worsened by tightening global financial conditions, which elevate currency and funding risks for the sovereign, potentially triggering a "safety net channel" response with higher contingent liabilities for banks, ultimately reinforcing a negative feedback loop where sovereign and bank stability are mutually threatened (Ariccia et al., 2018).

1.1.1.1 The Direct Balance-Sheet Channel: Sovereign Debt Concentration

The concentration of sovereign debt on individual bank balance sheets is best understood through the direct balance-sheet channel, whereby banks absorb large quantities of domestic government securities and thereby become increasingly exposed to the fiscal position of the sovereign (Acharya & Steffen, 2015). While sovereign securities are classified as liquid and low-risk assets, government bonds can become a vehicle through which sovereign stress is transmitted directly into the banking sector, especially when domestic banks hold them in concentrated volumes. In such seetings, Becker and Ivashina, (2018) argue that the deterioration of sovereign creditworthiness weakens bank balance sheets through valuation losses, collateral impairment, and heightened funding pressures, while banking sector distress sovereign default risk through contingent bailout expectations.

According to Gennaioli et al., (2018) from a financial stability perspective, concentration matters because it transforms sovereign debt from a presumed stabilizing asset into a source of undiversified systemic risk. A bank with an outsized exposure to domestic government securities becomes vulnerable to country-specific fiscal shocks, and abrupt repricing of sovereign credit. Furthur Gennaioli, Martin, and Rossi (2018), in their cross-country study of sovereign defaults and bank lending, demonstrate that the magnitude of a bank's exposure to government debt is the single strongest predictor of the credit contraction and balance-sheet stress a bank experiences during sovereign distress episodes. Banks with higher concentrations of sovereign debt relative to total assets suffer larger mark-to-market losses when sovereign bond yields rise, directly eroding regulatory capital and earnings (Bocola, 2016).

Acharya, Drechsler, and Schnabl (2014) formalized this mechanism in their analysis of the European sovereign debt crisis, showing that the transmission of sovereign risk to bank equity values is approximately proportional to the bank's sovereign debt holdings as a share of its balance sheet.

1.1.1.2 The Crowding-Out Channel: Crowding-Out of private credit

The second channel is the crowding-out channel which suggest that increased government borrowing can significantly influence the allocation of credit within the banking sector, often at the expense of private sector lending. Attout et al., (2022) asserts that when banks face attractive, zero-risk-weighted returns on government debt, they rationally substitute private sector credit with public debt holdings, particularly in environments of fiscal expansion. This is especially strong where information asymmetry, weak collateral enforcement, and high non-performing loans make private lending costly.

A study by Bouis (2019) finds that crowding-out effect is most pronounced in financial systems where government securities markets are deep and liquid relative to private credit markets. While Hauner (2009) notes that banks increase government-security holdings when NPLs are high. This trend aligns with a risk-mitigation strategy wherein banks systematically reallocate capital toward sovereign assets to stabilize their risk-weighted balance sheets. Kungu et al. (2025) extend this analysis to developing economies, showing that the displacement of private credit by sovereign debt accumulation tends to be most severe for the relatively under capitalised banks at the margin of the banking sector.

During the European sovereign debt crisis, Ongena, Popov and Van Horen found that domestic banks in fiscally stressed countries were more likely than foreign banks to increase holdings of domestic sovereign bonds when sovereign issuance was high, with stronger effects among state-owned banks. This suggests that in some context crowding out is reinforced by financial moral suasion.

1.1.1.3 The Macroeconomic and Rate Linkage Channel: Sovereign Credit Ratings

The macroeconomic and rate linkage channel refers to the way sovereign credit ratings transmit macroeconomic conditions into financial-sector funding costs, interest rates, credit allocation, and ultimately bank stability (Almeida et al., 2017). The rate linkage occurs because ratings act as a pricing signal. Kaminsky and Schmukler (2002) argue that a credit downgrade increases perceived default risk, raising sovereign bond yields. This increases the benchmark rate at which the government borrows and can also raise the cost of funds for domestic banks and firms. The effect is especially strong in emerging markets, where external investors often rely heavily on ratings to price risk. Kaminsky and Schmukler further show that rating and outlook changes affect country

risk and stock returns, with stronger effects during crises and in less transparent economies.

Almeida, et al (2017) using a global sample of sovereign rating actions demonstrate that sovereign downgrades trigger immediate and economically significant declines in the credit ratings and funding costs of domestic banks headquartered in the downgraded country. This is a phenomenon they term the sovereign ceiling effect, whereby a bank's own credit rating is constrained by the rating of its sovereign. Correa and Sapriza, (2014) extend this finding using bank-level equity return data, showing that the negative stock market reaction of banks to sovereign downgrades is significantly larger for banks with greater holdings of domestic sovereign debt confirming that the rating channel and the concentration channel interact rather than operate independently.

1.1.2 Bank Stability

The global focus on bank stability intensified markedly following the Global Financial Crisis (GFC) of 2008, which exposed systemic vulnerabilities across both advanced and emerging economies and prompted a fundamental rethinking of how financial institution health should be defined, monitored, and safeguarded (Financial Stability Board, 2023). Bank stability refers to capacity of banks to withstand internal and external shocks, continue operations, maintain solvency, and uphold public confidence without extraordinary government intervention (Beck et al., 2013). This capacity can be assessed at two complementary levels: the micro-prudential level, which focuses on the health of individual institutions, and the macroprudential level, which addresses systemic risks and interlinkages across the broader financial system (Gadanecz & Jayaram, 2023).

This study adopted the Z-score as the primary measure of bank stability, as it uniquely integrates profitability, capitalisation, and earnings volatility into a single, interpretable index of insolvency risk. The Z-score, developed in the banking literature by Boyd and Graham (1986) and subsequently formalised by Roy (1952), has emerged as the standard bank-level measure of stability in empirical finance. It is defined as:

$$\textit{Z-Score} = (\textit{ROA} + \textit{Equity/Assets}) / \sigma(\textit{ROA})$$

where ROA denotes return on assets, Equity/Assets is the equity-to-assets ratio (a proxy for capital adequacy), and σ(ROA) represents the standard deviation of return on assets over the sample period. The Z-score thus captures the number of standard deviations by which a bank's return on assets would need to fall before equity is exhausted and the

institution becomes insolvent (Čihák & Hesse, 2010; Chand et al., 2021). A higher Z-score indicates greater distance from insolvency and, therefore, greater stability. This composite structure is what makes the Z-score superior to single-dimensional proxies as it rewards banks that are simultaneously profitable, well-capitalized, and consistent in earnings the three pillars of genuine financial resilience

The Z-score's theoretical appeal is matched by its wide empirical adoption. Elnahass et al. (2021), Hafeez et al. (2022), Fu et al. (2014), and Mathuva (2025) all employ the standard Z-score formulation to assess bank stability in cross-country and single-country panel studies. In African contexts specifically, Oyetade and Muzindutsi (2023) use Z-scores to document a negative relationship between sovereign risk indicators and commercial bank stability across listed African banks, while Edeh et al. (2026) incorporate Z-scores alongside ARDL cointegration techniques in the Nigerian context. These precedents validate the Z-score's suitability for the Kenyan panel dataset used in the present study.

It is important to situate the Z-score within the broader empirical evidence on what drives bank stability, particularly in the context of sovereign debt exposure. Much of this evidence has historically centred on capital adequacy which is the regulatory floor for loss absorption. Jabra (2020), analyzing 280 European banks over 2002–2019, demonstrated that higher capitalization correlates with greater bank stability.

International standards under the Basel III accord have similarly prioritized Tier 1 core capital for its superior loss-absorbing features and regulatory universality (Ongena et al., 2019; Mathuva & Nyangu, 2025). This emphasis on capital adequacy is not incidental as Miao, Ma, and Xu (2025) establish; robust capital buffers support continued lending during downturns and reduce insolvency risk dynamics that map directly onto the equity-to-assets component of the Z-score. In other words, capital adequacy is not a competing measure of stability; it is one of the building blocks that the Z-score synthesizes.

Acharya and Steffen (2015) show that sovereign bond exposure is traditionally classified as risk-free and can act as a channel for systemic instability when sovereign creditworthiness deteriorates. In such environments, banks with thin equity buffers are particularly vulnerable to valuation losses on their government security portfolios, credit migration risk, and liquidity stress. Hryckiewicz et al. (2022) confirms that core capital serves as the primary buffer against the transmission of credit, liquidity, and

market risks that arise from sovereign exposure. These dynamics are captured by the Z-score through the interaction between the equity-to-assets ratio and earnings volatility as sovereign-related shocks erode profitability and increase the variance of returns, the denominator of the Z-score rises while the numerator contracts, driving the index downward and signalling deteriorating stability.

The Kenyan regulatory context reinforces the theoretical case for monitoring bank stability through a measure sensitive to both capitalisation and earnings volatility. The Central Bank of Kenya, through the Business Law Amendment Act of 2024, mandated a phased increase in minimum core capital from KES 1 billion to KES 3 billion by December 2025, with a target of KES 10 billion by 2029 (CBK, 2023). These thresholds reflect the regulator's recognition that sovereign risk transmission operating through liquidity shocks, capital erosion, and market contagion requires a strong equity base.

However, regulatory capital ratios measure only a static snapshot of capitalisation; they do not account for earnings consistency or the bank's capacity to generate profits through cycles of fiscal stress. The Z-score addresses this limitation by incorporating the stability of earnings (σROA) alongside the level of capitalisation, making it a more dynamic and forward-sensitive indicator of financial resilience (Khan, Scheule, & Wu, 2017).

Empirical studies by Jabra (2020), analyzing 280 European banks over 2002–2019, demonstrated that higher capitalization correlates with greater bank stability. International standards, particularly the Basel III accord, have prioritized core capital (tier1) for its superior loss-absorbing features, regulatory recognition, and universal relevance (Ongena et al., 2019; Mathuva & Nyangu, 2025). Unlike institutional capital which varies across organizational forms and lacks regulatory uniformity, core capital is a universal measure across banks, with a focus of mainstream regulatory policy in Kenya and internationally therefore suitable to act as a measure of bank stability.

Critiques of the Z-score is primarily on its backward-looking nature because it relies on historical accounting data specifically ROA and its volatility as it may understate risks that are not yet reflected in reported earnings (Hafeez et al., 2022). Nonetheless, Khan et al. (2017) assert that the standard Z-score remains significant in predicting bank stability and insolvency events, particularly in panel data settings where within bank variation over time provides sufficient identification. For the purposes of this study, which employs panel data from Kenyan commercial banks over a defined observation

window the Z-score represents the most appropriate balance between theoretical rigour, data availability, and comparability with the existing sovereign-bank nexus literature.

Bank size also moderates the Z-score dynamics of interest. Laeven et al. (2016) argue that larger banks benefit from diversification and broader funding access, which can sustain profitability and reduce earnings volatility both of which improve the Z-score. Yet size may also amplify systemic risk through complexity and implicit too-big-to-fail guarantees (Varotto & Zhao, 2018). In the Kenyan context, the CBK's peer-group classification distinguishing large, medium, and small banks on the basis of a composite index of net assets, deposits, capital, and branch network which provides a natural framework for examining whether the relationship between sovereign debt exposure and the Z-score varies systematically by institution size. This moderation hypothesis is central to the analytical design of the present study.

1.1.3 Bank Size

Bank size in the global banking sector has evolved significantly over decades, shaped by deregulation, crises, and consolidation through banks mergers and acquisitions (Kakes & Nijskens, 2018). The size of a bank plays a crucial role in determining its operational dynamics, stability and risk profile within the financial system, especially in the context of sovereign debt exposure. According to Bhagat et al. (2012) bank size is a central structural characteristic shaping a bank's risk-taking capacity, funding structure, and shock-absorption ability which is commonly proxied by the natural logarithm of total assets.

The total bank asset metric transparently indicates the gross balance sheet activity of banks however there are other metrics that measure the bank size which include total deposits, total capital or equity, and the number of branches (Schildbach, 2017). In the Kenyan context, the Central Bank of Kenya employs a more elaborate approach through a weighted composite index that considers net assets, customer deposits, capital, number of accounts, and number of branches. This index categorizes banks into three peer groups that is large, medium and small peer group banks (Central Bank of Kenya , 2024). Cyree, Davidson, and Stowe (2020) emphasizes the importance of peer group as clusters based on financial statement characteristics that can explain variation in performance and risk more effectively than size categories alone, suggesting that size should be combined with balance-sheet structure for richer peer group formation.

According to Chowdhury et al. (2024), large banks typically benefit from economies of scale and scope, superior diversification across assets and geographies, and easier access to capital markets, which can enhance resilience to economic shocks. However, as evidenced by the 2008 financial crisis, bank size through incentives such as, moral hazard, "too big to fail", and organisational complexities may amplify risk taking and encouraging higher risk exposure (Varotto & Zhao, 2018). Bawuah, (2024) asserts that regulatory frameworks such as those developed by the Bank for International Settlements under Basel III explicitly recognize size as a determinant of systemic risk, imposing additional capital buffers on systemically important banks.

Nonetheless regulatory-driven consolidation has been a key channel through which bank size has evolved. Evidence from Sub-Saharan Africa shows that increases in minimum capital requirements and enhanced supervisory scrutiny systematically induce mergers and acquisitions, particularly among undercapitalized and mid-sized banks (Ayagre et al., 2024). In Kenya, this pattern has been reinforced by regulatory interventions following episodes of bank distress and by the statutory increase in minimum core capital to KES 10 billion by 2029 enacted in 2024. As a result, M&As have contributed to a gradual increase in average bank size and market concentration, even though post-merger performance gains in profitability and stability remain heterogeneous across institutions (Ayagre et al., 2024).

According to European Central Bank, (2024) growing bank size has ambiguous implications on financial stability. On one hand, larger banks tend to hold higher capital buffers and benefit from economies of scale in risk management, supporting resilience to macro-financial shocks. On the other hand, cross-border expansion and consolidation can intensify competitive pressures on smaller domestic banks, potentially weakening their stability if they remain undercapitalised or operationally inefficient (Wagner & Schoenmaker, 2011). This duality makes bank size not merely an outcome of consolidation, but a critical moderating factor in the relationship between sovereign debt exposure and overall banking system stability.

Ochenge (2025) reveals that in Kenya medium-sized banks exhibit a higher risk appetite for sovereign debt to optimize yields; in contrast, both large and small banks adopt a more moderate investment stance. Figure 1.6 below presents government

securities holdings by presentation of Kenya banks by peer group including large, medium and small banks for the period between 2005 to 2022.

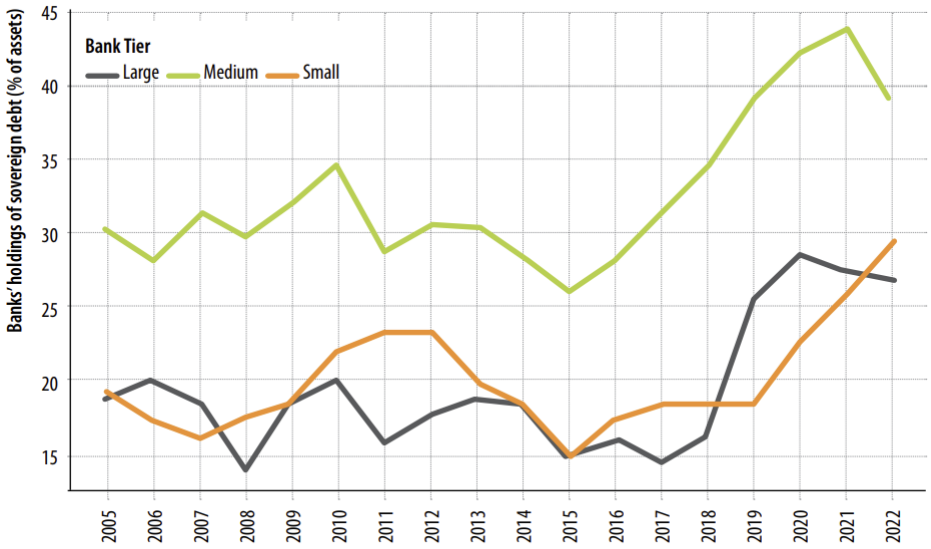


Figure 1.6 Bank's Holding of Sovereign Debt by Peer

Source (Ochenge , 2025)

1.1.4 The Kenya Commercial Bank Sector

The banking industry in Kenya is a cornerstone of the nation's financial framework with the main role of providing capital allocation, mobilizing deposits and extending credit. In fulfilling both commercial and economic roles, Kenyan commercial banks collectively hold over KES 7.7 trillion in assets, KES 2.9 trillion in loans, KES 0.5 trillion in interest income, and more than KES 4.4 trillion in customer deposit (Tiriongo et al., 2024).

In Kenya, the CBK oversees regulation of the commercial banking sector, with the goal of ensuring stability, transparency, and adherence to monetary policies. As of end of year 2024, the sector had a total of 38 commercial banks including one mortgage finance company, 37 of which were privately owned. A composite weighted index that incorporates elements such as net assets, total deposits, capital and reserves, along with the volume of deposit and loan accounts, is used to categorize these banks into three peers. Tier 1 banks are the largest, with a composite index of 5% and above, controlling a significant market share; Tier 2 banks have the medium banks with an index between 1% and 5%, catering to niche markets; and Tier 3 banks are classified as small and have an index of less than 1%, focusing on specific geographical areas or communities (CBK, 2024).

Momanyi & Mungai, (2025), asserts that the role of sector regulations in Kenya is to foster financial soundness by ensuring banks adhere to certain standards and practices. Key regulations such as the banking and central bank act provide the framework for oversight mechanisms, including licensing, capital requirements, and operational guidelines. These measures are designed to reduce systemic risks and strengthen the capacity of banks to withstand shocks to the economy. Banks often invest in government securities, which, while considered low risk, can severely undermine stability if the government's fiscal position deteriorates. Elevated levels of sovereign debt exposure can lead to a "doom loop," where the financial health of banks is closely tied to the government's debt servicing capacity. This interdependence can amplify financial instability during periods of economic stress (Feyen & Zuccardi , 2019).

1.2 Statement of the Problem

The stability of Kenya's commercial banking sector has shown measurable signs of deterioration in recent years, evidenced by rising credit risk and growing dispersion in capital strength across banks. The gross non-performing loans (NPLs) ratio rose from 15.6 percent in December 2023 to a record 17.6 percent by April 2025 marking the sharpest and most sustained decline in asset quality since the COVID-19 pandemic reflecting heightened credit risk within the sector (Central Bank of Kenya , 2025). At the same time, commercial banks maintained substantial holdings of government securities, a trend that has accelerated in recent years as banks have shifted their asset portfolios towards government securities creating a sovereign bank nexus through which fiscal distress can undermine bank stability (Tiriongo et al., 2024).

Between June 2023 and December 2024, the share of government securities to assets in Kenya's banking sector shifted from 29.2% to 27.8%. Despite this modest decrease, the high liquidity concentration of 37.9% in mid-2023 confirms that sovereign paper continues to dominate bank portfolios, often at the expense of private sector lending initiatives (Central Bank of Kenya, 2023). This sovereign bank nexus also has a direct bearing on credit risk. For instance, delayed disbursement of payments owed by national and county governments to contractors and suppliers has been identified by the CBK as a contributing factor behind rising non-performing loans in the trade, real estate, and construction sectors, illustrating a channel through which fiscal distress transmits into bank balance sheets independently of direct securities holdings (CBK,

2025). At the same time, the crowding-out of private sector credit by government securities concentrates banks' remaining loan books in a narrower, potentially riskier set of borrowers, compounding rather than mitigating credit risk (Ochenge, 2025).
The Kenyan banking sector is highly heterogeneous, with a small number of large banks coexisting alongside many smaller institutions that differ significantly in capitalization, diversification, and risk-bearing capacity (Kimundi, 2024). Kamau et al.(2004) posits that bank size is not merely a static institutional characteristic but a dynamic outcome of stringent regulatory capital requirements and shifting market structures. For instance, the CBK's escalation of minimum core capital thresholds of KES 3 billion and 10 billion by 2025 and 2029 consecutively has functioned as a structural catalyst for bank consolidation through takeovers, mergers and acquisitions (Cytonn, 2025) .

Existing studies report mixed effects: Pascual et al., (2025) found that increased holding of national debt is associated with elevated levels of impared loans indicating that banks hold sovereign debts as a way to protect themselves from credit risk. In contrast, D'Avino and Shabani, (2024) reported a positive association between foreign sovereign debt exposure and U.S. bank stability. Bottero, Lenzu and Mezzanotti (2023) demonstrated that higher sovereign bond holdings reduce lending and deteriorates capital ratios when bond spreads widen. In Kenya, Ochenge (2025) observed that increasing sovereign debt holdings contribute to the crowding-out of private credit and amplify systemic risk, though without addressing resilience metrics of each bank. Chibole et al. (2022) examine whether bank size moderates the relationship between financial distress factors including capital adequacy, liquidity, and asset quality and bank financial performance, finding no significant moderating effect. However, this prior test of bank size moderation does not extend to the sovereign debt exposure relationship specifically.

Afonso et al.(2024), found that banks held more government bonds in the time of the global financial crisis to stabalize the markets, which potentially heightened the overall risk exposure of banks by making their financial position more vulnerable to sovereign risk. Recent studies by Talam and Kiemo (2024), Lumumba et al. (2024), Deghi et al. (2022) reveal that rising sovereign debt exposure undermines Kenyan banks' capital adequacy, increases liquidity risk, and weakens performance, particularly during periods of monetary tightening. These results align with earlier studies by Qayyum and

Haider (2012), Hallak (2013) and Trad et al. (2017) linking fiscal stress and public debt to banking sector fragility.

While the relationship between sovereign debt exposure and bank stability is a critical area of concern, existing empirical evidence within the Kenyan context remains limited in scope and incomplete in design. Studies that examine this relationship in Kenya notably Ochenge (2025), Talam and Kiemo (2024) and Chibole et al. (2022) focused on the determinants of sovereign debt demand, on aggregate sector-level stability, and internal financial distress indicators without disaggregating findings by testing whether the sovereign exposure-stability relationship operates differently across Kenya's three-tier peer classification of large, medium, and small banks.

This study's aim was therefore to investigate the effects of sovereign debt exposure and the stability of banks in Kenya and more so across peer groups, offering insights for domestic policy makers and regional banking sectors (East Africa) across similar fiscal challenges.

1.3 Research Objectives

1.3.1 General Objective

The study sought to establish the moderating role of bank size on sovereign debt exposure and the stability of commercial banks in Kenya.

1.3.2 Specific Objectives

To address the general objective, the study achieved the following specific objectives:

i. To determine the effects of sovereign debt concentration on the stability of commercial banks in Kenya.
ii. To evaluate the effects of sovereign debt-induced crowding out of private credit on the stability of commercial banks in Kenya.
iii. To analyze the influence of sovereign credit ratings on the financial stability of commercial banks in Kenya.
iv. To examine the extent in which bank size moderates the relationship between sovereign debt exposure and commercial bank stability.

1.4 Research Questions

The study answered the following questions:

v. What is the effect of sovereign debt concentration on the stability of commercial banks in Kenya?

vi. To what extent does sovereign debt-induced crowding out of private credit affect the financial stability of commercial banks in Kenya?

vii. To what extent do changes in Kenya's sovereign credit ratings influence the overall stability of commercial banks?

viii. To what extent does the bank size moderate the relationship between sovereign debt exposure and commercial bank stability in Kenya?

