The Impact of Capital Adequacy Requirements on Financial Stability in the Banking Sector of Kenya.

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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 Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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List of Acronyms and Abbreviations

ARDL	Autoregressive Distributed Lag
CAR	Capital Adequacy Requirements
CET1	Common Equity Tier 1
CBK	Central Bank of Kenya
DGP	Data Generation Process
GDP	Gross Domestic Product
FGLS	Feasible Generalized Least Squares
FS	Financial Stability
J-B test	Jarque Bera Test
LCR	Liquidity Coverage Ratio
LM test	Lagrange Multiplier test
NSFR	Net Stable Funding Ratio
OLS	Ordinary Least Squares
ROA	Returns on Assets
ROE	Returns of Equity
VAR model	Vector Autoregressive model

Abstract

This study examines the impact of capital adequacy requirements (CAR) on financial stability (FS) in Kenya's banking sector from 2000 to 2022, addressing both long-term and short-term dynamics. Grounded in theories such as the Modigliani-Miller Theorem, Capital Buffer Theory, and Signaling Theory; the research employs a positivism philosophy and a correlational design. The methodology integrates econometric techniques, including the Autoregressive Distributed Lag (ARDL) model and error correction mechanism (ECM), alongside diagnostic tests for model robustness. Quarterly data on CAR, FS (measured using Z-scores), exchange rates, and GDP were sourced from reliable financial databases. The findings reveal that CAR significantly enhances FS in both the short and long run, affirming its critical role in absorbing shocks and mitigating systemic risks. Economic growth (GDP) positively influences FS over time, highlighting the interplay between macroeconomic stability and financial resilience. Conversely, while exchange rate fluctuations exhibit short-term effects, their long-term impact on FS is negligible. Diagnostic tests confirm the validity of the model, with no evidence of multicollinearity, autocorrelation, or heteroscedasticity. The study concludes that stringent CAR regulations are essential for a stable banking environment, complemented by policies promoting economic growth. Recommendations include enhancing CAR compliance, aligning regulatory frameworks with Basel III standards, and fostering economic policies to stabilize the exchange rate and GDP growth. The research underscores the importance of robust risk management strategies and provides a foundation for policymakers to strengthen Kenya’s banking sector against future shocks.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Capital adequacy requirements are regulations that determine the minimum capital reserves that a financial institution must hold to mitigate risks and absorb potential losses. These requirements are crucial in preserving the stability and integrity of the country's financial system. The Basel Accords especially the Basel III have provided guidelines for capital adequacy across the world while stressing the value of the high-quality capital cushions in containing systemic risks. In any economy of the world, the role of the financial institutions and markets cannot be overemphasized, and the banking sector as we all know is the engine for the economic growth development of any country. Businesses rely on banks for funding; banks boost economic development; and support stability against crises in the financial sector.

In Africa, Commercial banks have a tremendous impact on the economic growth and financial stability of any Country. According to Ouma and Muriu (2014), commercial banks performance is critical to the growth of the industry, which contributes to an economy's prosperity as a whole. The banking industry in Kenya has evolved during the last few decades, this has been preceded by increased competition technologist and new regulatory measures. However, this growth has also posed some challenges such as the requirement to develop sound measures in handling risks and sustaining the financial health of institutions. After the global financial crisis in 2007-2009 year, measures like higher capital adequacy requirements which are considered as more suitable for having stable banking sector became more pressing. majority of African countries have stepped up their capital accumulation towards the recommendations of the BASEL III. Historically, the Kenyan banking industry has faced several crises, such as bank failures and non-performing loans, which have underscored the need for stringent capital requirements. These crises have often been linked to inadequate capital buffers, poor governance, and insufficient regulatory oversight. In response, the Central Bank of Kenya (CBK) has progressively strengthened its regulatory framework, emphasizing the importance of capital adequacy in promoting a sound banking system.

A number of works have examined capital adequacy and soundness; There is also evidence from across the world that strict capital requirements can lower the risk of banking crises and also raise the general stability of systems across the world (Basel Committee on Banking Supervision, 2011); Earlier empirical works on African countries have highlighted the

importance of capital adequacy, but also note that its effectiveness depends on the openness of the economy and regime of the country.

In other empirical findings, it has been discovered that increase in capital requirements has a positive effect on performance of Kenyan bank, though there are challenges like regulatory duality and market conformity [See for instance, Oduor & Ngugi, 2017]; thus, as informative as this study is; it does not test empirically the effects of capital adequacy requirements on banking financial stability overall.

Understanding the impact of capital adequacy requirements on financial stability in Kenya is essential; Firstly, it provides insights into how regulatory policies influence the operational efficiency, profitability, and overall stability of banks. Secondly, understanding this relationship can help policymakers and regulators fine-tune capital requirements to balance financial stability with growth objectives. Lastly, for banking institutions, such research can inform strategic decisions regarding capital management, risk-taking, and competitive positioning.

1.2 Statement of the Problem

Capital adequacy requirements are prescriptive measures of the amount of capital that a bank or other financial institution should hold to cover for losses that may arise due to business risk exposures. Even if all these requirements are aimed at strengthening the stability of the financial systems, little is known on how they encourage stability of the financial sector within the Kenyan economy. Kenya's financial sector is characterized by a mix of large, well-capitalized banks and smaller, less stable institutions. Despite regulatory measures, the sector has experienced instances of bank failures and financial distress, raising concerns about the adequacy of current capital requirements. This study aims to assess whether the existing capital adequacy framework sufficiently addresses the risks faced by Kenyan banks and contributes to overall financial stability.