1.5 Scope of the Study

As indicated by CBK (2025), Kenya had 38 licensed commercial banks and 1 mortgage institution, grouped into three peer categories: large, medium, and small banks. This study focused on these 39 banks by analyzing bank-level data covering the period 2010 to 2024. The study period was characterized by four distinct phases, beginning with the 2010–2012 baseline of institutional stability following the Constitution of Kenya 2010 and the initial adoption of Basel II. This was followed by a period of debt acceleration (2013–2015), after Kenya was reclassified as a lower-middle-income country, lost access to concessional loans, and shifted toward commercial debt and domestic treasury bonds. This trend further intensified during the 2016–2019 interest rate cap era, as banks shifted aggressively from private sector lending to government securities. The subsequent global shocks of 2020–2023 served as a critical stress test for bank resilience and capital buffers during the COVID-19 pandemic.

The researcher utilized published financial performance reports, including audited financial statements of banks, which provided the data for this research. Additionally, secondary data from CBK and the National Treasury were utilized, with commercial banks as the unit of analysis. The study included key variables such as sovereign debt concentration, private sector loans to total assets, sovereign credit ratings, bank stability indicator (z score), and bank-level controls including liquidity ratio, profitability and asset quality.

1.6 Significance of the Study

The outcomes of this research are valuable to the following parties:

1.6.1 Policy Makers and Regulators

For policymakers and regulators, the research provides critical perspectives on the implications of sovereign debt exposure on the stability of commercial banks across

different peer banks. Understanding this relationship helps in designing more effective regulatory frameworks and macroprudential policies that balance the need for banks to hold government securities with the risks of excessive concentration. The study guides the CBK, the National Treasury and KBA in crafting fiscal and monetary policies that mitigate systemic risks arising from the sovereign-bank nexus, ultimately safeguarding financial stability and promoting sustainable economic growth.

1.6.2 Bank Managers, Board and Practitioners

Bank managers, board members, and financial practitioners stand to gain from the study through obtaining a clearer comprehension of how sovereign debt holdings impact their institutions' risk profiles and bank liquidity. This knowledge informs strategic asset allocation decisions, risk management practices, and capital planning to enhance resilience against fiscal shocks and interest rate volatility. Additionally, the study provides a roadmap for Kenyan banks to balance between regulatory compliance, concentration and profitability, improving their long-term stability and competitiveness in the Kenyan financial market.

1.6.3 Academicians and Researchers

This research will enrich the current academic literature for researchers and scholars on the sovereign-bank nexus, with a focus on developing markets like Kenya. It will offer empirical evidence on the dynamics between sovereign debt exposure and bank stability and the importance of peer grouping of banks, enriching theoretical frameworks and providing a foundation for further research. The methodological approach of the study and findings will constitute a point of reference for comparative studies, policy analyses, and future investigations into financial sector resilience, systemic risk, and development finance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The second section of this research reviews relevant scholarly literature on the research questions. It will focus on the guiding theoretical lens, a discussion on the variables affecting sovereign debt exposure and bank stability, summary of the literature gap, the presentation of the conceptual framework and a discussion on the definition and measurement of variables.

2.2 Theoretical Review

The financial sector's focus on commercial banks' large-scale purchases of government papers has drawn notable interest within the scholarly literature on finance. Scholars have put forward multiple theoretical frameworks as it allows integration of diverse perspectives such as sovereign bank interlinkages and institutional context ensuring a more comprehensive and contextually relevant analysis. This research paper sought to explain the motivation behind banks' preferences for sovereign assets using the sovereign bank nexus theory also referred to "Doom Loop" or diabolic theory and the moral hazard theory as presented below.

2.2.1 Sovereign-Bank Nexus (Diabolic Loop or "Doom Loop" Theory)

This study was primarily guided by the sovereign bank nexus a theoretical framework that attracted significant attention during the onset of the European debt crisis of 2010 to 2012. Key economists such as Markus K. Brunnermeier, Emmanuel Farhi, Jean Tirole, and Philip Lane have significantly advanced the understanding of the doom loop, providing essential insights into its mechanisms and implications (Ari, 2018). This theory explains the two-way financial linkage between government finances and bank balance sheets often described as a *"dooms loop"* or diabolic loop (Farhi & Tirole, 2018). Banks are major holders of sovereign debt, and governments often implicitly backstop banks, so distress in one can quickly transmit to the other as argued by (Podstawski & Velinov, 2018), and (Faour & Saad, 2025). Under these circumstances losses on sovereign bonds erode banks' capital, forcing public bailouts that worsen the fiscal position and depress bond prices further.

Over time, the doom loop theory has been refined to incorporate more refined mechanisms. For example, recent models introduce the idea that banks' sovereign exposure can also strengthen government incentives to repay debt, as governments seek to avoid the severe disruption to the financial sector that sovereign default would cause (Thale & Rojas, 2023).

Key proponents of the doom loop theory include Brunnermeier et al. (2016), who argue for regulatory interventions such as reducing banks' domestic sovereign debt holdings or requiring banks to hold equity against sovereign exposures to break the loop. These scholars further propose innovative solutions like ESBies (European Safe Bonds) to diversify sovereign risk and reduce home bias in bank portfolios. Similarly, Capponi, Corell, and Stiglitz (2020) emphasize the importance of the network structure of sovereign debt ownership in determining optimal bailout policies, highlighting how the diabolic loop worsens systemic risk and the "too interconnected to fail" problem.

Currently, the sovereign-bank nexus is understood as a complex, bidirectional relationship influenced by regulatory frameworks, market structures, and crisis management policies (Ariccia et al., 2018). Borio, Farag, and Tarashev , (2020) asserts that post-global financial crisis reforms have aimed at boosting banks' loss-absorption capacity through increased capital and liquidity buffers and to improve resolution mechanisms to reduce the likelihood and impact of bailouts. Importantly, the intensity of the sovereign–bank nexus is not uniform across banks.

Bank size plays a critical moderating role, as larger banks are typically more systemically important, more interconnected with government finances, and more likely to benefit from implicit "too-big-to-fail" guarantees (Laeven et al., 2016). Erce (2015) opine that these characteristics strengthen the feedback loop by increasing both banks' incentives to hold sovereign debt and governments' incentives to support distressed large banks. Additionally, Dell'Ariccia, et al. (2018) argue that banks' holdings of domestic sovereign debt can directly influence their vulnerability to sovereign risk shocks, potentially triggering the doom loop if the government faces fiscal stress.

Additionally, bank stability which is measured through indicators such as capital adequacy, non-performing loans, or liquidity ratios, reflects the banks' resilience or fragility in response to sovereign risk. The regulatory capital requirements can mitigate the doom loop by ensuring banks have sufficient equity buffers to absorb losses from sovereign debt exposures, breaking or weakening the feedback loop between sovereign distress and bank instability (Miao et al., 2025). However, the effectiveness of capital buffers itself may vary by bank size, given differences in risk-taking incentives and systemic importance (Hendrawan et al., 2023). Collectively, the sovereign–bank nexus framework predicts that sovereign debt exposure impairs bank stability, particularly among larger banks due to their systemic interconnections. Consequently, this theory

established the basis for investigating the moderating role of bank size in the relationship between banks' sovereign exposure and bank sector resilience.

A critical limitation of the doom loop framework, however, is its implicit assumption of uniformity where the original models were developed in the context of large, systemically important European banks during the 2010–2012 eurozone crisis (Brunnermeier et al., 2016; Capponi, Corell, & Stiglitz, 2020), and their predictions may not translate straightforwardly to a heterogeneous banking sector such as Kenya's, where peer-group differences in size, capitalization, and funding structures are substantial.

The doom loop framework predicts that larger banks being more interconnected with sovereign finances and more likely to hold disproportionate shares of government debt face amplified transmission of sovereign risk shocks (Laeven et al., 2016; Erce, 2015). However, larger banks may also hold greater capital buffers and diversification advantages that reduce the very transmission the doom loop predicts.

2.2.2 Moral Hazard Theory

Moral hazard theory, rooted in 17th-century was formalized by Arrow (1963) and Pauly (1968), posits that one party engages in risky behaviour because another party bears the consequences. Jose et al., (2022) reinforce this argument, stressing the misalignment of risk-taking and cost-bearing responsibilities. In the banking sector, this arises when institutions take excessive risks due to implicit or explicit government guarantees such as deposit insurance or bailouts. Jensen and Meckling (1976) later embedded this theory in principal agent theory, highlighting information asymmetries between risk-taking agents in this case the bank managers and risk-bearing principals (depositors/governments).

While moral hazard originated in insurance economics, its contemporary relevance in banking is closely linked to the sovereign–bank nexus. As argued by Gropp, Gruendl, and Guettler, (2013), banks that anticipate state support tend to internalize fewer downside risks, resulting in higher risk appetite. In response to GFC, there was a shift toward the sovereign-bank nexus, resulting to banks holding significant holdings of government bonds, often incentivized by regulatory treatments such as zero risk-weighting under Basel Accords (Georgiadis, 2022). Abad (2019) holds the view that this regulatory environment fosters a feedback loop in which banks accumulate sovereign bonds under the assumption of government solvency, while governments rely on domestic banks as stable absorbers of public debt.

The proponents of the moral hazard view argue that sovereign debt exposure undermines stability by increasing balance-sheet vulnerability to sovereign risk shocks and intensifying risk concentration (Popov, 2013). For instance, Acharya and Steffen (2015) demonstrate that European banks expanded their portfolio to include more domestic sovereign bonds during the eurozone crisis, exploiting regulatory arbitrage and expecting government support in case of distress. Such behavior aligns with moral hazard predictions, whereby banks substitute private-sector lending with government securities perceived as implicitly guaranteed, thereby increasing interconnectedness between sovereign and banking risks.

Skeppas (2023) emphasizes that moral hazard theory also provides a framework for understanding heterogeneity in risk-taking behavior across banks. This suggests that large banks and better capitalized institutions may face different incentives and constraints, influencing the extent to which sovereign debt exposure affects stability. On the other hand, Pernell and Jung (2023) observe that moral hazard predicts instability and riskier banks face higher failure risk if guarantees encourage reckless exposure.

Conversely, the moderating role of bank size is especially relevant as banks holding large regulatory capital can mitigate risk-taking incentives by forcing banks to internalize a greater share of potential losses attributing to weaken moral hazard channel (David et al., 2020). Ultimately, moral hazard theory provided a critical lens for analyzing sovereign-bank nexuses. By connecting regulatory incentives to balance-sheet risk, this theory provided a strong foundation for analyzing differential stability outcomes across banks with varying structural characteristics.

2.3 Empirical Review

A synthesis of empirical literature is provided in this section examining the association between sovereign debt exposure aspects and the stability of commercial banks, focusing on four key variables including sovereign debt concentration and bank stability, sovereign debt-induced crowding out of private credit and bank stability, sovereign credit ratings and bank stability and size and bank stability.

2.3.1 Sovereign Debt Concentration and Bank Stability

To explain the association of banks' high sovereign debt concentration on bank stability, a feedback loop often called 'the doom loop' is created where bank balance sheets are intertwined with government fiscal health (Gómez-Puig & Sosvilla-Rivero, 2025) .

According to IMF (2018), banks invest substantial amounts of sovereign securities for purposes such as liquidity requirements, trade intermediation, and credit exposure.

Studies such as Adrian et al. (2025) find that the banking sector stress transmits to sovereign risk globally, with transmission intensity magnified by three factors including high public debt, concentrated bank holdings of domestic sovereign debt, and weak bank capitalization. This observed trend underscores the sovereign-bank nexus and concentrated exposure to government debt ensures that banks spread and intensify financial shocks rather than absorbing them.

Ochenge (2025) investigated the demand for Kenyan government securities by banks between 2005 and 2022, focusing on determinants of sovereign debt holdings and their systemic risk implications. The study found that budget deficits, high bond returns, and capital adequacy requirements significantly increase banks' demand for government securities. In addition, the findings highlighted that banks with stronger capital adequacy ratios increase sovereign bond holdings to leverage basel's zero-risk weighting, optimizing capital buffers.

However by considering other relevant literature alongside this, it becomes clear that the relationship between capital adequacy and sovereign bond holdings is strongly conditioned by bank size, with larger banks more able to exploit basel's zero-risk weighting due to superior balance sheet capacity and preferential access to government securities markets, thereby intensifying the bank sovereign nexus relative to smaller banks (Acharya & Steffen, 2015).

A study by Oyetade and Muzindutsi (2023) across African banks find that higher country risk to public-debt indicators correlate negatively with bank stability. This item adds to existing literature on a study by Afonso, Alves, and Monteiro, (2023) who investigated the composition of public debt ownership that is domestic, foreign, and central bank in 31 countries, between 1989-2022. The findings establish that heightened sovereign risk correlates with increased domestic banks' public debt holdings, creating a vulnerability loop. Banks in economies with elevated public debt-to-GDP ratios and significant domestic sovereign bond exposure experience amplified credit risk transmission during banking sector stress. While these reseachers establishes a macro-link between country risk and bank stability, they fails to account for bank-level heterogeneity. Specifically, it remains unknown if factors like bank size or capitalization can shield individual institutions from sovereign-driven credit contagion.

In Nigeria, Edeh et al., (2026) investigated the long-run impact of sovereign indebtedness and institutional quality on financial stability using rule of law as the moderating variable. The study results indicate that public debt has a significant negative effect on banking sector stability.This item's unique approach to examine debt concentration contributes to the literature by confirming that high public debt levels can overwhelm even strong rule of law protections, leading to systemic instability and weaker financial system.

Chronopoulos et al. (2020) sought to the identify determinants of sovereign debt holdings across a global panel of banks. The results established that home bias is universal; government-owned banks hold more debt and bank size is negatively related to holdings of sovereign debt. By considering the above discussed studies I consider bank size as a critical factor that determines how a Kenyan bank determines its portfolio. Larger banks may use their size to resist moral suasion or buffer against the resulting stability risks, whereas smaller or medium banks may lack the diversification to survive a sovereign debt shock.

Conversely, a study by Abinzano et al. (2022) found that using Eurozone listed bank data that sovereign debt holdings improve banks' credit risk when the riskiness of the sovereign debt itself is disregarded, but that this effect reversed when forward-looking, market-based credit risk measures were used instead. This finding is significant for the present study as it confirms that the direction of the sovereign exposure-stability relationship is not settled but conditional dependent on both the measure of bank stability employed and the underlying creditworthiness of the sovereign whose debt the bank holds. Importantly, Abinzano et al.(2022) did not test whether the direction reversal varies by bank size, capitalisation, or peer group.

Not all evidence points uniformly toward a destabilising effect of sovereign debt exposure. Deghi et al. (2022), in the examination of the sovereign-bank nexus in emerging markets, document that the effects of sovereign distress on bank balance sheets and credit supply are strongly nonlinear in the magnitude of the distress shock where transmission is limited at low levels of sovereign stress and amplifies disproportionately only above a threshold. This implies that high sovereign debt concentration is not inherently destabilising but it becomes destabilising conditionally when fiscal vulnerabilities breach a critical level.

2.3.2 Sovereign Debt-Induced Crowding Out of Private Credit and Bank Stability

Various studies consistently demonstrate that sovereign debt induces crowding out effect by diverting bank liquidity away from the private sector. This crowding-out effect operates primarily through a credit channel where banks restrict private lending to accommodate public debt thereby intensifying the sovereign-bank nexus and heightening systemic stability risks (Yun Bai et al., 2024; Attout et al., 2022; Ari, 2018). Gennaioli et al., (2018) observes that the reason why banks substitute toward domestic sovereign bonds is because these instruments serve as high-quality liquid collateral, that enjoy favorable regulatory treatment and can be pushed on banks by moral suasion**.** According to Acharya and Steffen (2015) banks prioritize short-term returns through risk-shifting when sovereign spreads rise. This "yield-chasing" behavior temporarily boosts earnings but compromises institutional stability by increasing exposure to funding and credit shocks.

From a credit channel perspective, increased bank exposure to sovereign debt is strongly correlated with a contraction in private-credit growth across emerging markets. This 'crowding out' effect is significantly amplified during periods of fiscal instability or in economies with underdeveloped financial markets (Bouis , 2019). For instance, in Sub-Saharan Africa, Mbate, (2013) makes a significant contribution by establishing the non-linear relationship between domestic debt and economic growth in SSA and demonstrates the crowding out effect on private sector credit. However, the study leaves important questions unanswered regarding the heterogeneous effects within the banking sector and the specific implications for bank stability.

In Kenya Kodongo, (2025) investigated the effects of sovereign debt unsustainability on private sector credit growth in Kenya. The study finds out that there is a strengthened negative relationship during unsustainable debt periods, with banks contracting credit supply amid rising government lending.

From a European perspective, Becker and Ivashina (2018) conducted a study on the impact of financial repression on the banking sector in several European countries. The study found that increased domestic sovereign bond holdings by Eurozone banking sectors, particularly between 2010 and 2013, led to a crowding out of corporate lending. However, this effect was exclusive to the European debt crisis of 2010 to 2011. I find that these studies agree on the fundamental outcome where when the state increases its reliance on domestic banks for funding whether due to unsustainability or crisis-driven repression, the private sector suffers from reduced credit availability. Additionally, EIB

(2022) notes that the COVID-19 pandemic-era portfolio shifts intensified crowding out despite policy support.

Evidence from Nigeria indicates that bank holding domestic debts restricts private credit and drives up lending rates (Jato & Nwankwo, 2024). Similarly, evidence from Tanzania reveals that government expenditure and domestic borrowing exert a long run 'crowding out' effect on private sector credit by significantly driving up lending rates (Mwakalila , 2020). These findings are collaborated on a global scale by Kabir (2020), who documents a 'dollar-for-dollar' crowding out of private credit across 73 developing economies between 1995 and 2014. In these cases, banks prioritize sovereign securities over private loans, seeking the perceived safety of government assets at the expense of broader economic lending.

Certain bank level characteristics such as size, capitalization, liquidity and funding structure effects mean that crowding-out is not uniform across banks (García & Suárez, 2025). According to Bouis (2019), robust capitalization allows larger banks to hold government securities while simultaneously maintaining private lending. Conversely, weaker, smaller banks often engage in a more aggressive shift toward sovereign assets. This sovereign demand is further intensified during periods of stress by state-owned banks and pension-fund channels, which act as primary absorbers of government debt. Ochenge (2025) in Kenya shows fiscal deficits and bond yields drive sovereign holdings, increasing systemic risk via the "doom loop," where sovereign distress impairs bank balance sheets. World Bank analysis (2019) across 36 EMDEs confirms rising nexus, with banks' sovereign exposure doubling since 2007, limiting fiscal space for banking crises.

These arguments motivate my research question on to what extent does sovereign debt-induced crowding out of private credit affect the bank stability particularly in emerging and fiscally constrained economies where banks play a dominant role in public debt financing. While existing studies robustly document that rising sovereign exposure crowds out private lending and strengthens the sovereign–bank nexus, they provide limited causal evidence on how this reallocation translates into bank stability outcomes and whether such effects differ systematically across banks. In particular, the literature underexplores the moderating role of bank size and balance-sheet strength in shaping whether sovereign holdings serve as liquidity buffers or sources of heightened solvency and funding risk during fiscal stress.

2.3.3 Sovereign Credit Ratings and Bank Stability

The relationship between sovereign credit ratings and bank stability is grounded in the sovereign bank nexus literature, which documents a strong bidirectional linkage between government creditworthiness and banking-sector resilience (Ghachem et al., 2022). According to Afonso et al., (2011) sovereign credit ratings as generated by agencies like Fitch, S&P and Moody provide a standardized framework for assessing a nation's financial resilience and risk profile. This is achieved by synthesizing indicators such as macroeconomic stability, fiscal health, and governance quality which inform global capital pricing. While primarily used to price debt, these ratings also reflect the underlying drivers of banking fragility, including external vulnerabilities and geopolitical hazards (Reusens & Croux, 2017).

Adrian et al., (2025) observes that sovereign credit ratings impact the banking sector through three primary transmission mechanisms including balance sheet channel, funding cost and market access channel. First, through the balance sheet channel, sovereign downgrades reduce the market value of government securities held by banks, generating valuation losses and weakening capital positions. Specifically, Thale and Rojas, (2023) validates this argument that sovereign credit downgrades devalue the liquid assets held on bank balance sheets and tighten external funding conditions by raising risk premiums. These effects are often compounded by a 'doom-loop' dynamic, wherein the fiscal health of the state and the stability of the domestic banking system become inseparably linked and mutually reinforcing. For instance, the Zambian sovereign default in 2020 illustrates this mechanism where a downgrade event coincided with rising inflation and borrowing costs, intensifying pressures on an already fragile banking system (Grigorian & Bhayana, 2024).

Second, sovereign rating downgrades raise banks' funding costs and restrict access to external finance. Cross-country evidence shows that downgrades are associated with higher wholesale funding spreads, reduced interbank liquidity, and tighter credit supply (Kowalewski et al., 2025; Mensah et al. 2017, Adelino & Ferreira, 2014), Sahibzada et al., 2022). Mensah et al. (2017) find that deteriorating sovereign ratings significantly increase banks' cost of funding and compress profitability, whereas upgrades improve liquidity conditions. In low developed financial systems, these effects are amplified. Adelino & Ferreira (2014) supports this view by arguing that in countries with less developed financial markets, high bank exposure to domestic sovereign debt intensifies

the capital and liquidity pressures triggered by rating downgrades, which fundamentally impair the collateral utility of government bonds and restrict interbank funding access. A study by Oyetade and Muzindutsi, (2023) focusing on all the publicly listed commercial banks in Africa find that rating downgrades are associated with higher bank non-performing loans and lower loan growth where banks hold large sovereign portfolios implying that cross-country work calls for macro-prudential limits on sovereign concentration. This suggests that sovereign rating dynamics not only weaken bank balance sheets directly but also transmit through deteriorating macroeconomic conditions and credit quality.

Complementing this view, Arogundade et al. (2025) establish that improved sovereign credit ratings enhance financial development by lowering borrowing costs and strengthening investor confidence, while also documenting bidirectional causality between sovereign ratings and financial sector performance. This reinforces my the view that sovereign risk and bank stability are mutually reinforcing processes.

2.3.4 The Moderating Role of Bank Size and Bank Stability

Bank size has received considerable attention in banking literature because it may change the strength and direction of relationships between bank-level strategies, risk exposure, and financial stability (Bouteska et al., 2026). Bank size is commonly measured as the natural logarithm of total assets, while stability is often proxied by the Z-score, capital adequacy, non-performing loans, insolvency risk, or earnings volatility. The moderating role of bank size is therefore based on the argument that large and small banks do not respond uniformly to risk, diversification, liquidity, capital, governance, or market-structure conditions (Bank for International Settlements , 2018).

However some studies show mixed results. Chowdhury et al. (2024) studyed listed commercial banks in Bangladesh from 2018 to 2022 and found that income and asset diversification positively affect bank stability, but bank size moderates these relationships negatively. This means that diversification benefits may be stronger for smaller or medium-sized banks than for very large banks. The implication is that large banks may already possess diversified portfolios, so additional diversification produces diminishing stability gains. This supports the argument that bank size conditions the strength and direction of the relationship between strategic banking variables and stability.

In this study bank size moderates the relationship between sovereign debt exposure and bank stability suggesting that size exerts both amplifying and mitigating effects on

banks' vulnerability to sovereign risk. From a theoretical perspective, larger banks may amplify the adverse effects of sovereign debt exposure through concentration amplification, systemic interconnectedness, and the too-big-to-fail incentive distortion (Acharya & Steffen, 2015). According to Farhi and Tirole (2018) large banks typically hold greater absolute volumes of sovereign securities, making them more susceptible to substantial capital losses when sovereign creditworthiness deteriorates, while their systemic importance strengthens the sovereign-bank "doom loop" by intensifying fiscal and financial sector interdependencies.

Additionally, expectations of government support may encourage excessive sovereign debt accumulation, thereby increasing risk exposure through moral hazard behaviour (Freixas et al., 2015). Conversely, large bank size can reduce these risks. Stronger financial buffers and stricter regulation help large banks absorb losses and avoid excessive risk-taking (Berger & Bouwman, 2013). More over, larger banks benefit from broader funding sources and greater portfolio diversification, reducing earnings volatility and strengthening overall resilience to shocks (Adusei, 2015). Accordingly, the net moderating effect of bank size on the sovereign exposure stability nexus reflects the simultaneous interaction of these mechanisms, with the observed outcome depending on whether risk-amplifying forces outweigh the stabilizing influences within a given regulatory and institutional environment.

Several studies have examined the moderating role of bank size and the relationship between sovereign debt exposure and bank stability. For instance, from the eurozone lens Martínez and Pascual (2022) using system GMM on panel data covering 2010–2017 examined the bank specific and macroeconomic factors that motivate the European Less Significant Institutions (LSIs) to increase their sovereign debt exposure. The study found identified capitalization and credit quality as key determinants of sovereign exposure, indirectly linking size, risk-taking, and stability.

Kakes and Nijskens (2018) conducted a study on the relationship between banking sector size, financial stability and systemic risk analysing 38 advanced and emerging economies. Statistical analysis showed that larger banking sectors are associated with leverage and wholesale funding risks, whereas smaller sectors exhibit stronger sovereign concentration and home bias. Although the study highlights how size shapes stability channels, it operates at the aggregate sector level rather than the individual bank level and relies largely on correlations rather than causal identification. These findings imply heterogeneity in risk transmission by size but fails to test bank-level size

as a moderator between sovereign exposure and stability. This leaves a micro-level gap relevant for Kenya banking sector.

In a study by Gondwe et al. (2025) on how foreign bank penetration affects domestic banking sector stability in Sub Saharan Africa covering 270 banks. The study found out that larger banks are less stable, supporting the too-big-to-fail hypothesis, while smaller and less capitalised banks are more vulnerable to foreign competition. The study used panel fixed-effects and GMM estimations and incorporate bank size as a determinant of stability but did not explicitly test interaction effects between size and other risk exposures. Although the study introduces heterogeneity by bank type and governance quality, it focuses on foreign bank penetration rather than domestic sovereign exposure.

In Kenya, Chibole et al.(2022) conducted a study to assess whether bank size moderates the relationship between financial distress factors including capital adequacy, liquidity, and asset quality and financial performance of commercial banks in Kenya. The study used hierarchical panel regression using 2014 to 2020 data and ROA as proxy for performance. The study found out that there is no significant moderating effect. While In Ghana, Adusei (2015) using panel data on Ghanaian rural banks, found a robust positive relationship between bank size and stability, measured through multiple risk-adjusted indicators. This study advanced several channels including capital buffers, diversification, and supervisory monitoring through which larger size enhances resilience.

However, unlike the study by Chibole's study, Adusei's study focused on rural banks in a single country and did not assess how size interacts with asset composition, particularly sovereign debt holdings. This absence of interaction creates a gap on whether bank size weakens or stregnthens the relationship between sovereign debt exposure and bank stability.

From the above literature, bank size is consistently recognised as a relevant factor in commercial bank stability, but the literature is genuinely divided on both the direction of its effect and the mechanism through which it operates. Kakes and Nijskens (2018) and Gondwe et al. (2025) document size as a determinant of stability without testing interaction effects directly, while Chibole et al. (2022) explicitly test bank size as a moderating variable in the Kenyan context using hierarchical panel regression with financial distress factors, and Adusei (2015) examines size-related channels of stability, capital buffers, diversification and supervisory monitoring without testing a formal

interaction specification. This study is therefore to test whether bank size moderates the relationship between sovereign debt exposure specifically across the three distinct channels of concentration, crowding-out, and credit rating linkage and a measure of bank stability, within the Kenyan commercial banking sector.

2.4 Summary of Literature Review and Gaps

Multiple studies on the association between sovereign debt exposure and bank stability in developing, developed and emerging markets exists. The reviewed literature reveals a progressive narrowing of scope from global and regional studies toward more specific national contexts, highlighting key research gaps that this study on Kenya aimed to address.

Sovereign debt concentration measured as the share of government securities in bank assets is widely associated with systemic vulnerability through the "doom loop" mechanism (BIS, 2018; IMF, 2018). Cross-country analyses such as Adrian et al. (2025) employ global panel regressions and spillover models (panel VAR frameworks) to show that banking stress transmits to sovereign risk, particularly where public debt is high and bank capitalization weak. In African evidence largely relies on bank-level panel fixed effects and dynamic panel GMM models. Oyetade and Muzindutsi (2023), using panel regression on listed African banks, find a negative relationship between sovereign risk indicators and bank stability measure using Z-score. Edeh et al. (2026) apply ARDL cointegration techniques to Nigerian time-series data to assess long-run debt stability relationships, incorporating institutional quality as a moderator.

Chronopoulos et al. (2020), using a global bank-level panel with fixed effects, identify determinants of sovereign holdings and document universal home bias. While these studies establish correlation and dynamic linkages, most rely on system GMM or fixed effects estimators to address endogeneity, yet they rarely incorporate interaction terms to test whether bank size conditions exposure effects.

The sovereign debt-induced crowding out literature demonstrates that higher sovereign borrowing reduces private credit supply, particularly in emerging markets (Ari, 2018; Attout et al., 2022; Bai et al., 2024). Gennaioli et al. (2018) use cross country panel regressions with bank level balance sheet data to link sovereign bond holdings to reduced private lending. Becker and Ivashina (2018) adopt a framework exploiting the Eurozone crisis (2010–2013) to show that banks increased domestic sovereign holdings while cutting corporate lending. Kabir (2020) employs panel fixed effects models

across 73 developing economies, identifying near "dollar-for-dollar" crowding out effect.

Additionally, country-specific African studies apply time-series and panel ARDL models (Mwakalila, 2020; Jato & Nwankwo, 2024) to estimate long-run effects of domestic borrowing on credit supply. Kodongo (2025) uses Kenyan bank level panel regressions, showing stronger negative credit effects during debt-unsustainable periods. On the sovereign credit rating, Mensah et al. (2017) use cross-country panel regressions with bank-level funding cost data, while Kowalewski et al. (2025) apply event-study methodologies combined with panel estimations to evaluate funding spread reactions to downgrades. Thale and Rojas (2023) use bank level panel regressions with mark-to-market valuation effects, while Oyetade and Muzindutsi (2023) estimate dynamic panel models linking rating changes to non-performing loans and Z-scores.

In various studies bank size has been included as a control variable rather than a moderating variable. Martínez and Pascual (2022) employ system GMM estimation on Eurozone bank panel data from 2010 to 2017 to identify determinants of sovereign exposure. Kakes and Nijskens (2018) use cross-country macro-panel regression techniques to link aggregate banking sector size to systemic risk. Gondwe et al. (2025) apply panel fixed effects and system GMM to 270 Sub-Saharan African banks, examining size as a determinant of stability but not interacting it with sovereign exposure.

In Kenya, Chibole et al. (2022) use hierarchical panel regression with interaction terms to test size moderation in financial distress–performance relationships, finding no significant moderating effect. Adusei (2015), using panel regression on rural banks in Ghana, finds a positive relationship between bank size and bank stability through diversification and capital buffers.

Table 2.1 Summary of Literature Review and Gaps

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
Ochenge (2025)	The study investigated the demand for Kenyan government securities by banks between 2005 and 2022, investigating the drivers of sovereign debt holdings and their impact on systemic risk.	The study revealed that fiscal deficits, high bond yields, and capital adequacy requirements all play a major role in boosting banks' demand for government securities.	Ochenge, (2025) focused on the demand and factors influencing debt holdings and their systemic implication	The current study extend from demand and focus on how size effect alters the impact of sovereign debt exposure on individual bank stability metrics.
Oyetade and Muzindutsi (2023)	The research examined the relationship between country risk and publicly listed commercial bank financial stability in 10 African nations including Botswana, Egypt, Ghana, Kenya, Morocco, Namibia, Nigeria, South Africa, Swaziland, and Tanzania using data from 2000 to 2021.	The study found that adhering to Basel II capital requirements helps banks mitigate the short-term negative effects of country risk. Furthermore, complying with Basel III regulations provides banks with even greater long-term resilience	The study uses multi-country African panel data but does not provide granular, country-level insights. The study uses only publicly listed commercial banks.	This study used country specific analysis exclusively on all Kenya commercial banks.

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
Afonso, et al. (2024)	The study investigated how sovereign risk influences the composition of public debt holdings across different types of banks (domestic, foreign, central), using data from 31 countries from OECD over 1989–2022	The study revealed that rising sovereign risk increases public debt holdings by both domestic and foreign commercial banks, while reducing those of central bank.	The current study is based on 31 countries, predominantly European, and does not include specific analysis for African economies like Kenya. The paper does not explore the internal characteristic of bank size as a moderating factor.	The research targeted commercial banks operating within Kenya with a specific focus on bank size.
Edeh et al.(2026)	To examine the long-run impact of sovereign indebtedness and institutional quality on financial stability using the rule of law as the moderator.	Public debt has a significant negative effect on banking sector stability and high debt levels can overwhelm institutional protections and lead to banking distress.	The study looked at macro-institutional indicators and did not look at bank-level indicators as well did not disaggregate the banking sector by size	This study used bank size as a moderator

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
Chronopoulos et al.(2020)	To identify determinants of sovereign debt holdings across a global panel of banks	The study established that home bias is universal; government-owned banks hold more debt and bank size is negatively related to holdings of sovereign debt	The study proved that size affects holdings, but did not test how size affects the stability resulting from those holdings	This study investigatedthe magnitude in which bank size affects the relationship between sovereign debt exposure and bank stability.
Mbate (2013)	The study investigates the impact of domestic debt on economic growth and private sector credit in Sub-Saharan African (SSA) countries.	The study results indicate that domestic debt exerts a crowding-out effect on private sector credit which stifles capital accumulation and serves as a significant deterrent to private sector-led economic growth.	Use of aggregate regional analysis leading to lack of micro-level analysis of banking sector mechanisms. Treat bank sector as homogenous.	This study utilized bank level granular data. Furthermore, it will incorporate bank size as a moderating variable to account for institutional heterogeneity,
Kodongo (2025)	To investigate the impact of sovereign debt unsustainability on private sector credit growth in Kenya, specifically testing for a "crowding-out" effect and the moderating role of financial conditions.	There is a significant negative relationship between sovereign debt and private credit growth (crowding out).	Thes study focus outcome was credit growth	This study expanded the research scope to bank stability which is more comprehensive and not limited to just credit growth.

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
Mwakalila (2020)	The study examined the impact of government expenditure and domestic borrowing on credit to the private sector in Tanzania	Government expenditure and domestic borrowing crowd out credit to the private sector by increasing the lending rate in the long run	The study fails to differentiate between large, medium, and small Banks	The current study tested whether the sovereign debt exposure and bank stability relationship varies by bank size in the Kenya Context.
Jato and Nwankwo (2024)	To investigate the effect of public debt on private-sector credit in Nigeria, specifically to determine if public sector borrowings crowd out the private sector in credit acquisition through a rise in interest rates.	There is a significant crowding-out effect, where a one-unit increase in public debt leads to approximately a 1.49-unit decrease in private-sector credit	Focused on Nigerian Context and treated banks as homogeneous.	Introduces bank size as a moderating variable to examine heterogeneous effects across different types of banks.
Arogundade et al.(2025)	To examine the impact of sovereign credit ratings on financial development in 21 African countries (1995–2019), and to test causality and	Sovereign credit ratings have a significant positive impact on overall financial development, financial institutions, and financial markets and the	Focus primarily on macro-financial development level	The current study focused on bank-level financial stability data in Kenya.

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Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
	distributional effects using system GMM, JKS Granger non-causality, and Machado–Silva quantile regression	effect is stronger in countries with higher levels of financial development.		
Takawira and Mwamba (2020)	To examine the effects of sovereign credit ratings on financial stability in South Africa using quarterly data from 1999 to 2018.	The study found out that sovereign credit rating index had minimal impact on most financial stability categories and was largely insignificant as an independent variable.	Lack of disaggregated analysis of how sovereign risk affects different components of the financial system.	The current study focused on bank size as a moderating variable, recognizing that large, medium, and small banks may exhibit different risk profiles and resilience levels.
Mutize and Gossel (2018)	To investigate whether sovereign credit rating announcements by major agencies (Moody's, S&P, Fitch) provide valuable information to bond and equity markets in 24 African countries from 1994 to 2014.	The study found out that positive outlooks are not relevant information to investors and generate no significant excess returns such as effects on stock price adjustments while negative outlooks have a significant impact on the majority of African financial markets.	Lack of examination of whether institutional characteristics affect sensitivity to sovereign rating changes.	This study addressed the gap regarding differential responses across bank peers.

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
Mensah et al. (2017)	To investigate the sovereign-bank nexus by examining the impact of sovereign credit ratings on the funding costs of 17 banks in Africa between 2006 and 2012.	There is a significant inverse relationship between sovereign credit ratings and bank funding costs. Specifically, sovereign rating upgrades are found to reduce the cost of capital for banks, facilitating enhanced access to global financial markets at substantially lower interest margins compared to periods following a sovereign downgrade	The study uses multi-country African panel data but does not provide granular, country-level insights.	This study used country specific analysis exclusively on all Kenya commercial banks
Abinzano, Corredor, & Fernández, (2022)	The study examined the role of holding sovereign debt as a determinant for banks' credit risk on the Eurozone banking system (2008-2016).	The study demonstrated that unweighted sovereign debt holdings are associated with lower bank credit risk and risk-weighted sovereign debt holdings, when accounting for credit default swaps (CDSs). Basel II risk weights are associated with higher bank credit risk.	The study used forward-looking credit-risk measures based on market data. The study focused on the emerging markets and developed economies capture the transmission.	The current study used standard Z score as measure of stability, focusing in Kenya banking sector.

Author	Purpose of the Study	Findings	Research gap	Contribution of the Present study to addressing the research gap
(Deghi et al., 2022)	Examined the sovereign-bank nexus in emerging market economies in the wake of the COVID-19 pandemic.	Effects are strongly nonlinear in the size of sovereign distress: small sovereign shocks have limited transmission, but larger distress episodes produce disproportionately amplified stability damage a threshold-based, non-linear relationship.	Non-linearity documented but not explained by bank structure	This study provided a bank-structural explanation

Source (Author, 2025)

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2.5 Conceptual Framework

Drawing from the above reviewed literature and the rationale of the study, the proposed conceptual framework below outlines the relationship between independent variables that is sovereign debt concentration, crowding out of private credit, and sovereign credit ratings, the dependent variable bank stability, and the moderating variable (bank size). The dependent variable bank stability was measured by the standard Z score. Bank size was positioned to moderate the relationships between sovereign debt exposure variables and bank stability, with the direction and magnitude of moderation varying based on bank-specific characteristics and risk management capabilities. In this study bank size was measured using the weighted composite market index forming bank peer groups. To control for alternative influences, control variables were included such as profitability (ROA), liquidity risk and asset quality. This framework provides a structured basis used to test the causal relationships and moderating effects that underpin the study's hypotheses as illustrated in Figure 2.1 below.

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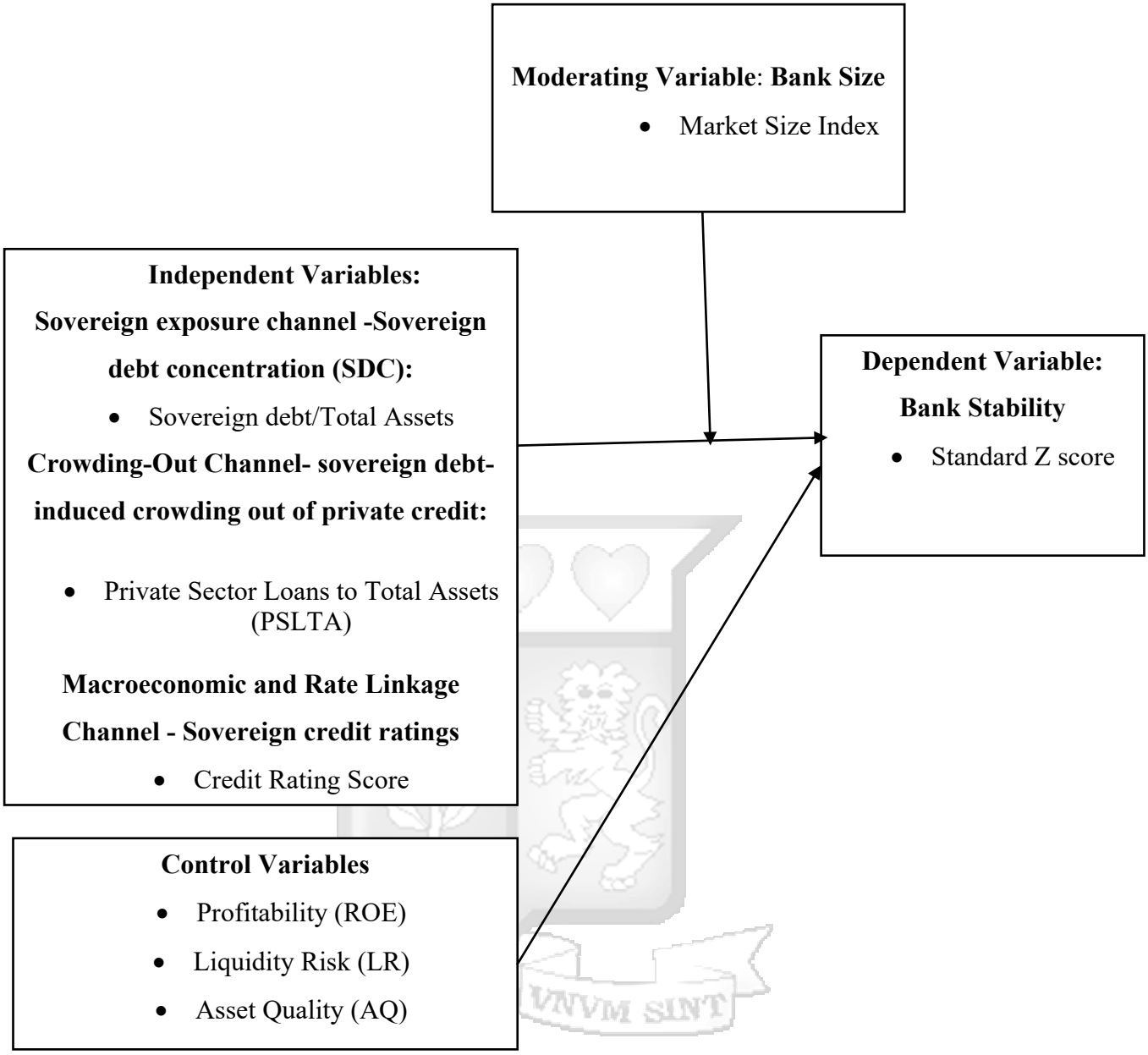


Figure 2.1 Conceptual Framework

Source: Author (2025)

2.5.1 Operationalization of the Variables

Table 2.2. Below represents the operationalization of the study variables

Table 2.2. Operationalization of the Variables

Variables	Abbreviation	Description	Measurement	Source	Supporting Theory
Independent Variables					
Sovereign Debt Concentration	*SDC*	Share of government securities within banks' investment portfolios	Government securities/total assets (%)	BIS, (2018), Acharya et al. (2022);	Doom-loop / sovereign–bank nexus
Sovereign debt-induced crowding out of private credit-Private Sector Loans to Total Assets (PSLTA)	*GDPC*	Portfolio allocation trade-off between private lending and sovereign holdings (crowding-out channel)	Private Sector Loans / Total Assets	(Yun Bai et al., 2024)	Sovereign-Bank Nexus Theory
Sovereign credit ratings Scores	*SCRs*	Change in sovereign creditworthiness affecting bank balance sheets	Annual numerical credit rating score (0–100 scale), where higher scores indicate stronger creditworthiness and lower default risk.	(Adrian et al., 2025)	Sovereign-Bank Nexus Theory
Dependent Variables					

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Variables	Abbreviation	Description	Measurement	Source	Supporting Theory
Bank Stability	*ZSCORE*	Distance-to-default proxy combining profitability & leverage-measures distance to default and risk-taking behavior	Z=(ROA+Equity/Assets)/σ(ROA)	Hafeez, Li, Kabir, and Tripe, (2022)	Moral Hazard Theory
Moderating Variables					
Bank Size	SIZE	The grouping of banks per Central Bank of Kenya based on financial statement characteristic	Market Share Index	(Bhagat et al., 2012)	Moral Hazard Theory
Control Variables					
Profitability (Return on Equity)	*ROE*	Indicator of a bank's ability to generate profit from Equity capital	Net income / Total Equity (%)	Abdelmoneim & Yasser, (2023)	Moral Hazard Theory
Liquidity ratio	*LR*	Indicates the capacity of a bank to fulfill its short-term liabilities	Loans - deposits) / total assets (%)	(Ochenge , 2025)	Moral Hazard Theory
Asset Quality	*AQ*	Loan Loss Provision Ratio	Non-performing loans /Total Loans	(Kuria et al., 2024)	Sovereign-Bank Nexus Theory

Source: Author (2025)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section elaborates the methodological approach that was used for this research. It covers the research philosophy, population and sampling techniques, data collection methods, data analysis and presentation, research quality, and ethical considerations of the study.

3.2 Research Philosophy

According to Crotty (1998), research philosophy encompasses the assumptions, beliefs, and guiding principles that shape how a researcher undertakes a study. It influences the selection of research methods, approaches to data collection, and procedures for data analysis. This study adopted a positivist research philosophy, which aligned with the quantitative nature of the inquiry through the employment of quantitative analysis of secondary financial data, the use of econometric modelling of stability indicators, and regulatory threshold testing.

Positivist research philosophy was appropriate for the research as it emphasized objective measurement, empirical observation, and the testing of hypotheses through statistical analysis (Creswell & Creswell, 2018). This approach supported the study's objective to establish causal relationships between sovereign debt holdings, bank stability indicators, and bank size using quantitative data and statistical techniques. This philosophical position held that reality was external to the researcher and could be objectively observed and evaluated using empirical approaches (Saunders et al., 2023).

Guided by the research questions and conceptual framework presented earlier, the study followed a deductive logic. This deductive strategy involved examining theories on the sovereign-bank nexus and bank size to generate testable hypotheses, which were then tested using empirical evidence. To achieve a comprehensive understanding, a panel approach utilizing quantitative data collection methods was adopted, drawing from secondary sources.