Specifically, the research will explore the relationship between capital adequacy requirements and indicators of financial stability. By examining this relationship, the study seeks to provide insights into the effectiveness of capital adequacy requirements in mitigating systemic risks and enhancing the robustness of Kenya's financial sector.

1.3 Objectives of the Study

1.3.1 General Objective

As stated by the topic of this research study, its general objective is to assess the impact of capital adequacy requirements on the financial stability of the banking sector in Kenya. The proceeding subtopics in this section will look at the specific objectives as well as the research questions towards pursuing this study.

1.3.2 Specific Objectives

The specific objectives of this study are;

a) To analyze the trends and patterns in capital adequacy requirements and financial stability of the Kenyan banking sector over the period of 2000-2022.
b) To examine the long-term cointegration between capital adequacy requirements and financial stability in the Kenyan banking industry.
c) Analyze the impact of capital adequacy requirements on financial soundness of Kenyan banking sector.

1.4 Research Questions

The research questions for this study are as follows;

a) What are the historical trends and patterns of the capital adequacy requirements and financial stability of the Kenyan banking sector over the period of 2000-2022?
b) What is the long-term cointegration between the capital adequacy requirements and financial stability in the Kenyan banking industry?
c) What is the impact of capital adequacy requirements on the financial soundness of Kenyan banking sector?

1.5 Significance of the Study

The research question is important from theoretical, empirical and practical perspectives in financial sector within an emerging economy like Kenya. But the effect of these requirements was that policymakers can fine tune these requirements in order to sustain the stability of banking sector in Kenya to avoid shocks that may lead to financial crises and to ensure public confidence in the financial institutions. This study will also provide insights into the effectiveness of current regulatory frameworks and guide the Central Bank of Kenya and other

regulatory bodies in making data-driven decisions to improve banking regulations, ensuring they are both stringent and adaptable to evolving economic conditions. The study will help banks develop better risk management strategies. Understanding how capital adequacy affects financial stability will also enable banks to optimize their capital structures, manage risks more effectively, and improve their overall financial health. Lastly the study outcomes will inform policymakers in designing comprehensive policies that not only focus on capital adequacy but also integrate other macro prudential tools to safeguard financial stability.

1.6 Scope and limits of the Study

This study was conducted in Kenya. It will focus on the entire banking industry in Kenya, which encompasses all the commercial banks. The study will employ secondary data based on Central Banks and World Bank data between 2000 and 2022. These data sources are the most reliable and valid data sources in economics and finance. It's important to note that Kenyan financial stability index z-score and CAR started being calculated in 2000. Thus, the study duration is pegged on availability of data.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section provides a review of literature on capital adequacy and financial stability by looking at the theoretical underpinnings of capital adequacy; empirical literature for both global and Kenya and the gaps to be filled.

2.2 Theoretical Literature Review

2.2.1 Modigliani-Miller Theorem

The theoretical concepts supporting the arguments for much higher cap ratios are within the context of Modigliani and Merton Miller's, 'capital structure irrelevance' theory of 1958. This 'M&M' hypothesis also states that there is no right level of equity financing compared to debt financing for a firm because any attempt to enhance profitability by increased gearing leads to greater cost of unit per remaining equity as a result of increased risk. Based on this premise, some authors state that on principle, there should be no reason why banks should have any problem with equity capital requirements, many more folds higher than at the moment, because their leverage would get cut down to size, in exchange for a fully compensating decrease in the cost of equity capital. Others analytical seek to find the right level of capital needed, recognizing that imposing it will decrease banks' profitability and shrink lending and activities. Such reductions are made against the corresponding reductions in probabilities of financial crises, and thus expected damages avoided are used to arrive at the optimal increase in capital requirements.

2.2.2 Capital Buffer Theorem

The capital buffer theory offers the rationale that financial institutions maintain capital over and above the fundamental regulatory requirement as an insurance. This is because the host financial institutions which are located in a specific regulatory framework undergo certain regulatory costs and benefits on holding capital and this they have to factor in (Hessou & Lai, 2017). This theorem was widely known after the world financial meltdown of year 2007-8 with fears that institutions especially the banking institutions should have a capital cushion. Another component is the counter-cyclical buffer where the banks can add or subtract from their capital requirements according to the state of the economy; augmented requirements are needed during the economic boom while restricted, during the slump (Beatty & Liao, 2014). The authors

Calem and Rob (1999) note that buffer acts as a cushion during economic downturns, ensuring the bank's solvency and operational continuity.

2.2.3 Signaling Theory

This theory was implanted in the based on the issues of the agency nature of information asymmetry between managers and investors in the 1970. These models were based on the assumption that managers of the firm with information advantage will have incentives to disclose such information to the outside investors so that the price of the stock will rise. But managers cannot just make an open declaration of the good news to the investors because they will confront it with suspicion, (Ross, 1977).

According to signaling theory, banks with higher capital levels signal their soundness and lower risk to the market. This, in turn, can lead to lower funding costs and enhanced financial performance. High capital adequacy ratios may thus attract more deposits and investment, improving the bank's market position and profitability, (*ibid*)

2.3 Empirical Literature

2.3.1 Capital adequacy Regulations in Kenya

Referring to King (2023) capital regulation is among the most frequently used methods adopted by various jurisdictions to discourage the undertakings of unnecessary risks and to strengthen the financial structure of various economies. However, there is a hitch here in that capital regulation comes with certain implications on efficiency, risk and profitability as well as the price determination of the institution in question. There is also other forgone consideration; the minimum capital that those firms held could have been in use in extending credit to customers profitably.

Correspondingly