3.3 Research Design

The study was designed to examine the moderating role of bank size on sovereign debt exposure and the stability of banks in Kenya, thus a quantitative, explanatory research design utilizing longitudinal panel data approach analyzing 39 banks in Kenya for a period between 2010 to 2024 was applied. Oyetade and Muzindutsi, (2023) used

quantitative research design in their study on country risk and financial stabilty. The explanatory design was appropriate as it sought to establish causal relationships between the independent variable (sovereign debt exposure), the dependent variable (bank stability), and the moderating variable (bank size). Its primary aim was to explain why or how certain phenomena occur by testing hypotheses and determining the direction and strength of associations (Creswell & Creswell, 2022).

The study utilized a longitudinal panel data approach because it combined cross-sectional data from 39 commercial banks in Kenya with time-series observations spanning 2010 to 2024. This approach was appropriate as it enabled the examination of changes in bank stability and sovereign debt exposure over time while accounting for heterogeneity across banks.

Consistent with studies by Njuguna and Mathuva, (2024), panel data approach was particularly chosen because it provided advantages such as, reducing bias in estimation, increasing efficiency and capturing observable heterogeneity which is present across all commercial banks in Kenya. Troeger, (2020) argue that integrating time series with cross-sectional data enhances both the quality and quantity of these data, achieving insights that neither time series nor cross-sectional designs could provide independently. The year 2024 provided the most recent published and available data by the time of the study completion.

3.4 Population and Sampling

The study's target population consisted of 39 banks licensed and regulated by the CBK, operating within the country between 2010 and 2024. The choice of the 39 banks was informed by two main reasons; these banks constituted the entire population of licensed commercial banks in Kenya ensuring comprehensive coverage of the sector, and the financial and regulatory data for these banks was publicly available through CBK reports and banks audited financial statements, facilitating robust empirical analysis.

The choice of 2010 as the starting point was motivated by economic changes marked the implementation of key banking sector reforms following the global financial crisis while year 2024 as the end point was selected because it represented the most recent period for which complete annual data are available. It also captured the aftermath of the COVID-19 pandemic. This is a long-term period with different structural changes as discussed below.

The 2010-2024 period was informed by structural changes that lead to significant changes in Kenya banking sector for example pre 2014 there was implementation of new prudential guidelines Basel II aligned (increase in core capital requirement) and debt acceleration in Kenya (2013-2015). During this period, government securities became increasingly integrated into banks' liquidity management and capital allocation strategies, strengthening the sovereign–bank nexus.

In addition, other major structural shocks included the introduction of IFRS 9 in 2018 which altered loss-provisioning and capital buffers. This accounting reform altered the way sovereign credit risk is measured and reported in bank balance sheets, creating an important structural break that distinguishes the pre- and post-IFRS 9 periods. The COVID-19 era between 2020 to 2021 and the subsequent rate-hiking cycle reshaped banks' risk and sovereign appetite. This period was characterized by elevated government borrowing requirements alongside rising interest rates, which increased sovereign debt exposure while simultaneously reducing the market value of banks' existing government securities holdings.

Kenya banking sector is categorized into three peer groups (large, medium and small) using the weighted composite market share index (WCMSI), (Muriithi, 2021). As of December 2023, there were 9 banks in the large peer group, 8 banks in the medium peer group and 22 banks in the small peer group (Okwiri & Muathe, 2024). The use of the bank size ensured that this research fully captured the distinct characteristics and systemic importance of each group of banks, leading to more refined and actionable findings for understanding the effects of sovereign debt exposure and bank size in Kenya.

3.5 Data Collection Methods

The study relied on secondary data obtained from audited financial reports of commercial banks and records from CBK's bank supervision report and Kenya national treasury for a period between 2010 to 2024. Specifically, the researcher collected and analyzed bank level data such as sovereign debt holdings, private sector loans to total assets and bank stability indicators for each commercial bank over the period of the study. Additionally, data on macroeconomic variables and some bank structural variables were obtained from world bank database and the central bank of Kenya. What's more the bank level data was compiled by aggregating data across banking peer groups. This study used group level data which was compiled by aggregating data

across bank peers. Data sourced from statutory regulators, such as the CBK, provided a comprehensive basis for robust analysis, interpretation, and inference.

3.6 Data Analysis and Presentation

3.6.1. Empirical Model

To examine the effects of sovereign debt exposure on the stability of commercial banks in Kenya using bank size as a moderating variable, panel data regression analysis model was applied. Panel data involves cross-sectional observations across banks, allowing the study to exploit both inter-bank differences and temporal dynamics simultaneously (Humphrey, 2019). This dual nature increased variability in explanatory variables, which improved the precision of coefficient estimates (Ibrahim & Arundina , 2022). Consistent with Chand et al., (2021), and Čihák and Hesse, (2010), standard score is a bank stability indicator that measures how much volatility in returns a bank's capital buffer can absorb before insolvency.

The researcher used the standard Z score model as adopted by Elnahass et al., (2021). The standard Z score model which focuses on the use of historical financial data such as ROA and volatility of ROA has received critics that it is "backward looking" (Hafeez et al, 2022). However, despite the critics Khan, Scheule, and Wu, (2017) asserts that the standard z score continues to be significant in predicting bank stability.

Using the Z- score measure of bank stability I formulated two empirical models guided by the following general model adopted by Elnahass et al., (2021), Hafeez et al., (2022), Fu et al., (2014) and Mathuva, (2025):

$$Z_Score\ (B_Stability)\ i,t = [\underline{ROAi,\ t + Equityi,\ t / Assetsi,t}]$$
$$\sigma ROAi,\ p$$

Where by bank stability (*B_Stability*) is denoted by *Z_Score* of bank *i* in time *t,* ROA *it* is the return on assets of bank *i*, in time *t*. Equity*it*/Assets *it* is the equity to asset ratio *and* σROA*it* is the standard deviation of ROA of bank *i* in time *t* over the sample period. The base model 3.1 was used to establish the bank stability using historical accounting data without the moderator as shown below:

$$BStability_{i,t} = \alpha + \beta_1 SDC_{i,t} + \beta_2 PSLTA_{i,t} + \beta_3 SCR_t + \beta_4 ROE_{i,t} + \beta_5 LR_{i,t} + \beta_6 AQ_{i,t} + \varepsilon_{i,t}$$

..... Model 3.1

Model 3.2 was used to establish the bank stability using historical accounting data while incorporating the bank size as the moderator as shown by model below:

$$BStability_{i,t} = \alpha + \beta_1 SDCi,t + \beta_2 PSLTA_{i,t} + \beta_3 SCR_t + \beta_4 (SDC_{i,t} \times SIZE_{i,t}) + \beta_5 (PSLTA_{i,t} \times SIZE_{i,t}) + \beta_6 (SCR_t \times SIZE_{i,t}) + \beta_7 ROE_{i,t} + \beta_8 LR_{i,t} + \beta_9 AQ_{i,t} + e_{i,t} \quad \text{Model 3.2}$$

$BStability_{i,t}$ = Bank stability for bank i at time t

α- intercept term

$\beta_1 \ldots B_{10}$- Coefficients estimating the effect of each variable

$SDCFL_{i,t}$ -Sovereign Debt Concentration (Gov't securities as % of total bank assets)

$PSLTA_{i,t}$- Private Sector Loans / Total Assets for bank i at time t

SCR_t = *Sovereign Credit Rating Shock (dummy or ordinal)*

$BSIZE_{i,t}$: Bank Size (Market share Index)

$ROE_{i,t}$: Return on Equity for bank *i* at time *t*

$LR_{i,t}$: Liquidity ratio for bank *i* at time *t*.

$AQ_{i,t}$ Non-performing Loans / Total Loans

$SDC_{it} \times SIZE_{it}$- – Sovereign debt concentration moderated by bank size

$PSLTA_{it} \times SIZE_{it}$- Private Sector Loans to Total Asset moderated by bank size

$SCR_t \times SIZE_{it}$- Sovereign credit rating fluctuations moderated by bank size

ϵit: Error term

3.7 Model Diagnostic Tests

According to Lu and White, (2014), an effective measurement model must satisfy tests of validity, reliability and practicability. The following section therefore outlines the diagnostic procedures and statistical tests that were employed to ensure the robustness of the regression models that was adopted.

3.7.1 Generalized Least Squares (GLS) Estimation and Testing

In this study, the choice of estimator was guided by the structure of the panel data, the study objectives, and the potential endogeneity concerns associated with the relationship between sovereign debt exposure and bank stability. A key econometric concern in this study is the possibility of endogeneity arising from reverse causality. While the theoretical foundations of the sovereign-bank nexus suggest that higher sovereign debt exposure may adversely affect bank stability, it is also possible that less stable banks may increase their holdings of sovereign securities as government

securities are generally perceived as safer and attract favourable regulatory treatment under the Basel framework. Previous studies, including Acharya and Steffen (2015) and Abad (2019), provide evidence supporting this possibility, highlighting the need to carefully consider the estimation strategy.

In panel data analysis, System Generalised Method of Moments (System GMM) is commonly recommended when endogeneity is suspected because it uses internal instruments derived from lagged values of the variables to address potential reverse causality. Developed by Arellano and Bover (1995) and further extended by Blundell and Bond (1998), System GMM is particularly suitable for dynamic panel models where endogeneity is likely to be present. Accordingly, System GMM was considered during the estimator selection process. However, despite its theoretical advantages, System GMM was deemed unsuitable for the present study due to the dimensions of the dataset.

The study employed a panel consisting of 39 commercial banks observed over a 15-year period. In such circumstances, the number of instruments generated by System GMM increases rapidly and may exceed the number of cross-sectional units. Roodman (2009) cautions that excessive instruments can weaken the Hansen test of instrument validity and introduce finite-sample bias, thereby undermining the reliability of the estimator. Studies such as Bun and Windmeijer (2010) and Hayakawa (2015) further demonstrate that System GMM performs less reliably in panels with relatively small cross-sectional dimensions. Given that the study includes only 39 banks, the risk of instrument proliferation was considered substantial. Consequently, System GMM was not adopted as the primary estimation technique.

The study also evaluated the suitability of the Fixed Effects model with Driscoll-Kraay standard errors. This estimator is attractive because it is robust to heteroscedasticity, serial correlation, and cross-sectional dependence. Nevertheless, the fixed effects transformation removes all time-invariant characteristics by focusing exclusively on within-bank variation over time. This presents a challenge for the current study because bank size, which serves as the moderating variable, is largely time-invariant over the study period. The variable is based on the Central Bank of Kenya's market share classification framework, under which banks rarely move between peer-group categories. As a result, the Fixed Effects estimator would absorb the SIZE variable and, consequently, eliminate the interaction terms used to test the moderating effect of bank

size. Since the moderation analysis constitutes a central objective of the study, the Fixed Effects approach was considered inappropriate.

Having established that System GMM is invalid for this sample size and that Fixed Effects with Driscoll-Kraay standard errors is structurally incompatible with the moderation design, the study adopted the Random Effects Generalized Least Squares (GLS) estimation technique to account for the classical regression assumption violations identified during the diagnostic stage. Specifically, GLS was adopted to address the presence of heteroscedasticity, autocorrelation, and non-normality in the error terms, which rendered Ordinary Least Squares (OLS) estimates inefficient and potentially biased.

This approach was appropriate for panel banking data characterized by cross-sectional heterogeneity and time-series dependence, as it improves the efficiency and reliability of parameter estimates. GLS works by transforming the original model to eliminate non-spherical disturbances, thereby ensuring that the error terms satisfy the assumptions of constant variance and no serial correlation. By accounting for the structure of the error variance-covariance matrix, GLS produced more efficient and unbiased estimates compared to OLS, especially in the presence of heteroscedasticity and autocorrelation (Gujarati & Porter, 2009). The method was particularly suitable for this study given the heterogeneity across banks in terms of size, risk exposure, and financial performance.

In this study, GLS estimation was implemented within a panel data framework, allowing for the simultaneous analysis of cross-sectional (bank-level) and time-series (yearly) variations. This enhanced the precision of coefficient estimates by exploiting both dimensions of the data, consistent with the recommendations of panel data econometrics (Wooldridge, 2016). To ensure the robustness and validity of the GLS estimates, a series of diagnostic tests were conducted prior to estimation. These included the Breusch–Pagan test for heteroscedasticity, the Durbin–Watson test for autocorrelation, and the Shapiro–Wilk test for normality. The results of these tests confirmed the presence of violations of classical assumptions, thereby justifying the use of GLS as a more appropriate estimation technique.

3.7.2 Multi-collinearity Test

Multicollinearity arises in multiple regression when explanatory variables are highly correlated, inflating coefficient variances and undermining statistical inference (Kim, 2019). Given the inclusion of sovereign debt exposure, bank size, and their interaction term, the risk of collinearity is non-trivial. In this regard, variance inflation factors (VIF) test was computed to detect the presence and extent of multicollinearity. Detecting multicollinearity ensures robustness in interpreting coefficients and confirming that regulatory capital distinctly moderates sovereign debt's impact on stability. Because interaction terms mechanically increase collinearity, all variables entering the interaction were mean centered prior to estimation to reduce non-essential multicollinearity. While VIF diagnostics are computed using pooled or fixed-effects specifications they provided an important pre-estimation robustness check to ensure reliable coefficient interpretation.

3.7.3 Autocorrelation Test

Owing to the panel attributes of bank-level data over multiple periods, the potential for serial correlation among error terms exists. Autocorrelation violates the classical regression assumption of error term independence, resulting in biased standard errors and misleading test statistics. This is especially salient in panel data analyses exploring temporal dynamics of sovereign debt exposure effects on bank stability. The Durbin-Watson statistic for autocorrelation in panel data was employed. When autocorrelation was identified, the study employed GLS model to obtain consistent and efficient estimators.

3.7.4 Normality Test

For this study, I tested the normality of the residuals to ensure that the inferential statistics such as hypothesis testing, and confidence intervals are valid. This is essential for accurately analysing how regulatory capital moderates the association between sovereign debt exposure and stability of banks.

3.8 Data Validity and Reliability

Data validity was ensured by relying exclusively on audited and regulatory-sourced financial data. Bank-level variables including sovereign debt concentration, private sector loans to total assets, profitability (ROE), liquidity ratio, asset quality, bank size, and stability measures were constructed from published annual financial statements and

supervisory reports submitted to the Central Bank of Kenya. These disclosures followed prudential reporting standards aligned with Basel regulatory requirements, enhancing measurement validity and comparability across banks. Sovereign credit rating data was obtained from internationally recognized rating agencies such as Moody's Investors Service, Standard & Poor's, and Fitch Ratings, ensuring external credibility and consistency in sovereign risk measurement.

Construct validity was reinforced by using widely accepted proxies in the banking literature. For example, the Z-score is a standard measure of insolvency risk used by the IMF and the World Bank in global financial stability assessments while NPL ratios and capital adequacy measures are established indicators of asset quality and solvency. Using established measures reduces specification error and enhances comparability with prior empirical studies. Reliability was supported through consistent annual frequency harmonization, uniform variable definitions across banks, and replication of ratio constructions using standardized formulas. Data cleaning procedures included cross-verification across reports, and consistency checks over time to detect reporting anomalies. The panel structure further enhanced reliability by allowing persistence checks and internal validation through dynamic specification tests.

3.9 Research Quality

According to Cooper and Schindler (2011) an effective measurement tool is characterized by its ability to satisfy tests of validity, reliability, and practicability. In this study, validity was enhanced through the use of theoretically grounded measures, including sovereign debt concentration, and the Z-score as a measure of bank stability. Internal validity was strengthened by the longitudinal panel design, which captured temporal dynamics and incorporated relevant control variables to account for potential confounding effects.

Reliability was enhanced through the use of audited secondary data obtained from verifiable sources, including the Central Bank of Kenya (CBK) and National Treasury reports. Consistency in data analysis was maintained through the uniform application of panel regression techniques across all sampled banks and study periods. Furthermore, a stationarity test was conducted to assess whether the statistical properties of the time-series variables remained constant over time, thereby ensuring the suitability of the data for panel data analysis and minimizing the risk of spurious

regression results. These measures enhanced the robustness, credibility, and overall rigor of the study findings.

3.10 Ethical Issues in Research

I followed the Strathmore University and NACOSTI ethical standards in conducting this study. Adherence to these guidelines were paramount throughout the research process.

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CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

This chapter presents the empirical findings of the study on the moderating role of bank size on sovereign debt exposure and the stability of commercial banks in Kenya. It begins with a description of the sample and data structure, followed by descriptive statistics that summarize the key characteristics of the variables. Correlation analysis is then conducted to examine preliminary relationships. Subsequently, diagnostic tests are performed to assess the validity of model assumptions. The Hausman test is employed to guide the selection between fixed and random effects models. Finally, the chapter presents and discusses the results of the estimated econometric models.

4.2 Sample Description

The study utilized a panel dataset comprising all 39 commercial banks operating in Kenya for the period 2010 to 2024 yielding 507 bank level observations out of 585. The banks that exited the banking sector through structural exits due to receivership and merger or had missing data on key variables of interest were excluded. Beginning with the dual impact of the 2010 Kenya constitutional reform and Basel II implementation, this period is characterized by a surge in sovereign borrowing between 2013 and 2015. The subsequent 2016 to 2019 policy shift regarding interest rate caps, followed by the unprecedented Covid 19 global shocks from 2020 to 2023, offered a comprehensive timeline for investigating the transmission of sovereign risk through various market cycles.

The selection of banks was guided by data availability across all study variables, including measures of sovereign debt exposure, bank-specific financial indicators, and macro-financial controls. This resulted in a comprehensive panel covering 15 years, thereby capturing both cross-sectional and time-series variations necessary for robust econometric analysis. The use of panel data enhances statistical efficiency and helps control unobserved heterogeneity, thereby reducing potential estimation bias. The use of an unbalanced panel enhances the reliability and comparability of results by ensuring uniform observations for each bank over the study period. The dataset was constructed from secondary sources, primarily drawn from banks' financial statements and CBK annual supervision reports, providing a solid empirical foundation for the analysis.

4.3 Descriptive Statistics

This section presents the descriptive statistics of the study variables to provide an overview of their distribution and central tendencies across the 39 commercial banks. The analysis includes measures such as mean, standard deviation, minimum and maximum values, as well as skewness and kurtosis to assess the distributional properties of the data. These statistics offer initial insights into the behavior and variability of bank stability, sovereign debt exposure, and other control variables over the study period. Table 4.1 summarizes the descriptive statistics for all variables included in the analysis.

Table 4.1: Descriptive Statistics

	count	mean	median	std	min	max	skewness	kurtosis
ZSCORE	507	4.982	3.062	7.361	-4.930	41.130	2.425	7.686
SDC	507	1.777	1.003	0.02284	0.0005	11.697	2.442	6.183
PSLTA	507	0.574	0.605	0.182	0.141	1.083	-0.292	0.163
SCR	507	62.19	61.2	15.05	36.224	89	0.100	-1.174
SIZE	507	2.620	0.9	3.455	0.101	14.1	1.737	2.197
ROE	507	9.973	11.8	22.9	-90.8	49.4	-1.744	4.871
LR	507	0.802	0.814	0.309	0.189	1.903	0.704	1.921
AQ	507	0.174	0.123	0.166	0.006	0.861	2.008	4.458

Source (Author, 2026)

Table 4.1 presents the descriptive statistics for all variables used in the study based on 507 panel observations drawn from commercial banks in Kenya over the period 2010–2024. The results provide important insights into the distributional characteristics, variability, and behavior of sovereign debt exposure, bank size, and financial stability indicators within the Kenyan banking sector.

The findings show that bank stability, measured using the Z-score (ZSCORE), recorded a mean of 4.982 and a median of 3.062, suggesting that, on average, commercial banks maintained a moderate stability buffer above insolvency risk. However, the relatively large standard deviation of 7.361, coupled with the wide range between the minimum value (-4.930) and maximum value (41.130), indicates substantial heterogeneity in stability levels across banks and over time. The negative minimum value reflects periods of financial distress among some banks, characterized

by negative profitability and weakened capital positions. Since the Z-score measures the distance to insolvency, negative values indicated elevated insolvency risk and lower levels of bank stability.

Given the average Z-score of 4.98, improvements in sovereign creditworthiness are associated with measurable increases in banks' distance-to-default, indicating enhanced resilience against adverse shocks. This suggests that maintaining sound fiscal and debt management policies may generate stability benefits for the banking sector through lower funding costs, stronger market confidence, and improved asset valuations.

The positive skewness (2.425) and high kurtosis (7.686) imply that the distribution was highly right skewed and leptokurtic, indicating the presence of extreme values and significant volatility in bank stability. This suggests that while some banks maintained exceptionally strong capital and profitability buffers, others experienced periods of financial vulnerability. These findings are consistent with studies by Elnahass et al. (2021) and Hafeez et al. (2022), who observed substantial dispersion in accounting-based bank stability measures during periods of macro-financial uncertainty. Similarly, Oyetade and Muzindutsi (2023) found that African banks exhibit varying stability outcomes depending on exposure to sovereign risk and regulatory conditions.

The descriptive results further indicate that sovereign debt concentration (SDC) averaged 1.777 with a median of 1.003, suggesting that, on average, sovereign debt holdings constituted a relatively modest proportion of commercial banks' total assets. The standard deviation of 2.284 indicates considerable variation in sovereign debt exposure across banks and overtime. The minimum and maximum values of 0.050 and 11.697, respectively, reveal substantial differences in banks' investment in government securities, with some institutions maintaining minimal sovereign exposure while others allocated a significant proportion of their asset portfolios to sovereign debt instruments.

The strong positive skewness 2.442 and high kurtosis 6.183 indicate that the distribution of sovereign debt concentration was highly right skewed and leptokurtic.

This suggests that although most banks maintained relatively low levels of sovereign debt exposure, a small number of banks held disproportionately high concentrations of government securities, resulting in the presence of extreme observations. These findings imply that government securities remained an important investment avenue within the Kenyan banking sector, although exposure levels varied considerably across institutions. The results support the sovereign–bank nexus argument advanced by

Acharya and Steffen (2015), Adrian et al. (2025), and Afonso et al. (2023, 2024), who found that banks tend to increase sovereign debt holdings during periods of fiscal pressure, heightened economic uncertainty, and attractive sovereign yields. However, the generally low average exposure partly contrasts with the findings of Chronopoulos et al. (2020), who argued that larger and more diversified banks tend to maintain balanced asset portfolios that limit excessive concentration in sovereign debt instruments.

Private sector loans to total assets (PSLTA) recorded a mean of 0.574 and a median of 0.605, indicating that private sector lending constituted approximately 57.4 percent and 60.5 percent of total assets, respectively. The relatively low standard deviation (0.182) suggests moderate variation in lending intensity across commercial banks. Although the slight negative skewness (-0.292) and low kurtosis (0.163) indicate a generally symmetric and stable distribution, the maximum value of 1.083 points to a small number of extreme bank-year observations where reported gross loans slightly exceeded total assets. Further review revealed that these observations resulted from reporting inconsistencies and exceptional balance-sheet conditions rather than the prevailing trend in the sector. Consequently, while private sector lending remained relatively stable overall, these extreme observations influenced the upper tail of the distribution and should be interpreted cautiously. The findings support studies by Kodongo (2025), Mbate (2013), and Kabir (2020), which argue that public borrowing may crowd out private sector lending, although the effect varies across institutions and economic conditions.

The sovereign credit rating score (SCR) recorded a mean of 62.19 and a median of 61.2, with moderate variability as indicated by a standard deviation of 15.05. The near-zero skewness (0.100) and negative kurtosis (-1.174) suggest a relatively symmetric and platykurtic distribution. This implies that sovereign credit conditions evolved gradually over the study period without extreme fluctuations. These findings support the literature suggesting that sovereign ratings operate as broad macro-financial signals influencing bank stability through confidence, valuation, and funding channels (Mensah et al., 2017; Adrian et al., 2025).

Bank size (SIZE) exhibited a mean of 2.620 and a median of 0.9, with a large standard deviation of 3.455. The positive skewness (1.737) and kurtosis (2.197) indicate that the banking sector was dominated by a few relatively large institutions alongside many

smaller banks. This structural asymmetry supports the theoretical expectation that size heterogeneity influences risk-taking behavior, diversification capacity, and resilience. The findings are consistent with Kakes and Nijskens (2018) and Adusei (2015), who argued that larger banks possess distinct risk and stability characteristics compared to smaller institutions. Return on equity (ROE) averaged 9.973 with a median of 11.8, but exhibited substantial dispersion as reflected by the standard deviation of 22.9. The strong negative skewness (-1.744) and high kurtosis (4.871) indicate that although profitability was positive on average, some banks experienced severe profitability declines or losses during the study period. This suggests uneven earnings performance across banks, consistent with the findings of Abdelmoneim and Yasser (2023), who identified profitability as a key determinant of banking resilience.

Liquidity risk (LR) recorded a mean of 0.802 and a median of 0.814, suggesting that loans constituted a substantial proportion of deposits within the banking sector. The moderate standard deviation (0.309), positive skewness (0.704), and kurtosis (1.921) indicate moderate variability in liquidity positions across banks. Meanwhile, asset quality (AQ) recorded a mean of 0.174 and a median of 0.123, with strong positive skewness (2.008) and high kurtosis (4.458), implying that non-performing loans were concentrated among a subset of banks. This indicates that credit risk and asset quality deterioration were not evenly distributed across institutions. These findings support Oyetade and Muzindutsi (2023) and Ochenge (2025), who found that sovereign exposure and macro-financial stress are associated with weaker loan quality and heightened financial vulnerabilities within African banking systems.

4.4 Correlation Analysis

This section presents the correlation analysis to examine the strength and direction of relationships among the study variables and to assess potential multicollinearity concerns prior to model estimation. The pairwise correlation coefficients provide preliminary insights into how sovereign debt exposure, bank size, and other control variables relate to bank stability. Additionally, the analysis helps identify highly correlated variables that may affect the reliability of regression estimates. Table 4.2 summarizes the correlation matrix for all variables included in the study.

Table 4.2: Correlation Analysis

	ZSCORE	SDC	PSLTA	SCR	SIZE	ROE	LR	AQ
ZSCORE	1	-0.160	-0.020	0.487	0.432	0.468	-0.073	-0.243
SDC	-0.160	1	0.172	-0.147	-0.086	-0.003	0.202	0.118
PSLTA	-0.020	0.172	1	-0.045	0.023	0.063	0.804	-0.096
SCR	0.487	-0.147	-0.045	1	0.808	0.530	-0.118	-0.329
SIZE	0.432	-0.086	0.023	0.808	1	0.463	-0.033	-0.261
ROE	0.468	-0.003	0.063	0.530	0.463	1	0.021	-0.243
LR	-0.073	0.202	0.804	-0.118	-0.036	0.021	1	0.085
AQ	-0.243	0.118	-0.096	-0.329	-0.261	-0.243	0.085	1

Source (Author, 2026)

Table 4.2 presents the pairwise pearson correlations among the study variables and offers preliminary evidence on the direction and strength of association between sovereign debt exposure, bank size, and bank stability. The findings show that bank stability which is measured by ZSCORE is positively correlated with SCR ((r = 0.486)), ROE ((r = 0.468)), and SIZE ((r = 0.432)). These results suggest that better sovereign credit conditions, stronger profitability, and larger bank size are associated with greater bank stability. Substantively, the positive association between ZSCORE and SCR supports the sovereign credit channel and implies that an improved sovereign credit environment may strengthen banks through lower funding pressures, improved market confidence and stronger balance-sheet valuations. Likewise, the positive relationship between ZSCORE and ROE indicates that more profitable banks are better positioned to absorb shocks through retained earnings and internal capital generation. The positive correlation between ZSCORE and SIZE further suggests that larger banks may benefit from diversification, economies of scale and stronger capital bases, all of which can enhance resilience.

These positive associations are broadly consistent with the empirical literature reviewed. The positive relationship between bank stability and sovereign credit ratings is in line with Mensah et al. (2017), who found that sovereign rating improvements reduce bank funding costs, and with Arogundade et al. (2025), who reported that stronger sovereign ratings improve overall financial conditions and market confidence. Similarly, the positive association between ZSCORE and ROE is consistent with the banking stability literature that links profitability to resilience through stronger earnings

capacity and greater loss-absorption ability. The positive relationship between ZSCORE and SIZE also supports Adusei (2015), who found that larger banks tend to be more stable because of better diversification, stronger supervisory visibility and larger capital buffers. However, this finding is not universally supported. Gondwe et al. (2025) reported that larger banks may be less stable, consistent with the too-big-to-fail and complexity arguments, while Chibole et al. (2022) found no significant moderating role of bank size in the Kenyan banking context.

In contrast, ZSCORE is negatively correlated with SDC ((r = -0.160)), LR ((r = -0.073)), PSLTA ((r = -0.020)), and AQ ((r = -0.243)). The negative relationship between ZSCORE and SDC suggests that higher sovereign debt concentration is associated with lower bank stability supporting the sovereign–bank nexus hypothesis, though the magnitude of the relationship is modest. This implies that greater allocation of bank assets to sovereign securities may expoe banks to fiscal distress and valuation risk, consistent with the sovereign-bank nexus.

The negative association between ZSCORE and AQ is stronger, indicating that worsening asset quality, as reflected in a higher non-performing loan ratio, is linked to lower stability. The negative relationship between ZSCORE and LR, although weak, suggests that excessive loan expansion relative to deposits may create liquidity pressure that modestly weakens bank resilience. The near-zero negative correlation between ZSCORE and PSLTA indicates that private sector lending relative to assets has little bivariate association with stability, implying that its effect may only emerge clearly in multivariate analysis.

These findings are consistent with the empirical literature. The negative association between ZSCORE and SDC supports Adrian et al. (2025), Oyetade and Muzindutsi (2023) and Edeh et al. (2026), all of whom show that rising sovereign risk or public debt exposure weakens banking-sector stability. It also aligns with Ochenge (2025), who found that increasing bank demand for Kenyan government securities heightens systemic risk, and with the sovereign-bank nexus arguments of Dell'Ariccia et al. (2018) and Deghi et al. (2022), which emphasize the destabilizing feedback loop between sovereign distress and bank balance sheets. Likewise, the negative association between stability and asset quality is consistent with Oyetade and Muzindutsi (2023), who linked worsening sovereign conditions to higher non-performing loans and weaker

financial stability. However, the weak negative link between ZSCORE and PSLTA does not fully align with the crowding-out literature, which often finds stronger adverse effects of sovereign borrowing on private credit and, indirectly, on banking-sector outcomes. For example, Gennaioli et al. (2018), Kodongo (2025), Mbate (2013), and Jato and Nwankwo (2024) document more pronounced crowding-out effects on private credit.

Among the explanatory variables, the strongest correlation is observed between SCR and SIZE ((r = 0.808)). This indicates a strong positive association between sovereign credit ratings and bank size. Although this does not automatically imply a specification problem, it suggests that larger banks tend to operate in periods of improved sovereign creditworthiness or are better positioned to benefit from favorable sovereign conditions. Another strong positive correlation is between PSLTA and LR ((r = 0.804)), which is unsurprising because both variables are closely linked to loan book expansion. The result suggests that banks with a higher share of loans in total assets also tend to exhibit higher loan-to-deposit exposure. These patterns are also supported, at least in part, by the empirical literature.

The strong positive relationship between SCR and SIZE is broadly consistent with literature arguing that larger banks are more integrated into sovereign and financial markets and therefore more exposed to the effects of sovereign credit conditions. Studies reviewed, such as Mensah et al. (2017) and Arogundade et al. (2025), suggest that improved sovereign conditions ease financing constraints and strengthen broader financial-system performance, which may disproportionately benefit larger institutions. At the same time, the strength of this correlation also resonates with Kakes and Nijskens (2018), who show that size shapes the channels through which systemic and sovereign risks operate. However, the result contrasts somewhat with studies like Takawira and Mwamba (2020), who found that sovereign credit ratings had limited direct influence on financial stability outcomes in South Africa. The high correlation between PSLTA and LR is also theoretically plausible because both are loan-related ratios, though it echoes the crowding-out literature's concern that aggressive asset allocation decisions may increase liquidity pressure when banks shift their portfolios in response to sovereign borrowing conditions (Ari, 2018; Bouis, 2019).

Other pairwise relationships are moderate and generally consistent with theoretical expectations. SCR is positively correlated with ROE ((r = 0.530)), implying that improved sovereign creditworthiness may coincide with stronger profitability among banks. SIZE is positively correlated with ROE ((r = 0.463)), suggesting that larger banks tend to be more profitable. On the other hand, AQ is negatively correlated with SCR ((r = -0.329)), SIZE ((r = -0.261)), and ROE ((r = -0.243)), indicating that better sovereign conditions, larger bank size, and stronger profitability are associated with improved asset quality.

These relationships suggest that stronger macro-financial conditions and stronger institutions are linked to better-performing loan portfolios. This broader pattern accords with several strands of the reviewed literature. The positive association between SCR and ROE is consistent with Mensah et al. (2017), who found that sovereign rating improvements reduce funding costs and improve banks' financial conditions, thereby supporting profitability.

The positive relationship between SIZE and ROE is also plausible in light of Adusei (2015) and Chowdhury et al. (2024), who argue that larger banks benefit from economies of scale, broader funding access, and diversification advantages. Similarly, the negative correlations involving AQ are in line with Oyetade and Muzindutsi (2023), who found that deteriorating sovereign conditions are associated with higher non-performing loans, and with the broader bank-stability literature that treats asset quality deterioration as a major channel through which financial fragility emerges.

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4.5 Diagnostic Test

This section presents the diagnostic tests conducted to assess the validity and robustness of the estimated econometric models. Specifically, tests for multicollinearity, normality, heteroskedasticity and autocorrelation are performed to evaluate whether the underlying assumptions of classical regression are satisfied. In addition, the Hausman test is employed to determine the appropriate panel estimation technique between fixed effects and random effects models.

4.5.1 Multicollinearity Test

This section examines the presence of multicollinearity among the independent variables using the Variance Inflation Factor (VIF). Multicollinearity arises when

explanatory variables are highly correlated, potentially inflating standard errors and weakening the reliability of coefficient estimates. This test is critical because severe multicollinearity inflates standard errors, reduces the precision of estimates, and may lead to unstable or misleading coefficient signs and significance levels. If left unaddressed, it can result in unstable coefficients and misleading significance levels, undermining the reliability of the model's results. The VIF values are used to assess whether the degree of correlation among the variables exceeds acceptable thresholds (Kalnins & Hill, 2023). Table 4.3 presents the VIF results for all explanatory variables included in the model.

Table 4.3: Variance Inflation Factor

Variable	VIF
const	65.931
SDC	1.074
PSLTA	3.068
SCR	3.394
SIZE	2.928
ROE	1.431
LR	3.084
AQ	1.226

Source (Author, 2026)

Table 4.3 presents the Variance Inflation Factor (VIF) results used to assess the presence of multicollinearity among the explanatory variables included in the regression models. Multicollinearity arises when explanatory variables are highly linearly related, inflating coefficient variances and weakening statistical inference. The findings show that, except for the constant term, all predictors have VIF values well below both the conventional threshold of 10 and the stricter benchmark of 5. Specifically, SDC has a VIF of 1.074, PSLTA 3.068, SCR 3.394, SIZE 2.928, ROE 1.431, LR 3.084, and AQ 1.226. These values indicate that the linear association among the regressors is low to moderate and does not pose a serious multicollinearity problem. In practical terms, the explanatory variables appear to retain sufficient independent variation to permit reliable estimation of their separate effects on bank stability. This result is consistent with empirical literature, which notes that multicollinearity can

inflate coefficient variances and undermine inference, but that VIF diagnostics provide an appropriate pre-estimation check for the models used in the study (Kim, 2019).

Among the predictors, SCR records the highest VIF value of 3.394, followed by LR at 3.084 and PSLTA at 3.068. Although these are the highest values in the model, they remain comfortably within accepted limits and therefore do not indicate problematic collinearity. The empirical literature suggests that sovereign credit conditions affect bank funding, liquidity and credit conditions (Mensah et al., 2017; Thale & Rojas, 2023; Oyetade & Muzindutsi, 2023), while private lending and liquidity indicators are mechanically related through banks' balance-sheet structure and portfolio allocation decisions (Bouis, 2019; Ochenge, 2025). It is therefore unsurprising that SCR, PSLTA, and LR share some common variation. However, the VIF results show that this overlap is not severe enough to distort estimation.

The low VIF values for SDC (1.07), ROE (1.43), and AQ (1.23) further indicate that these variables contribute distinct explanatory information. This is important because the study treats these variables as conceptually different channels through which bank stability may be affected: sovereign debt concentration through the sovereign-bank nexus, profitability through internal earnings capacity and asset quality through credit-risk deterioration. The fact that their VIF values are close to 1 suggests that these constructs are empirically distinguishable in the Kenyan banking data.
This supports the literature in the, where sovereign exposure, profitability and asset quality are treated as separate determinants of stability rather than as interchangeable balance-sheet indicators The constant term records a VIF of 65.931, which is high, but this does not imply a substantive multicollinearity problem. As noted in the empirical literature, emphasis should be placed on the explanatory variables rather than the intercept when interpreting VIF outcomes. High VIF values on the constant are common when regressors are not mean-centered, and they do not invalidate the model.

4.5.2 Normality Test

This section assesses whether the residuals from the estimated models follow a normal distribution, which is an important assumption for valid statistical inference. In a regression analysis, the assumption of normality implies that the residuals follow a normal distribution with a mean of zero and constant variance. The normality of

residuals was evaluated using Shapiro–Wilk statistics. Deviations from normality may indicate the presence of outliers or model misspecification. Table 4.4 presents the results of the normality test.

Table 4.4: Normality Test

Test	Statistic	p_value
Shapiro-Wilk	0.758176	1.33E-26

Source (Author, 2026)

Table 4.4 presents the results of the Shapiro–Wilk test used to assess the normality of the model residuals. The test yields a statistic of 0.758 with a corresponding p-value of 1.33×10^{-26}, which is far below the conventional 0.05 significance level. This result leads to the rejection of the null hypothesis of normality, indicating that the residuals are not normally distributed. The deviation from normality suggests the presence of skewness, excess kurtosis, or outliers in the data, all of which may weaken the reliability of standard Ordinary Least Squares (OLS) estimates and their associated inferential statistics. In practical terms, the residual structure appears inconsistent with the classical assumption that underpins conventional OLS-based hypothesis testing.

Given this violation, the study adopted the Generalized Least Squares (GLS) estimation technique, which is more robust in the presence of error-structure inefficiencies and can provide more reliable and efficient parameter estimates. These findings are consistent with the empirical literature reviewed. Studies such as Elnahass et al. (2021) and Hafeez et al. (2022) emphasize that accounting-based measures of bank stability, particularly Z-score specifications, often display distributional irregularities because they are influenced by periods of financial stress, extreme profitability outcomes, and heterogeneous institutional conditions. Likewise, Oyetade and Muzindutsi (2023), whose work informed the study's design, examined African banks using panel methods precisely because bank-level financial data in risk and stability analysis rarely satisfy ideal classical assumptions.

4.5.3 Heteroscedasticity Test

This section examines the presence of heteroscedasticity in the regression model residuals, which occurs when the variance of the error terms is not constant across

observations. Heteroscedasticity can lead to inefficient estimates and biased standard errors, thereby affecting statistical inference (Pinder, 2022). The Breusch–Pagan test is employed to detect the existence of heteroscedasticity in the model. Table 4.5 presents the results of the heteroscedasticity test.

Table 4.5: Heteroscedasticity Test

Test	**Value**
LM Statistic	27.826
LM p-value	0.000
F Statistic	4.140
p-value	0.000

Source (Author, 2026)

Table 4.5 presents the results of the Breusch–Pagan test for heteroscedasticity. The test yields an LM statistic of 27.826 with a p-value of 0.000236, and an F-statistic of 4.140 with a p-value of 0.000193. Since both p-values are well below the 0.05 significance level, the null hypothesis of homoscedasticity is rejected. This confirms the presence of heteroscedasticity, implying that the variance of the error terms is not constant across observations. Such variability in the error structure is typical in panel data involving heterogeneous banking institutions, where differences in size, portfolio composition, and exposure to macroeconomic conditions generate unequal variance across cross-sectional units. The presence of heteroscedasticity suggests that Ordinary Least Squares (OLS) estimates may be inefficient and their standard errors biased, thereby undermining the reliability of statistical inference.

To address this violation, the study adopted the Generalized Least Squares (GLS) estimation technique, which adjusts for non-constant error variance and produces more efficient and consistent parameter estimates. These findings are consistent with the methodological and empirical literature which explicitly acknowledges that panel data drawn from banking institutions are prone to heterogeneity arising from differences in bank size, capital structure, and risk exposure, all of which can induce heteroscedastic disturbances. Oyetade and Muzindutsi (2023) emphasize that banking-sector panel data, particularly in African contexts, often exhibit cross-sectional dependence and heteroscedasticity due to structural and institutional differences among banks.

Similarly, Adrian et al. (2025) and Dell'Ariccia et al. (2018) highlight that sovereign risk exposure and macro-financial shocks do not affect all banks uniformly, leading to unequal variability in financial outcomes across institutions.

4.5.4 Autocorrelation Test

This section examines the presence of autocorrelation in the model residuals using the Durbin–Watson statistic. Autocorrelation arises when error terms are correlated across time, violating the assumption of independent disturbances and potentially leading to inefficient estimates and biased standard errors. The Durbin–Watson test provides an indication of first-order serial correlation in the residuals. Table 4.6 presents the results of the autocorrelation test.

Table 4.6: Autocorrelation Test

Test	Value
Durbin-Watson	1.582

Source (Author, 2026)

Table 4.6 presents the Durbin–Watson statistic used to assess the presence of first-order autocorrelation in the model residuals. The reported value of 1.582 deviates from the benchmark value of 2, indicating the presence of positive serial correlation in the error terms. This suggests that residuals are correlated over time, thereby violating the classical assumption of independent disturbances. Such persistence in errors is common in panel banking data, where past financial performance, risk exposure, and macroeconomic conditions influence current outcomes. The presence of autocorrelation implies that Ordinary Least Squares (OLS) estimates may be inefficient and their standard errors biased, leading to unreliable statistical inference. To address this violation, the study adopted the Generalized Least Squares (GLS) estimation technique, which corrects for serial correlation and produces more efficient and consistent parameter estimates.

These findings are consistent with the empirical and methodological literature which recognizes that banking-sector panel data, particularly those involving stability measures such as Z-score, often exhibit dynamic persistence, where past stability conditions influence current performance (Elnahass et al., 2021; Hafeez et al., 2022).

This inherent persistence naturally generates autocorrelation in the residuals when static models are estimated. Similarly, Oyetade and Muzindutsi (2023) emphasize that African banking data are characterized by temporal dependence and structural dynamics, necessitating robust estimation techniques that account for serial correlation. The adoption of GLS is well supported by the literature which notes that when classical assumptions such as independence of errors are violated, estimator such as GLS is preferred because it explicitly account for serial correlation and improve estimation efficiency (Hafeez et al., 2022).

4.5.5 Stationarity Test

This section examines the stationarity properties of the study variables using the Augmented Dickey–Fuller (ADF) unit root test. Stationarity is an important assumption in panel and time-series econometric analysis because non-stationary variables may produce spurious regression results characterized by misleading relationships, inflated goodness-of-fit measures, and unreliable statistical inference. The ADF test evaluates whether a variable contains a unit root, with the null hypothesis stating that the series is non-stationary. Rejection of the null hypothesis implies that the variable is stationary and suitable for regression analysis without the risk of spurious results. Table 4.7 presents the results of the stationarity tests.

Table 4.7 Stationarity Test

Variable	ADF Statistic	P-value
ZSCORE	-5.72858	0.000
SDC	-5.63686	0.000
PSLTA	-8.95835	0.000
SCR	-4.7833	0.000
SIZE	-4.6604	0.000
ROE	-6.73618	0.000
LR	-7.90772	0.000
AQ	-9.52404	0.000

Source (Author, 2026)

Table 4.7 presents the results of the Augmented Dickey–Fuller (ADF) test conducted to determine the stationarity of the variables used in the study. The findings indicate

that all variables have negative ADF statistics and p-values less than 0.05. Specifically, ZSCORE recorded an ADF statistic of -5.729 (p = 0.000), SDC recorded -5.637 (p = 0.000), PSLTA recorded -8.958 (p = 0.000), SCR recorded -4.783 (p = 0.000), SIZE recorded -4.660 (p = 0.000), ROE recorded -6.736 (p = 0.000), LR recorded -7.908 (p = 0.000), and AQ recorded -9.524 (p = 0.000). Since all p-values are significantly below the conventional 5 percent significance level, the null hypothesis of a unit root is rejected for all variables. The results therefore confirm that all study variables are stationary, implying that their means, variances, and covariance structures remain stable over time. Consequently, the variables do not exhibit stochastic trends that could generate spurious relationships during estimation. The stationarity of the variables indicates that the observed relationships among sovereign debt concentration, private sector lending, sovereign credit ratings, bank size, profitability, liquidity risk, asset quality, and bank stability are genuine and not driven by common trending behaviour. This finding provided a sound basis for proceeding with panel regression estimation using the original level data without the need for differencing or additional transformation to achieve stationarity.

The findings are consistent with empirical studies on banking stability and sovereign risk that emphasize the importance of verifying stationarity before conducting panel regression analysis. For instance, Elnahass et al. (2021) reported that key banking stability indicators and risk variables became suitable for econometric estimation only after confirming stationarity properties. Similarly, Hafeez et al. (2022) established that bank-specific financial indicators such as profitability, liquidity, and asset quality generally exhibit stationary behaviour once appropriate panel structures are considered.

In the African context, Oyetade and Muzindutsi (2023) found that banking-sector variables associated with sovereign exposure and financial stability were stationary and therefore suitable for panel estimation techniques. The current findings further align with the recommendations of Wooldridge (2016) and Baltagi (2021), who argue that stationarity testing is a critical prerequisite for reliable panel-data analysis because stationary variables ensure valid statistical inference and consistent parameter estimation. The confirmation that all variables are stationary at levels therefore strengthens the reliability and robustness of the subsequent GLS regression results reported in this study.

4.5.6 Hausman Test

This section presents the results of the Hausman specification test conducted to determine the most appropriate panel data estimation technique between the Fixed Effects (FE) model and the Random Effects (RE) model. The Hausman test evaluates whether the unobserved entity-specific effects are correlated with the explanatory variables included in the model. The null hypothesis states that the Random Effects model is appropriate because the individual effects are uncorrelated with the regressors, while the alternative hypothesis supports the Fixed Effects model. Selecting the appropriate model is critical because it ensures that parameter estimates are efficient, consistent, and unbiased. Table 4.8 presents the results of the Hausman specification test.

Table 4.8 Hausman Specification Test

Statistic	Degrees of Freedom	P-value	Decision
1.492216	7	1	Use Random Effects

Source (Author, 2026)

Table 4.8 presents the results of the Hausman specification test used to determine the appropriate panel data estimation approach for the study. The test yielded a Hausman statistic of 1.492 with 7 degrees of freedom and a p-value of 1.000. Since the p-value is substantially greater than the conventional significance level of 0.05, the null hypothesis cannot be rejected. This result indicates that there is no statistically significant difference between the Fixed Effects and Random Effects estimators. Consequently, the Random Effects model was considered more appropriate for the analysis. The findings suggest that the unobserved bank-specific characteristics are not systematically correlated with the explanatory variables included in the model, namely sovereign debt concentration, private sector loans to total assets, sovereign credit ratings, bank size, return on equity, liquidity risk, and asset quality. Under such circumstances, the Random Effects estimator is preferred because it is more efficient than the Fixed Effects estimator, as it exploits both the within-bank and between-bank variations in the data. This allows the model to retain valuable cross-sectional information while generating more precise parameter estimates.

The results further imply that differences in stability across commercial banks are largely captured by random variations rather than omitted bank-specific factors that are correlated with the explanatory variables. Therefore, the assumptions underlying the Random Effects framework were satisfied, making it suitable for analyzing the determinants of bank stability within the Kenyan banking sector. These findings are consistent with the empirical literature on banking and financial stability, where the Random Effects model is often preferred when cross-sectional heterogeneity is assumed to be random and uncorrelated with the regressors. For example, Adusei (2015) employed the Hausman test in examining bank stability and governance and found that the Random Effects estimator was more appropriate because bank-specific effects were not significantly correlated with the explanatory variables. Similarly, Oyetade and Muzindutsi (2023) reported Hausman test results supporting the use of Random Effects in their analysis of sovereign risk and banking-sector performance in Africa. Comparable findings were reported by Abdelmoneim and Yasser (2023), who found that the Random Effects model provided efficient estimates when investigating the determinants of financial stability in banking institutions.

Methodologically, the findings are consistent with the recommendations of Baltagi (2021) and Wooldridge (2016), who argue that when the Hausman test fails to reject the null hypothesis, the Random Effects estimator should be preferred because it is both consistent and more efficient than the Fixed Effects estimator. The present results therefore justified the adoption of the Random Effects framework as the basis for the subsequent panel regression analysis. However, given the presence of heteroscedasticity, autocorrelation, and non-normality identified in the diagnostic tests, the study ultimately employed the Generalized Least Squares (GLS) estimator to obtain efficient, robust, and reliable parameter estimates while retaining the advantages associated with the Random Effects specification.

4.6 Direct Effect of Sovereign Debt Exposure on the Stability of Commercial Banks in Kenya

This section presents the results of the Generalized Least Squares (GLS) estimation used to examine the direct effect of sovereign debt exposure on the stability of commercial banks in Kenya. GLS was considered the most appropriate estimation technique because the diagnostic tests revealed violations of key Ordinary Least Squares (OLS) assumptions, specifically non-normality, heteroscedasticity, and

autocorrelation in the model residuals. These violations implied that OLS estimates would be inefficient and their standard errors potentially biased, thereby compromising the reliability of statistical inference.

GLS was therefore adopted because it corrects for non-constant error variance and serial correlation, producing more efficient, consistent, and reliable parameter estimates. The model evaluates the influence of sovereign debt concentration, private sector lending, and sovereign credit ratings on bank stability while controlling for bank-specific characteristics. Table 4.8 presents the GLS regression coefficients for sovereign debt concentration, showing its effect on bank stability while controlling for profitability, liquidity risk, and asset quality.

Table 4.8: GLS Coefficients for Sovereign Debt Concentration-Direct Effect

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	8.152	1.318	6.183	1.4E-09
SDC	-0.01	0.009	-3.144	0.033
ROE	0.054	0.006	8.496	2.86E-16
LR	0.061	0.442	-0.137	0.891
AQ	-1.414	0.814	-2.736	0.043

Source (Author, 2026)

Table 4.8 presents the Generalized Least Squares (GLS) regression results examining the effect of sovereign debt concentration on the stability of commercial banks in Kenya while controlling for return on equity, liquidity risk, and asset quality. The coefficient for sovereign debt concentration (SDC) is negative (-0.010) and statistically significant at the 5 percent level (p = 0.033). This implies that an increase in sovereign debt concentration significantly reduces bank stability. Specifically, a one-unit increase in SDC leads to an approximate decline of 0.01 units in the Z-score, holding other factors constant. The finding suggests that excessive allocation of bank assets toward government securities weakens financial resilience, possibly by increasing banks' exposure to sovereign risk and limiting portfolio diversification opportunities. The result supports the sovereign–bank nexus argument that greater sovereign exposure can transmit fiscal vulnerabilities into the banking sector.

Among the control variables, return on equity (ROE) records a positive coefficient of 0.054 and is highly statistically significant ($p < 0.001$). This indicates that more profitable banks tend to be more stable. A one-unit increase in ROE increases bank stability by approximately 0.054 units, suggesting that profitability enhances internal capital generation, improves shock absorption capacity, and strengthens financial resilience. The finding is economically intuitive because profitable institutions are generally better positioned to absorb unexpected losses and maintain solvency during periods of financial stress. Liquidity risk (LR) records a positive coefficient of 0.061 but is statistically insignificant ($p = 0.891$). Although the positive sign suggests that higher loan-to-deposit ratios may be associated with improved stability, the lack of statistical significance implies that liquidity risk does not exert a meaningful direct influence on bank stability within this model specification. Therefore, no conclusive inference can be drawn regarding the effect of liquidity conditions on bank stability in the present analysis.

Asset quality (AQ) exhibits a negative coefficient of -1.414 and is statistically significant at the 5 percent level ($p = 0.043$). This indicates that deterioration in asset quality significantly weakens bank stability. Specifically, an increase in the ratio of non-performing loans to gross loans reduces the Z-score by approximately 1.414 units, holding other variables constant. The result implies that poor loan performance undermines bank earnings, weakens capital buffers, and increases vulnerability to financial distress.

Table 4.9 presents the GLS regression coefficients for private sector loans to total assets, showing their effect on bank stability while controlling for key bank-specific factors.

Table 4.9: GLS Coefficients for Private Sector Loans to Total Assets-Direct Effect

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	7.199	0.957	7.523	2.92E-13
PSLTA	-0.775	1.101	-0.704	0.482
ROE	0.057	0.006	9.079	3.41E-18
LR	0.204	0.580	0.351	0.725
AQ	-1.461	0.785	-2.862	0.033

Source (Author, 2026)

Table 4.9 presents the Generalized Least Squares (GLS) regression results examining the effect of private sector loans to total assets (PSLTA) on the stability of commercial banks in Kenya while controlling for return on equity, liquidity risk, and asset quality. The coefficient for PSLTA is negative (-0.775) but statistically insignificant ($p = 0.4817$). This indicates that private sector lending relative to total assets does not exert a statistically significant direct effect on bank stability within the estimated model. Although the coefficient of PSLTA is negative and statistically insignificant, its direction is consistent with credit risk theory. Higher exposure to private sector lending may increase the likelihood of non-performing loans, which can reduce bank stability as measured by the Z-score through its effects on profitability (ROA) and capital adequacy.

The lack of statistical significance suggests that, when sovereign debt concentration (SDC) is included in the model, PSLTA does not independently explain variations in bank stability. This may be because SDC captures a larger share of the risk factors affecting bank stability, leaving limited additional explanatory power for PSLTA. This finding indicates that sovereign debt exposure may be a more important source of balance-sheet risk for Kenyan banks than the level of private sector lending. Therefore, in the Kenyan banking sector, sovereign debt concentration appears to play a more significant role in influencing bank stability than private credit exposure.

Among the control variables, return on equity (ROE) records a positive coefficient of 0.0567 and is highly statistically significant ($p < 0.001$). This finding indicates that profitability significantly enhances bank stability. Specifically, a one-unit increase in ROE increases the Z-score by approximately 0.057 units, holding other variables constant. The result implies that profitable banks possess stronger earnings capacity, improved capital accumulation, and greater resilience against financial distress. The finding supports the argument that internally generated earnings strengthen the ability of banks to absorb unexpected losses and maintain solvency during periods of economic uncertainty. Liquidity risk (LR) records a positive coefficient of 0.2037 but remains statistically insignificant ($p = 0.7255$).

Although the positive coefficient suggests that higher loan-to-deposit ratios may be associated with improved stability, the absence of statistical significance indicates that liquidity risk does not independently explain variations in bank stability in the current model. This suggests that liquidity conditions may interact with other balance-sheet

factors rather than directly influencing stability on their own. Asset quality (AQ) exhibits a negative coefficient of -1.4615 and is statistically significant at the 5 percent level (p = 0.0333). This finding implies that deterioration in asset quality significantly reduces bank stability. Specifically, an increase in non-performing loans relative to gross loans lowers the Z-score by approximately 1.462 units, ceteris paribus. The result suggests that weak loan performance undermines profitability, erodes capital buffers, and increases exposure to credit risk, thereby weakening the financial resilience of commercial banks.

Table 4.10 presents the GLS regression coefficients for sovereign credit rating scores, showing their effect on bank stability while controlling for key bank-specific characteristics.

Table 4.10: GLS Coefficients for Sovereign Credit Rating Score-Direct Effect

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	13.791	70.521	0.196	0.845
SCR	0.283	0.828	2.100	0.020
ROE	0.059	0.006	9.106	2.77E-18
LR	0.063	0.414	-0.151	0.880
AQ	-1.254	0.757	-2.656	0.038

Source (Author, 2026)

Table 4.10 presents the Generalized Least Squares (GLS) regression results examining the effect of sovereign credit rating scores (SCR) on the stability of commercial banks in Kenya while controlling for return on equity, liquidity risk, and asset quality. The coefficient for sovereign credit rating score is positive (0.283) and statistically significant at the 5 percent level (p = 0.020). This indicates that improvements in sovereign credit ratings significantly enhance bank stability. Specifically, a one-unit increase in SCR increases the Z-score by approximately 0.283 units, holding other variables constant. The finding implies that stronger sovereign creditworthiness improves investor confidence, lowers sovereign risk transmission, and strengthens the financial position of commercial banks. Improved sovereign ratings may also enhance market confidence, reduce funding costs, and increase the value of sovereign securities held by banks, thereby improving overall banking sector resilience.

Among the control variables, return on equity (ROE) records a positive coefficient of 0.059 and is highly statistically significant ($p < 0.001$). This finding indicates that more profitable banks tend to be more financially stable. A one-unit increase in ROE leads to an approximate increase of 0.059 units in the Z-score, ceteris paribus. The result suggests that profitability enhances internal capital generation, strengthens earnings capacity, and improves the ability of banks to absorb unexpected financial shocks.

Consequently, profitable banks are better positioned to maintain solvency and operational stability during periods of economic and financial stress. Liquidity risk (LR) records a positive coefficient of 0.063 but is statistically insignificant ($p = 0.880$). Although the positive sign may suggest that higher loan-to-deposit ratios are associated with increased stability, the lack of statistical significance implies that liquidity risk does not exert a meaningful direct influence on bank stability in the present model specification. This finding suggests that liquidity conditions alone may not independently determine financial stability once sovereign risk and other bank-specific factors are taken into account.

Asset quality (AQ) exhibits a negative coefficient of -1.254 and is statistically significant at the 5 percent level ($p = 0.038$). This implies that deterioration in asset quality significantly weakens bank stability. Specifically, an increase in non-performing loans relative to gross loans reduces the Z-score by approximately 1.254 units, holding other factors constant. The result indicates that poor loan performance erodes profitability, weakens capital adequacy, and increases credit risk exposure, thereby reducing the financial resilience of commercial banks.

Table 4.11 presents the GLS regression coefficients showing the direct effect of sovereign debt exposure indicators and bank-specific characteristics on commercial bank stability in Kenya.

Table 4.11: GLS Direct Effect Model Coefficients and Model Performance Results

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	-12.076	7.567	-1.596	0.111
SDC	-0.039	0.010	-3.841	0.000
PSLTA	-1.013	2.149	-0.471	0.638
SCR	0.335	0.118	2.847	0.005

SIZE	-1.366	0.422	-3.238	0.001
ROE	0.063	0.009	6.657	0.000
LR	1.277	0.957	1.335	0.183
AQ	-3.344	1.593	-2.100	0.036

Model Performance Statistic	**Value**
R-squared	0.609
F-statistic	81.884
Probability (F-statistic)	0.000
Log-Likelihood	-563.568
Number of Observations	507

Source (Author, 2026)

Table 4.11 presents the Generalized Least Squares (GLS) results for the direct effect model examining how sovereign debt exposure influences the stability of commercial banks in Kenya. The coefficient for sovereign debt concentration (SDC) is -0.039 and statistically significant at the 1 percent level ((p = 0.00014)). This implies that, holding other factors constant, an increase in sovereign debt concentration significantly reduces bank stability. Specifically, a one-unit increase in SDC leads to a decrease of approximately 0.0395 units in Z-score. This finding suggests that excessive concentration of bank assets in government securities weakens the resilience of banks, possibly by heightening their exposure to sovereign risk and reducing diversification opportunities. The result supports the sovereign-bank nexus argument that stronger sovereign exposure can transmit fiscal vulnerabilities into the banking sector.

There was a discrepancy in the magnitude of the coefficients between the model where sovereign debt concentration is estimated separately and the model where SDC is estimated alongside the other explanatory variables, with coefficients of -0.010 and -0.039, respectively. However, the coefficient retains the same negative sign across both models, indicating consistency in the direction of the relationship. The observed difference relates to magnitude rather than direction, which is common when moving from a simpler specification to a fully controlled model. In the full model, the coefficient reflects the partial effect of SDC after accounting for the influence of other explanatory variables. This suggests that controlling for these factors reveals a stronger adverse effect of SDC on the dependent variable. Furthermore, the higher level of statistical significance in the full model indicates that the relationship remains robust after accounting for other determinants.

The coefficient for private sector loans to total assets (PSLTA) is -1.013, but it is statistically insignificant ((p = 0.638)). This indicates that, in the direct effect model, private sector lending relative to total assets does not have a statistically meaningful effect on bank stability. Although the negative sign may suggest that higher lending exposure could increase risk, the lack of significance means the estimate carries high uncertainty, likely because the effect of private lending on stability is heterogeneous across banks and not detectable as a stable linear relationship in the pooled panel. Economically, this is consistent with García and Suárez (2025), who demonstrate that crowding-out effects on bank stability are not uniform: larger, well-capitalised banks can sustain high PSLTA without stability consequences, while smaller, thinly capitalized banks cannot.

The coefficient for sovereign credit rating score (SCR) is 0.335 and statistically significant at the 1 percent level ((p = 0.005)). This shows that improvements in sovereign credit ratings significantly enhance the stability of commercial banks. A one-unit increase in the sovereign credit rating score increases bank stability by about 0.335 units, holding other variables constant. This finding implies that a stronger sovereign credit profile improves confidence in the financial system, lowers sovereign risk transmission, and strengthens bank balance sheets.

The moderating variable, bank size (SIZE), has a coefficient of -1.366 and is statistically significant at the 1 percent level ((p = 0.001)). This suggests that, in the direct model, larger bank size is associated with lower bank stability. A one-unit increase in size reduces the Z-score by about 1.366 units, ceteris paribus. This negative effect may indicate that larger banks in Kenya are more exposed to systemic risk, moral hazard, or aggressive balance-sheet strategies that weaken stability despite their scale advantages.

Among the control variables, return on equity (ROE) records a positive and highly significant coefficient of 0.0632 ((p < 0.001)), meaning that more profitable banks tend to be more stable. The coefficient for liquidity risk (LR) is 1.2775, but it is statistically insignificant ((p = 0.1826)), while asset quality (AQ) is -3.344 and statistically significant at the 5 percent level ((p = 0.036)), indicating that deterioration in asset quality significantly reduces bank stability.

These findings are aligned with the empirical literature reviewed. The negative and significant effect of sovereign debt concentration on stability is consistent with the sovereign-bank nexus literature, which argues that heavy holdings of sovereign securities intensify the "doom loop" by transmitting fiscal stress into banks' balance sheets. Adrian et al. (2025) showed that banking-sector stress is magnified where public debt is high and domestic sovereign holdings are concentrated, while Oyetade and Muzindutsi (2023) found that higher country risk and public-debt indicators are negatively associated with African banks' stability.

Similarly, Afonso et al. (2023, 2024) reported that rising sovereign risk increases domestic banks' public debt holdings and heightens vulnerability, while Edeh et al. (2026) found that public debt has a significant negative effect on banking-sector stability. In the Kenyan context, the current result also supports Ochenge (2025), who documented that budget deficits, bond yields, and capital adequacy incentives increase banks' sovereign debt demand, thereby reinforcing systemic risk implications.

The insignificant coefficient on PSLTA partly departs from, but does not entirely contradict, the crowding-out literature reviewed in the proposal. Studies such as Gennaioli et al. (2018), Kodongo (2025), Mbate (2013), Mwakalila (2020), and Jato and Nwankwo (2024) generally found that sovereign borrowing crowds out private credit, often with adverse implications for lending and broader economic performance. However, most of these studies focus on the impact of sovereign borrowing on credit supply, private-sector loan growth, or lending rates rather than directly on bank stability. The current result therefore suggests that while crowding-out may exist, its effect on bank stability is not strong enough to emerge as statistically significant in the direct GLS model once sovereign debt concentration, credit ratings, bank size, and control variables are included. This interpretation is also consistent with Bouis (2019), whose work suggested that crowding-out effects are heterogeneous across banks and may depend on balance-sheet strength and market conditions.

The positive and significant effect of sovereign credit ratings on bank stability is also well supported by the literature. The review notes that sovereign credit ratings affect bank stability through valuation effects, funding costs and market access. Mensah et al. (2017) found that sovereign upgrades reduce banks' cost of capital and improve access to finance, while Arogundade et al. (2025) showed that improved sovereign ratings

strengthen financial development and investor confidence. In addition, Thale and Rojas (2023) and Adrian et al. (2025) argued that deteriorating sovereign ratings weaken bank balance sheets by eroding the value of sovereign assets and raising risk premiums, implying that rating improvements should have the opposite stabilizing effect. However, the result contrasts with Takawira and Mwamba (2020), who found that sovereign credit rating indices had minimal or largely insignificant effects on several financial stability categories in South Africa.

The negative and significant coefficient on bank size is particularly important because it runs against one strand of the literature while supporting another. On one hand, the result contradicts Adusei (2015), who found a robust positive relationship between bank size and stability through diversification, stronger capital buffers, and supervisory monitoring. On the other hand, the negative coefficient supports the alternative "too-big-to-fail" and moral hazard perspective. Gondwe et al. (2025) found that larger banks are less stable in Sub-Saharan Africa, while the theoretical discussion drawing on Gropp et al. (2013), Acharya and Steffen (2015), and Pernell and Jung (2023) suggest that large banks may take on greater risks under expectations of implicit support. The positive and highly significant effect of ROE on bank stability is strongly consistent with both theory and empirical evidence. The empirical evidence identifies profitability as a key control variable because stronger earnings improve internal capital generation and loss-absorption capacity. This aligns with Abdelmoneim and Yasser (2023), who emphasized profitability as a major performance indicator, and with the broader bank-stability literature such as Jabra (2020) and Miao et al. (2025), which argues that stronger capital and earnings buffers enhance resilience.

The insignificant coefficient on liquidity risk suggests that, in the direct model, loans relative to deposits do not independently explain stability once other sovereign exposure and bank-specific factors are controlled for. This partly contrasts with the literature, especially Talam and Kiemo (2023, 2024) and Ochenge (2025), which emphasize that sovereign exposure and tightening conditions can worsen liquidity pressures. However, the absence of significance may indicate that liquidity risk operates jointly with other balance-sheet conditions rather than as a stand-alone predictor. Finally, the negative and significant effect of asset quality is consistent with the literature. Current result supports Oyetade and Muzindutsi (2023), who showed that

worsening sovereign conditions are associated with higher non-performing loans and weaker bank stability.

The results further indicate that the model fits the data well. The R-squared of 0.609 implies that approximately 60.9% of the variation in bank stability is explained by the explanatory variables included in the model, namely sovereign debt concentration, private sector loans to total assets, sovereign credit ratings, bank size, return on equity, liquidity risk, and asset quality. This suggests that the model has substantial explanatory power and that the selected regressors jointly capture a meaningful share of the observed variation in bank stability across Kenyan commercial banks.

The F-statistic of 81.885 with a corresponding p-value of 0.0000 further indicates that the model is statistically significant at conventional levels. This means that the explanatory variables, taken together, significantly explain variations in bank stability and that the GLS specification provides a sound basis for inference. The reported log-likelihood of -563.568 offers additional information on model fit and is useful for comparison with alternative specifications, where a relatively higher log-likelihood would generally indicate a better-fitting model. The model is based on 507 observations, confirming that the estimation utilized the unbalanced panel available for the study period.

These findings are consistent with the empirical literature reviewed. The literature identifies sovereign debt concentration, sovereign creditworthiness, profitability, liquidity conditions, asset quality and bank size as central channels through which bank stability is affected, so an R-squared above 0.60 is consistent with the expectation that these variables jointly explain a substantial portion of bank-level stability outcomes. In particular, studies such as Oyetade and Muzindutsi (2023), Adrian et al. (2025), Afonso et al. (2023, 2024), and Ochenge (2025), all of which underscore the significance of sovereign exposure and related financial conditions in shaping banking-sector resilience.

Second, the statistical significance of the overall model, as shown by the F-statistic and its near-zero p-value, is in line with the broader literature suggesting that sovereign-bank nexus variables have meaningful joint effects on bank outcomes. Empirical literature notes that fiscal risk transmission, sovereign rating movements, crowding-out pressures, and institutional characteristics interact to influence banking stability. As

such, the strong joint significance of the regressors accords with the empirical studies reviewed that find sovereign debt exposure to be an important explanatory factor for banking-sector fragility or resilience. This includes evidence from Edeh et al. (2026) on the negative effect of public debt on stability, Mensah et al. (2017) on the importance of sovereign ratings for banking conditions, and Kodongo (2025) and Mbate (2013) on the implications of sovereign borrowing for private credit dynamics.

4.7 The Moderating Role of Bank Size on Sovereign Debt Exposure and the Stability of Commercial Banks in Kenya

This section examines the moderating effect of bank size on the relationship between sovereign debt exposure and the stability of commercial banks in Kenya. Specifically, interaction terms between bank size and the key explanatory variables; sovereign debt concentration, private sector lending and sovereign credit ratings are incorporated into the GLS model. This approach enables the analysis to capture how the impact of sovereign exposure on bank stability varies across banks of different sizes. Table 4.12 presents the GLS regression coefficients examining the moderating effect of bank size on the relationship between sovereign debt concentration and bank stability.

Table 4.12: GLS Coefficients for the Moderating Effect of Bank Size on the Relationship Between Sovereign Debt Concentration and Bank Stability

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	12.035	2.549	4.721	3.14E-06
SDC_c	-0.015	0.011	-2.344	0.039
SIZE_c	-0.795	0.336	-2.369	0.018
SDC_SIZE	-0.001	0.004	-0.325	0.745
ROE	0.057	0.006	8.829	2.37E-17
LR	0.055	0.432	0.128	0.898
AQ	-1.840	0.827	-2.225	0.027

Source (Author, 2026)

Table 4.12 presents the Generalized Least Squares (GLS) regression results examining the moderating effect of bank size on the relationship between sovereign debt concentration and the stability of commercial banks in Kenya. The findings indicate that sovereign debt concentration (SDC_c) retains a negative coefficient of -0.0154 and

is statistically significant at the 5 percent level (p = 0.0394). This implies that higher concentration of bank assets in sovereign securities significantly reduces bank stability. Specifically, a one-unit increase in sovereign debt concentration decreases the Z-score by approximately 0.015 units, holding other variables constant. The result suggests that excessive exposure to government securities increases banks' vulnerability to sovereign risk and weakens financial resilience.

Bank size (SIZE_c) records a negative and statistically significant coefficient of -0.7952 (p = 0.0183). This finding indicates that larger banks tend to exhibit lower financial stability compared to smaller banks. The result may imply that large banks are more exposed to systemic risk, complexity, moral hazard, or aggressive balance-sheet expansion strategies that weaken resilience despite potential diversification benefits. The interaction term between sovereign debt concentration and bank size (SDC_SIZE) records a negative coefficient of -0.00124 but is statistically insignificant (p = 0.7450). This suggests that bank size does not significantly moderate the relationship between sovereign debt concentration and bank stability. Although the negative sign implies that the destabilizing effect of sovereign debt concentration may intensify slightly as bank size increases, the absence of statistical significance indicates that this moderating effect is weak and unreliable within the present model specification. Therefore, the effect of sovereign debt concentration on bank stability appears relatively similar across both large and small banks.

In Table 4.12, the SDC × SIZE interaction is estimated in isolation and is statistically insignificant (β = -0.00124, p = 0.745). However, when the interaction is estimated within the full moderation model in Table 4.15, which simultaneously controls for the other sovereign exposure channels and their interactions with bank size, the coefficient increases substantially in magnitude (β = -0.0107) and becomes weakly significant (p = 0.089). This suggests that the negative interaction coefficient indicates that larger banks experience a stronger adverse effect of sovereign debt concentration on stability than smaller banks. This finding is consistent with the sovereign-bank doom loop hypothesis, which posits that banks with high concentrations of domestic sovereign debt become increasingly vulnerable to sovereign risk shocks.

Larger banks typically hold greater volumes of government securities and are more interconnected with the financial system. Consequently, deterioration in sovereign creditworthiness can expose these banks to larger valuation losses, capital erosion, and

heightened solvency risk. The stronger negative interaction observed in the full model therefore suggests that bank size amplifies the stability-reducing effect of sovereign debt concentration.

In practical terms, an increase in sovereign debt concentration is likely to have a more pronounced negative impact on the stability of large banks than small banks, underscoring the systemic risks associated with concentrated sovereign exposures in large financial institutions. While the interaction is only weakly significant at the 10 percent level, the consistency of the negative sign across specifications provides evidence of a stable and theoretically coherent moderation effect.

Among the control variables, return on equity (ROE) records a positive coefficient of 0.0571 and is highly statistically significant ($p < 0.001$). This indicates that profitable banks are more stable than less profitable institutions. Specifically, a one-unit increase in ROE increases the Z-score by approximately 0.057 units, ceteris paribus. The finding suggests that profitability strengthens internal capital accumulation, improves earnings capacity, and enhances banks' ability to absorb financial shocks.

Liquidity risk (LR) records a positive coefficient of 0.0554 but is statistically insignificant ($p = 0.8980$). This implies that liquidity conditions do not independently exert a significant direct effect on bank stability in the moderation model. The result suggests that liquidity risk may operate jointly with other balance-sheet factors rather than acting as a stand-alone determinant of stability.

Asset quality (AQ) records a negative coefficient of -1.8405 and is statistically significant at the 5 percent level ($p = 0.0266$). This indicates that deterioration in asset quality significantly reduces bank stability. Specifically, an increase in non-performing loans relative to gross loans lowers the Z-score by approximately 1.84 units. The finding implies that poor loan performance weakens profitability, erodes capital adequacy, and heightens credit risk exposure, thereby reducing the resilience of commercial banks.

Table 4.13 presents the GLS regression coefficients examining the moderating effect of bank size on the relationship between private sector lending and bank stability.

Table 4.13: GLS Coefficients for Moderating Effect of Bank Size on the Relationship Between Private Sector Lending and Bank Stability

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	8.877	1.658	5.353	1.38E-07
PSLTA_c	-1.176	1.906	-0.617	0.537
SIZE_c	-0.608	0.323	-1.883	0.060
PSLTA_SIZE	1.076	0.746	1.443	0.150
ROE	0.059	0.006	9.350	4.15E-19
LR	0.259	0.563	0.461	0.645
AQ	-1.805	0.800	-2.257	0.025

Source (Author, 2026)

Table 4.13 presents the Generalized Least Squares (GLS) regression results examining the moderating effect of bank size on the relationship between private sector lending and the stability of commercial banks in Kenya. The findings indicate that private sector loans to total assets (PSLTA_c) records a negative coefficient of -1.1763 but is statistically insignificant (p = 0.5374). This implies that private sector lending relative to total assets does not exert a significant direct effect on bank stability within the moderation model. Although the negative sign suggests that higher exposure to private sector lending may slightly reduce bank stability, the lack of statistical significance indicates that direct effect of private sector lending on bank stability is weak. Therefore, any influence of private sector lending on stability may depend more on other factors such as bank size, capitalization, risk management practices, asset quality, or macroeconomic conditions rather than the volume of private sector lending itself.

Bank size (SIZE_c) records a negative coefficient of -0.6084 and is weakly significant at the 10 percent level (p = 0.0603). This finding suggests that larger banks tend to exhibit lower stability compared to smaller banks. The result may indicate that larger institutions are exposed to greater operational complexity, risk-taking behavior, or systemic vulnerabilities that weaken financial resilience despite potential diversification benefits associated with size. The interaction term between private sector lending and bank size (PSLTA_SIZE) records a positive coefficient of 1.0764 but remains statistically insignificant (p = 0.1498). This indicates that bank size does not significantly moderate the relationship between private sector lending and bank stability. Although the positive sign suggests that larger banks may experience a slightly

less adverse effect from private sector lending exposure, the absence of statistical significance implies that the moderating influence of size is weak and unreliable. Therefore, the effect of private sector lending on bank stability does not appear to vary systematically across banks of different sizes.

Among the control variables, return on equity (ROE) records a positive coefficient of 0.0589 and is highly statistically significant ($p < 0.001$). This finding implies that profitability significantly strengthens bank stability. Specifically, a one-unit increase in ROE increases the Z-score by approximately 0.059 units, holding other variables constant. The result suggests that profitable banks possess stronger earnings capacity, improved internal capital generation, and greater ability to absorb financial shocks.

Liquidity risk (LR) records a positive coefficient of 0.2595 but is statistically insignificant ($p = 0.6450$). This implies that liquidity conditions do not independently exert a significant influence on bank stability within the moderation model. The finding suggests that liquidity risk may interact with other balance-sheet characteristics rather than operating as a stand-alone determinant of stability.

Asset quality (AQ) records a negative coefficient of -1.8049 and is statistically significant at the 5 percent level ($p = 0.0245$). This indicates that deterioration in asset quality significantly reduces bank stability. Specifically, an increase in non-performing loans relative to gross loans lowers the Z-score by approximately 1.805 units, ceteris paribus. The result implies that poor loan performance weakens profitability, erodes capital buffers, and heightens credit risk exposure, thereby undermining financial resilience.

Table 4.14 presents the GLS regression coefficients examining the moderating effect of bank size on the relationship between sovereign credit ratings and bank stability.

Table 4.14: GLS Coefficients for Moderating Effect of Bank Size on the Relationship Between Sovereign Credit Ratings and Bank Stability

Variable	Coefficient	Std_Error	t_stat	p_value
Intercept	8.614	18.216	0.473	0.637
SCR_c	0.070	0.790	0.089	0.929
SIZE_c	-0.956	0.357	-2.682	0.008
SCR_SIZE	0.045	0.019	2.365	0.018
ROE	0.062	0.007	9.315	5.44E-19

LR	0.151	0.416	0.362	0.717
AQ	-1.976	0.804	-2.459	0.014

Source (Author, 2026)

Table 4.14 presents the Generalized Least Squares (GLS) regression results examining the moderating effect of bank size on the relationship between sovereign credit ratings and the stability of commercial banks in Kenya. The findings indicate that the direct effect of sovereign credit ratings (SCR_c) is positive (0.0701) but statistically insignificant (p = 0.9293). This suggests that sovereign credit ratings do not independently exert a significant direct influence on bank stability once the moderating role of bank size is incorporated into the model. Although the positive coefficient implies that improvements in sovereign creditworthiness may enhance stability, the lack of statistical significance indicates that this effect is not uniform across banks and may depend on bank-specific structural characteristics such as size. Bank size (SIZE_c) records a negative coefficient of -0.9563 and is statistically significant at the 1 percent level (p = 0.0076). This finding suggests that larger banks tend to exhibit lower levels of financial stability compared to smaller institutions. The result may imply that large banks face greater operational complexity, systemic exposure, risk concentration, or moral hazard behavior that weakens their resilience despite possible diversification advantages associated with scale.

The interaction term between sovereign credit ratings and bank size (SCR_SIZE) records a positive coefficient of 0.0448 and is statistically significant at the 5 percent level (p = 0.0185). This indicates that bank size significantly moderates the relationship between sovereign credit ratings and bank stability. Specifically, the positive interaction effect implies that improvements in sovereign credit ratings have a stronger stabilizing effect on larger banks than on smaller banks. The finding suggests that large banks benefit more from favorable sovereign credit conditions, possibly because they hold larger sovereign portfolios, possess greater access to financial markets, and experience stronger valuation gains and funding advantages following improvements in sovereign creditworthiness. Among the control variables, return on equity (ROE) records a positive coefficient of 0.0624 and is highly statistically significant ($p < 0.001$). This implies that profitability significantly enhances bank stability. Specifically, a one-unit increase in ROE increases the Z-score by approximately 0.062 units, holding other factors constant. The result suggests that profitable banks possess stronger internal

capital generation capacity, improved earnings strength, and greater ability to absorb financial shocks.

Liquidity risk (LR) records a positive coefficient of 0.1509 but is statistically insignificant (p = 0.7172). This indicates that liquidity conditions do not independently exert a statistically significant influence on bank stability within the moderation model. The finding suggests that liquidity risk may operate jointly with other balance-sheet characteristics rather than functioning as a direct determinant of stability. Asset quality (AQ) records a negative coefficient of -1.9760 and is statistically significant at the 5 percent level (p = 0.0143). This indicates that deterioration in asset quality significantly weakens bank stability. Specifically, an increase in non-performing loans relative to gross loans reduces the Z-score by approximately 1.976 units, ceteris paribus. The result implies that poor loan performance erodes profitability, weakens capital adequacy, and increases exposure to credit risk, thereby undermining the financial resilience of commercial banks.

Table 4.15 presents the GLS regression coefficients for the moderation model examining the combined effects of sovereign debt exposure indicators, bank size, and interaction terms on bank stability.

Table 4.15: GLS Moderation Model Coefficients and Model Performance Results

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	-1.0227	8.5773	-0.1192	0.9051
SDC	-0.0247	0.0114	-2.1735	0.0303
PSLTA	-1.2678	2.0590	-0.6158	0.5384
SCR	0.1569	0.1353	1.1596	0.2468
SIZE	-7.0192	2.4146	-2.9069	0.0038
SDC × SIZE	-0.0107	0.0063	-1.7033	0.0892
PSLTA × SIZE	0.2512	1.2237	0.2053	0.8374
SCR × SIZE	0.0750	0.0347	2.1610	0.0312
ROE	0.0659	0.0099	6.6648	0.0000
LR	0.6583	1.0091	0.6524	0.5145
AQ	-4.0077	1.8717	-2.1413	0.0328

Model Performance Statistic	Value
R-squared	0.613
F-statistic	160.82
Probability (F-statistic)	0.0000
Log-Likelihood	-583.56
Number of Observations	507

Source (Author, 2026)

Table 4.15 presents the GLS results for the moderation model examining whether bank size influences the relationship between sovereign debt exposure and the stability of commercial banks in Kenya. The findings show that sovereign debt concentration (SDC) remains negative and statistically significant (beta = -0.02469, p = 0.0303), indicating that greater concentration of bank assets in sovereign securities reduces bank stability.

Private sector loans to total assets (PSLTA) are negative but statistically insignificant (beta = -1.26784, p = 0.5384), suggesting that private lending does not exert a meaningful direct effect on bank stability once the moderation terms are introduced. Sovereign credit ratings (SCR) are positive but insignificant (beta = 0.15687, p = 0.2468), implying that their direct effect weakens after accounting for bank size. Bank size (SIZE) itself is negative and significant (beta = -7.0192, p = 0.0038), indicating that larger banks are, on average, less stable. Regarding the interaction terms, SDC × SIZE is negative and weakly significant (beta = -0.01065, p = 0.0892), showing that larger banks suffer more from sovereign debt concentration.

PSLTA × SIZE is positive but insignificant (beta = 0.25123, p = 0.8374), implying no meaningful size-based moderation in the private lending channel. In contrast, SCR × SIZE is positive and statistically significant (beta = 0.07499, p = 0.0312), indicating that improvements in sovereign credit ratings enhance the stability of larger banks more strongly than smaller banks. Among the controls, ROE remains positive and highly significant, LR remains insignificant, and AQ remains negative and significant, confirming that profitability strengthens stability while poor asset quality weakens it.

These findings are connected to the empirical literature reviewed. The negative and significant direct effect of SDC supports the sovereign-bank nexus literature, which

argues that heavy sovereign debt concentration deepens the "doom loop" between bank balance sheets and fiscal distress. Adrian et al. (2025) showed that banking stress is magnified where public debt is high and sovereign holdings are concentrated, while Oyetade and Muzindutsi (2023) found that sovereign risk indicators are negatively associated with bank stability in African banks. Likewise, Edeh et al. (2026) reported that public debt significantly reduces banking-sector stability, and Ochenge (2025) documented that rising demand for Kenyan government securities increases systemic risk.

The insignificant direct effect of PSLTA suggests that, once interaction effects are introduced, private sector lending relative to assets does not independently explain bank stability. This result partly contrasts with the existing literature. Studies such as Gennaioli et al. (2018), Kodongo (2025), Mbate (2013), Mwakalila (2020), and Jato and Nwankwo (2024) generally found that rising sovereign borrowing crowds out private credit, with implications for lending and broader financial outcomes. However, most of those studies focused on credit growth or lending rates rather than bank stability itself. The present finding therefore suggests that while crowding-out may occur, its direct translation into bank stability is not strong enough to remain significant once bank size and sovereign interaction effects are considered. This is closer to Bouis (2019), whose work implied that the crowding-out channel is heterogeneous and may depend on bank structure and market conditions rather than operating uniformly across all institutions.

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The weakening of the direct effect of SCR after introducing bank size is a particularly important result. In the direct model, sovereign credit ratings significantly improved bank stability, but in the moderation model the direct coefficient becomes insignificant. This suggests that the influence of sovereign ratings is conditional on bank size rather than uniform across banks. This interpretation is consistent with the literature showing that sovereign credit ratings affect banks through balance-sheet valuation, funding costs, and market access channels.

Mensah et al. (2017) found that sovereign rating upgrades lower banks' funding costs, while Arogundade et al. (2025) show that improved sovereign creditworthiness strengthens financial development and investor confidence. The present moderation result extends this literature by showing that these benefits are not evenly distributed; rather, they appear to accrue more strongly to larger banks. At the same time, the result

departs from studies like Takawira and Mwamba (2020), which found minimal or insignificant effects of sovereign credit ratings on financial stability in South Africa.

The negative and significant direct effect of bank size is also highly relevant to the empirical literature. This result supports the strand of literature associated with the too-big-to-fail, complexity, and moral hazard arguments rather than the diversification hypothesis. Gondwe et al. (2025) found that larger banks in Sub-Saharan Africa are less stable, while the theoretical discussion around moral hazard indicates that larger banks may engage in greater risk-taking because of their systemic importance and expectations of implicit support.

The current result is therefore consistent with the view that large banks may face greater leverage, complexity, and systemic exposure. However, it contradicts Adusei (2015), who found a positive relationship between bank size and stability through diversification and stronger capital buffers, and it also contrasts with the general argument that larger institutions enjoy economies of scale and better shock absorption. The current study therefore contributes new Kenyan evidence that bank size is not merely a neutral structural characteristic but may directly weaken stability when sovereign exposure is taken into account.

The interaction term SDC × SIZE is introduced to test whether bank size moderates the relationship between sovereign debt concentration and commercial bank stability. Th moderation, in this context, means that the effect of sovereign debt concentration on the Z-score is not fixed across all banks but varies systematically depending on bank size. Specifically, a negative coefficient on this term indicates that size amplifies the destabilizing effect of sovereign debt concentration. Conversely, a positive coefficient would suggest that larger banks absorb sovereign debt exposure with greater resilience, consistent with the diversification and capital-buffer arguments in the literature.

The estimated coefficient on SDC × SIZE is negative at -0.01065 and statistically significant at the 10 percent level ($p = 0.0892$). This result indicates that bank size intensifies, rather than reduce, the adverse effect of sovereign debt concentration on stability. For larger banks, as size increases, the combined destabilizing effect of sovereign debt concentration deepens. This means that large Kenyan commercial banks are not insulated from the sovereign-bank nexus by virtue of their scale; rather, their

greater integration into sovereign debt markets and their systemic role appear to intensify the feedback loop between sovereign risk and bank fragility.

While a positive coefficient would suggest that larger banks absorb such exposure with greater resilience. Its negative and weakly significant coefficient indicates that bank size intensifies the adverse effect of sovereign debt concentration on stability. In substantive terms, this means that larger banks appear to suffer more from excessive sovereign debt concentration than smaller banks. This finding is closely aligned with the empirical argument that large banks, because of their stronger integration into sovereign debt markets and their systemic role, may deepen the sovereign-bank nexus rather than escape it.

This findings resonates with Martínez and Pascual (2022), who indirectly linked size, risk-taking, and sovereign exposure in European less significant institutions, and with Kakes and Nijskens (2018), who showed that size shapes the channels through which financial stability and systemic risk operate. Although these prior studies did not explicitly estimate interaction effects between size and sovereign exposure, they pointed to heterogeneity in how risk is transmitted across institutions of different sizes.

The present study extends that literature by providing direct evidence that size amplifies the destabilizing impact of sovereign concentration in the Kenyan banking sector. At the same time, this result contrasts with Chibole et al. (2022), who found no significant moderating effect of bank size in a different Kenyan setting, thereby suggesting that the moderating role of size becomes more visible when the outcome is bank stability and the exposure is specifically sovereign debt.

By contrast, the interaction term PSLTA × SIZE is insignificant, showing that bank size does not significantly moderate the relationship between private sector lending and bank stability. This implies that the influence of private sector lending on stability does not vary systematically with size. This result differs from strands of the crowding-out literature that imply institutional heterogeneity matters for the allocation of credit between sovereign assets and private loans. For example, Bouis (2019) suggests that stronger or larger banks may maintain private lending even when holding government securities, whereas weaker banks may crowd out private credit more aggressively. The current result suggests that, at least in terms of stability outcomes, such heterogeneity

is not sufficiently strong to produce a statistically significant moderation effect through bank size.

The interaction term SCR × SIZE is positive and statistically significant, showing that improvements in sovereign credit ratings have a stronger stabilizing effect on larger banks than on smaller banks. This finding is consistent with the empirical literature on sovereign credit ratings, which emphasizes funding-cost and market-access channels.

Larger banks are typically more integrated into debt markets and hold larger sovereign portfolios, making them more likely to benefit from upgrades through valuation gains, lower risk premia, and improved confidence. This interpretation is supported by Mensah et al. (2017), Adrian et al. (2025), and Arogundade et al. (2025), all of whom show that sovereign credit improvements strengthen financial conditions. The present study extends this literature by showing that the stabilizing effect of improved sovereign ratings is not uniform, but stronger for larger institutions. This moderating result also helps explain why the direct effect of SCR became insignificant after the interaction term was introduced: the impact of sovereign ratings appears to operate through size-dependent channels rather than as a universal sector-wide effect.

The control variables also align with much of the reviewed literature. The positive and highly significant effect of ROE is consistent with the empirical literature's treatment of profitability as a stabilizing force, since stronger earnings increase retained capital and shock-absorption capacity. The insignificant effect of LR suggests that liquidity conditions do not independently determine stability in this moderation model, even though prior literature, especially Ochenge (2025) and Talam and Kiemo (2023, 2024), suggests that sovereign exposure can heighten liquidity pressures. Finally, the negative and significant effect of AQ is fully consistent with the literature that views poor asset quality and high non-performing loans as key sources of fragility, including Oyetade and Muzindutsi (2023).

The results further show that the model fits the data well. The R-squared of 0.613 indicates that approximately 61.3% of the variation in bank stability is explained by the variables included in the moderation model. Compared with the direct effects model reported in Table 4.9, which yielded an R-squared of 0.609, the inclusion of the interaction terms produces a marginal improvement in explanatory power of

approximately 0.4 percentage points. This suggests that the model has strong explanatory power and that the included predictors and interaction terms jointly account for a substantial proportion of changes in bank stability.

The F-statistic of 160.82 with a corresponding p-value of 0.0000 shows that the overall model is highly statistically significant. This implies that the explanatory variables, taken together, significantly explain variations in the stability of commercial banks in Kenya. Therefore, the GLS moderation model provides a valid and reliable basis for empirical inference. The log-likelihood value of -583.56 provides an additional measure of model fit and is useful for comparison with alternative model specifications. The model is estimated using 507 observations, confirming that the full unbalanced panel was retained in the analysis.

These findings are consistent with the empirical literature reviewed. First, the relatively high explanatory power of the moderation model supports the literature's argument that bank stability is shaped not only by direct sovereign exposure variables, but also by the institutional characteristics of banks, particularly size. Second, the strong overall significance of the model is in line with the empirical literature that treats sovereign exposure and institutional heterogeneity as important joint drivers of financial stability. Studies such as Adrian et al. (2025), Oyetade and Muzindutsi (2023), Afonso et al. (2023, 2024), and Edeh et al. (2026) collectively show that sovereign risk and public debt indicators significantly influence banking-sector outcomes. At the same time, the empirical literature on bank size, including Kakes and Nijskens (2018), Gondwe et al. (2025), Adusei (2015), and Chibole et al. (2022), suggests that institutional size is not neutral but is closely related to stability, risk-taking and resilience. The high F-statistic observed in the current study is therefore consistent with the broader empirical expectation that sovereign exposure variables and size-related effects jointly matter for bank stability.

4.8 Summary of the Chapter

This chapter presented the empirical analysis of the moderating role of bank size on the relationship between sovereign debt exposure and the stability of commercial banks in Kenya. It began with a description of the unbalanced panel dataset comprising 39 banks over the period 2010–2024, followed by descriptive statistics which revealed significant heterogeneity in bank stability and sovereign exposure. Correlation analysis

provided preliminary insights into the relationships among variables, while diagnostic tests confirmed violations of classical assumptions, justifying the adoption of the Generalized Least Squares (GLS) estimator. The Hausman test supported the use of the random effects framework. The GLS results showed that sovereign debt concentration negatively affects bank stability, while sovereign credit ratings and profitability enhance stability. The moderation analysis further revealed that bank size amplifies the adverse effects of sovereign debt concentration but strengthens the positive influence of sovereign credit ratings.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents a synthesis of the study's findings on the moderating role of bank size in the relationship between sovereign debt exposure and commercial banks stability in Kenya. It provides a summary of key results and discusses their implications in light of existing theory and empirical literature. The chapter further draws conclusions based on the evidence and offers policy and managerial recommendations for enhancing banking sector stability. It also outlines the limitations of the study and suggests areas for future research to deepen understanding of the sovereign-bank nexus and financial stability.

5.2 Summary of the Findings

This study sought to examine the effect of sovereign debt exposure on the stability of commercial banks in Kenya, with a particular focus on the moderating role of bank size. Using a unbalanced panel dataset of 39 commercial banks over the period 2010–2024, the analysis employed Generalized Least Squares (GLS) following diagnostic tests that confirmed violations of classical regression assumptions. The findings reveal that sovereign debt concentration (SDC) has a negative and statistically significant effect on bank stability. This indicates that increased allocation of bank assets to government securities reduces financial resilience, supporting the sovereign-bank nexus argument that excessive sovereign exposure heightens systemic risk. In contrast, private sector loans to total assets (PSLTA) were found to be statistically insignificant, suggesting that private lending does not exert a direct effect on bank stability within the model specification. The results further show that sovereign credit ratings (SCR) have a positive and significant effect on bank stability in the direct model, implying that improved sovereign creditworthiness enhances confidence, reduces risk transmission and strengthens bank balance sheets.

However, this effect becomes insignificant in the moderation model, indicating that the influence of sovereign credit ratings is conditional on bank size. With respect to bank-specific factors, bank size (SIZE) was found to have a negative and significant effect on stability, suggesting that larger banks are more vulnerable to instability, possibly due to increased exposure to systemic risk and moral hazard. The moderation analysis revealed that bank size plays a significant role in shaping the relationship between

sovereign exposure and stability. Specifically, the interaction between SDC and SIZE was negative, indicating that the destabilizing effect of sovereign debt concentration is more pronounced among larger banks. Conversely, the interaction between SCR and SIZE was positive and significant, suggesting that improvements in sovereign credit ratings benefit larger banks more strongly. Among the control variables, return on equity (ROE) exhibited a positive and highly significant effect on bank stability, confirming that profitability enhances resilience. Asset quality (AQ) was negative and significant, indicating that higher levels of non-performing loans reduce stability. However, liquidity risk (LR) remained statistically insignificant.

5.3 Discussion of Empirical Findings

This section discusses the empirical findings in relation to the study objectives and situates them within the broader theoretical and empirical literature on the sovereign-bank nexus. The discussion integrates both descriptive and regression results, with particular emphasis on the moderating role of bank size in shaping the relationship between sovereign debt exposure and bank stability in Kenya.

5.3.1 Effects of Sovereign Debt Concentration on the Stability of Commercial Banks in Kenya

The findings reveal that sovereign debt concentration (SDC) has a negative and statistically significant effect on bank stability. This implies that increased allocation of bank assets to government securities reduces the Z-score, thereby weakening financial resilience. Descriptive statistics showed substantial variation in sovereign exposure across banks, while regression results confirmed that higher concentration amplifies vulnerability.

This finding supports the sovereign-bank nexus theory, as formalized by Brunnermeier et al. (2016) and Farhi and Tirole (2018) which posits that excessive sovereign exposure creates a feedback loop between fiscal distress and banking instability. Through the sovereign exposure channel sovereign debt concentration on bank balance sheets rises, the bank becomes progressively more exposed to sovereign fiscal risk, and when sovereign stress materializes, the erosion of sovereign bond values simultaneously depleting bank capital and increasing earnings volatility driving the Z-score downward through both its numerator and denominator.

The empirical finding is consistent with Oyetade and Muzindutsi (2023), who document negative sovereign risk-stability associations across listed African banks, and with Ochenge (2025), who finds that rising demand for Kenyan government securities increases systemic risk. Adrian et al. (2025) further confirm that banking stress is amplified where sovereign holdings are concentrated.

The doom loop operates as a dynamic, feedback-reinforcing process where deteriorating sovereign creditworthiness weakens banks, weakened banks require bailouts, bailouts worsen sovereign debt sustainability, and the loop deepens. The Z-score, as an accounting-based measure computed from historical ROA and equity ratios, captured the static balance-sheet consequence of sovereign exposure, capital erosion and earnings volatility but not the dynamic feedback amplification that makes the doom loop theoretically distinctive. The significant negative SDC coefficient in this study therefore confirms the first-order balance-sheet transmission channel of the doom loop framework but cannot confirm the second-order sovereign fiscal feedback that constitutes its defining feature.

In the Kenyan context, increased government borrowing may incentivize banks to invest heavily in relatively risk-free sovereign securities at the expense of portfolio diversification. While such investments may appear safe in the short term, they expose banks to sovereign risk, particularly in periods of fiscal stress, debt sustainability concerns, or credit rating downgrades. Consequently, banks become more susceptible to macroeconomic shocks transmitted through the public sector. The result underscores the importance of prudent sovereign exposure management and diversification strategies within the banking sector.

5.3.2 Effects of Sovereign Debt-Induced Crowding Out of Private Credit on the Stability of Commercial Banks in Kenya

The study finds that private sector loans to total assets (PSLTA), which proxies the crowding-out effect, has an insignificant impact on bank stability. Although the coefficient is negative, it is not statistically different from zero, suggesting that private lending does not directly influence stability within the model. This finding suggests that the crowding-out effect operates more strongly through credit allocation and economic growth channels rather than directly affecting bank stability. While higher sovereign borrowing may reduce the availability of credit to the private sector, its immediate

impact on bank risk and solvency appears limited. This may be explained by the fact that private sector lending, although riskier than sovereign lending, can also generate higher returns that offset potential risks.

From a banking microeconomics perspective, moral hazard theory predicts that banks facing implicit sovereign guarantees and zero Basel risk-weights on government securities will rationally substitute private credit with sovereign bonds, reducing their lending-to-asset ratios and their exposure to credit risk (Acharya and Steffen, 2015; Abad, 2019).

Furthermore, the insignificant result may indicate that Kenyan banks maintain a balanced portfolio strategy, combining both sovereign and private sector lending to optimize returns and manage risk. It also suggests that the relationship between private credit and stability is complex and may depend on other factors such as credit quality, regulatory frameworks, and macroeconomic conditions. Therefore, the crowding-out channel may be more relevant in explaining economic performance rather than bank-level stability outcomes.

Additionally, types of banks respond to crowding out in different ways dues to bank-level heterogeneity. Larger, well-capitalized banks can buy more government bonds without cutting back on loans to the private sector. For these large banks, government bonds act as high-quality liquid collateral that helps support their lending capacity. In contrast, smaller and more financially constrained banks face a strict, either-or choice between holding government debt or making private loans.

Because the Kenyan sample of 39 banks includes both types ranging from massive, systemically important banks to very small ones, the overall results get mixed together. The statistics average out the near-zero effect of the large banks and the negative effect of the small banks, resulting in an "insignificant" finding that fails to show what is structural realities of both groups.

The interaction term PSLTA and SIZE was not statistically significant, this does not mean the differences between banks do not exist. Instead, it proves that bank size alone is too simple a metric to separate these two groups. Future research should use more precise measures, such as capital strength or specific bank business models, to uncover these hidden differences.

5.3.3 Effect of Sovereign Credit Ratings on the Financial Stability of Commercial Banks in Kenya

The results show that sovereign credit ratings (SCR) have a positive and statistically significant effect on bank stability in the direct model. This indicates that improvements in sovereign creditworthiness enhance bank stability by increasing the Z-score. This finding is supported by the descriptive evidence, which showed a positive association between credit ratings and stability indicators. This result highlights the importance of macro-financial conditions in shaping banking sector performance. Improved sovereign ratings signal stronger fiscal discipline, lower default risk and enhanced investor confidence. These improvements reduce funding costs, stabilize financial markets, and increase the value of sovereign assets held by banks, thereby strengthening their balance sheets.

However, in the moderation model, the direct effect of SCR becomes insignificant, suggesting that the influence of sovereign credit ratings is conditional on bank size. This implies that the benefits of improved sovereign creditworthiness are not evenly distributed across banks but depend on institutional characteristics. The finding emphasizes that macroeconomic improvements alone are insufficient to ensure uniform stability across the banking sector.

The theoretical implication is that the doom loop operates asymmetrically across the sovereign credit quality cycle. In the deterioration phase, large banks suffer more because of their greater SDC exposure which is consistent with the negative SDC × SIZE interaction. In the recovery phase large banks benefit more because of their deeper integration into capital markets and their larger sovereign bond portfolios. This duality where large banks are simultaneously the most exposed to sovereign debt concentration risk and the most positioned to benefit from sovereign quality improvements is precisely the pattern that the moral hazard framework predicts for to big to fail institutions. Commercial banks accumulate sovereign debt to capture financial gains, relying on implicit government guarantees to mitigate their downside exposure.

5.3.4 The Moderating Role of Bank Size on the Relationship Between Sovereign Debt Exposure and Commercial Banks Stability

The study provides strong evidence that bank size plays a significant moderating role in the relationship between sovereign debt exposure and bank stability. The results show that bank size has a negative and significant direct effect on stability, indicating

that larger banks are more prone to instability. This may be attributed to increased exposure to systemic risk, complex operations, and moral hazard behavior associated with "too-big-to-fail" expectations. More importantly, the interaction effects reveal that bank size amplifies the impact of sovereign debt exposure on stability. The negative interaction between SDC and SIZE indicates that larger banks experience a stronger adverse effect of sovereign debt concentration. This suggests that large banks, due to their significant involvement in government securities markets, are more vulnerable to fiscal shocks and sovereign risk transmission.

Conversely, the positive and significant interaction between SCR and SIZE indicates that improvements in sovereign credit ratings benefit larger banks more than smaller ones. This implies that larger banks are better positioned to capitalize on favorable macroeconomic conditions, possibly due to their stronger market presence, better access to capital, and greater integration into financial markets. The insignificant interaction between PSLTA and SIZE further suggests that bank size does not significantly alter the relationship between private sector lending and stability. This reinforces the earlier finding that the crowding-out channel is not a primary determinant of bank stability in this context.

The theoretical contribution of this interaction pattern to the sovereign-bank nexus literature is therefore precise in Kenya, where bank size does not uniformly amplify or weaken the sovereign exposure-stability relationship. It amplifies the doom loop channel (SDC × SIZE negative) while simultaneously strengthening the sovereign signalling benefit channel (SCR × SIZE positive), and it is neutral with respect to the crowding-out stability channel (PSLTA × SIZE insignificant).

5.4 Conclusion

This study set out to examine the effect of sovereign debt exposure on the stability of commercial banks in Kenya, with a particular focus on the moderating role of bank size. Drawing on panel data for 39 banks over the period 2010–2024 and employing Generalized Least Squares (GLS), the study provides important empirical insights into the sovereign-bank nexus within the Kenyan banking sector. The findings confirm that sovereign debt concentration significantly undermines bank stability, supporting the argument that excessive exposure to government securities heightens vulnerability to fiscal risk and weakens diversification. This highlights the presence of a sovereign-

bank feedback loop, where fiscal pressures can transmit directly into the banking system. In contrast, private sector lending does not exhibit a significant direct effect on bank stability, suggesting that the crowding-out channel may not independently determine bank resilience in the Kenyan context.

The study further establishes that sovereign credit ratings play a crucial role in enhancing bank stability, although this effect is conditional on bank size. Improved sovereign creditworthiness strengthens financial conditions, boosts confidence and enhances balance sheet performance, but the benefits are not uniformly distributed across institutions. Importantly, the study concludes that bank size is a critical moderating factor. Larger banks were found to be more susceptible to instability, likely due to increased systemic exposure and moral hazard tendencies. Moreover, bank size amplifies the negative impact of sovereign debt concentration while strengthening the positive influence of sovereign credit ratings. This dual effect underscores the complex role of size in shaping financial stability outcomes.

5.5 Recommendations

Based on the empirical findings and conclusions of the study, several policy, regulatory and managerial recommendations are proposed to enhance the stability of commercial banks in Kenya and mitigate risks associated with sovereign debt exposure. These recommendations are aligned with the study objectives and the observed moderating role of bank size.

5.5.1 Policy Recommendations

The findings indicate that excessive sovereign debt concentration weakens bank stability. Therefore, policymakers, particularly the National Treasury and the Central Bank of Kenya, should adopt policies aimed at reducing overreliance on domestic banks for government financing. This can be achieved by diversifying government funding sources, including expanding access to external concessional financing and deepening capital markets. Additionally, fiscal discipline should be strengthened to ensure sustainable public debt levels, thereby minimizing systemic risks transmitted to the banking sector. Further, policymakers should promote balanced credit allocation by incentivizing banks to extend credit to the private sector. This can be done through

credit guarantee schemes, tax incentives, and targeted policy interventions that enhance private sector participation in economic growth.

5.5.2 Regulatory Recommendations

Regulatory authorities should introduce prudential limits on sovereign exposure to prevent excessive concentration of bank assets in government securities. The Central Bank of Kenya may consider implementing exposure caps or risk-weight adjustments that reflect the potential risks associated with sovereign holdings, especially in periods of fiscal stress. Moreover, given that larger banks are more vulnerable to instability, there is a need for differentiated regulatory frameworks that account for bank size. Systemically important banks should be subjected to enhanced supervision, higher capital buffers, and more stringent stress testing requirements to mitigate systemic risk and moral hazard.

5.5.3 Managerial Recommendations

Bank management should adopt robust risk management strategies to mitigate the adverse effects of sovereign debt exposure. This includes diversifying investment portfolios, reducing excessive reliance on government securities, and strengthening internal risk assessment frameworks. In addition, banks should focus on improving profitability and asset quality, as these were found to significantly influence stability. Strengthening credit appraisal processes, enhancing loan monitoring systems, and reducing non-performing loans will improve resilience. Banks should also maintain optimal capital levels to absorb potential shocks arising from sovereign risk exposure. For example, no more than 20–25% of total assets in government securities which should be reviewed quarterly by the board risk committee, rather than leaving allocation solely to yield-driven treasury decisions.

5.5.4 Recommendations on Sovereign Credit Environment

Given the positive effect of sovereign credit ratings on bank stability, the government should prioritize maintaining and improving sovereign creditworthiness. This can be achieved through sound macroeconomic management, fiscal consolidation, and transparent public financial management practices. Improved sovereign ratings will enhance investor confidence and strengthen the banking sector. The National Treasury should pursue a public debt-to-GDP target consistent with the Public Finance

Management Amendment Act of 2023 criteria of 55% of GDP, in present value terms, since Kenya's debt ratio has remained materially above this benchmark, which is the proximate driver of rating agency concern.

5.5.5 Recommendations on Bank Size and Systemic Risk Management

The study finds that bank size plays a dual role in influencing stability. Therefore, regulators and policymakers should adopt size-sensitive regulatory policies. Larger banks should be closely monitored due to their increased exposure to sovereign risk and systemic importance. At the same time, smaller banks should be supported to enhance competitiveness and resilience, ensuring a balanced and stable banking ecosystem.

5.6 Limitations of the Study

Despite the study providing important insights into the relationship between sovereign debt exposure and the stability of commercial banks in Kenya, several limitations should be acknowledged. First, the study relied exclusively on secondary data obtained from published financial statements and regulatory reports. While such data are generally reliable and standardized, they may be subject to reporting errors, omissions, or inconsistencies across banks and over time. Additionally, secondary data limit the ability to capture qualitative factors such as managerial decision-making, risk appetite and governance structures, which may also influence bank stability.

Second, the measurement of key variables presents inherent limitations. For instance, bank stability was proxied using the standard Z-score, which, although widely used, is based on historical accounting data and may not fully capture forward-looking risks or market-based indicators of stability. Similarly, proxies used for sovereign debt exposure and liquidity risk may not completely reflect the complexity of banks' balance sheet structures and risk profiles.

Third, the study focused on commercial banks in Kenya, which limits the generalizability of the findings to other financial institutions such as microfinance institutions, SACCOs, or banks operating in different regulatory and macroeconomic environments. Differences in institutional frameworks and market conditions may yield different results in other contexts.

Fourth, although the study employed GLS estimation to address violations of classical assumptions, there remains the possibility of endogeneity and omitted variable bias,

particularly given the dynamic interactions between sovereign debt exposure, bank size, and financial stability. While efforts were made to include relevant control variables, not all influencing factors could be fully accounted for. Finally, the study covered the period 2010–2024, which includes episodes of economic shocks and policy changes. While this enhances the richness of the analysis, it may also introduce structural breaks that are not fully captured in the model.

There was a deliberate exclusion of banks under receivership, failed institutions, and entities that ceased independent operations following mergers and acquisitions presents a methodological limitation. This sampling decision was primarily driven by severe data unavailability and the necessity of maintaining data consistency across the panel. Incorporating observations with substantial missing values would have introduced significant measurement errors, thereby compromising the statistical reliability and validity of the econometric estimates.

A methodological limitation of this study pertains to the measurement of sovereign debt-induced crowding out. Rather than directly quantifying the macro-level crowding-out mechanism, this study utilizes bank-level portfolio allocation specifically, the proportion of assets allocated to government securities as a proxy for balance-sheet exposure to sovereign debt.These limitations, however, do not invalidate the findings but rather provide context for their interpretation and highlight areas for further research.

5.7 Recommendations for Future Research

Building on the findings and limitations of this study, several avenues for future research are proposed to deepen understanding of the relationship between sovereign debt exposure and bank stability. First, future research could incorporate market-based measures of bank stability, such as stock price volatility, distance-to-default from market data, or credit default swap (CDS) spreads, to complement accounting-based indicators like the Z-score. This would allow for a more comprehensive assessment of financial stability. Second, future studies should explore additional moderating and mediating variables, such as governance quality, capital adequacy, digitalization and regulatory frameworks, to better understand the mechanisms through which sovereign debt exposure affects bank stability.

Third, comparative studies across different countries or regions, particularly within Sub-Saharan Africa, would enhance the generalizability of findings and allow for cross-country analysis of institutional and macroeconomic differences. Fourth, future research could extend the scope beyond commercial banks to include other financial institutions, such as SACCOs, microfinance institutions, and development banks, to provide a broader perspective on financial system stability. Finally, there is a need for mixed-method approaches that combine quantitative analysis with qualitative insights from industry experts, regulators, and bank managers. This would help capture institutional dynamics and behavioral factors that are not fully reflected in secondary data.

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VT OMNES VNVM SINT

Appendix I: List Of Commercial Banks In Kenya

1. KCB Bank Kenya Limited
2. Equity Bank Kenya Ltd
3. Co-operative Bank of Kenya Ltd
4. NCBA Bank Kenya PLC
5. Absa Bank Kenya PLC
6. Stanbic Bank Kenya Ltd
7. I & M Bank Limited
8. Standard Chartered Bank (K) Ltd
9. Diamond Trust Bank Kenya Limited
10. Prime Bank Ltd
11. Bank of Baroda (Kenya) Limited
12. Citibank N.A. Kenya
13. Family Bank Ltd.
14. National Bank of Kenya Ltd
15. Bank of India
16. Ecobank Kenya Ltd
17. SBM Bank Kenya Ltd
18. HFC Ltd
19. Victoria Commercial Bank Limited
20. Sidian Bank Ltd
21. Gulf African Bank
22. Bank of Africa Ltd
23. Guaranty Trust Bank
24. African Banking Corporation Ltd
25. Habib Bank AG Zurich

26. DIB Bank Kenya Ltd
27. Kingdom Bank Limited
28. Premier Bank
29. Credit Bank Ltd
30. Guardian Bank Limited
31. Development Bank of Kenya Ltd
32. Commercial International Bank (CIB) Kenya Ltd
33. Paramount Bank Ltd
34. M-Oriental Commercial Bank
35. Middle East Bank (K) Ltd
36. UBA Kenya Bank Ltd
37. Access Bank (Kenya) PLC
38. Consolidated Bank of Kenya Limited
39. Spire Bank

VT OMNES VNVM SINT

Appendix ii: Ethical Approval Letter

Strathmore UNIVERSITY

1st April 2026

Ms Njuguna Judy,
judy.njuguna@strathmore.edu

Dear Ms Njuguna,

RE: The Moderating Role of Bank Size on Sovereign Debt Exposure and the Stability of Banks in Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC3457/26.** The approval period is from **1st April 2026 to 31st March 2027.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, and MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification
iv. Any changes, anticipated or otherwise, that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix Iii: Introductory Letter From The University

Ole Sangale Rd, Madaraka Estate
P. O Box 59857 - 00200, Nairobi, Kenya
Cell: +254 703 034 414/6/7
X/Twitter/Tiktok: @SBSKenya
Facebook/Linkedin: Strathmore University Business School

Email: **sbsinfo@strathmore.edu** or visit **www.sbs.strathmore.edu**

Strathmore UNIVERSITY BUSINESS SCHOOL

Years of Developing Great African Leaders

2nd April 2026

To Whom It May Concern.

Dear Sir/ Madam.

RE: FACILITATION OF RESEARCH – NJUGUNA, JUDY WAMBUI

This is to introduce Njuguna, Judy Wambui who is a Master of Science in Development Finance student at Strathmore University Business School, admission number MDF/85002/23. As part of our MDF Program, Judy is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MDF course. To this effect, he would like to request for appropriate data from your organization.

Judy is undertaking a research paper on " ***The Moderating Role of Bank Size on Sovereign Debt Exposure and the Stability of Banks in Kenya***". The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MDF seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Njoki Kiagiri
Manager – Graduate Programs.
Strathmore University Business School.

Strathmore University Business School is a Proud member of:

Association of African Business Schools AABS EFMD AACSB

Appendix Iv: Research Permit From Nacosti

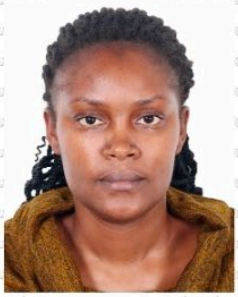
REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **610741**

Date of Issue: **15/April/2026**

RESEARCH LICENSE



This is to Certify that Ms.. JUDY WAMBUI NJUGUNA of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: The Moderating Role of Bank Size on Sovereign Debt Exposure and the Stability of Banks in Kenya for the period ending : 15/April/2027.

License No: **NACOSTI/P/26/4187823**

610741

Applicant Identification Number

Ag. Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions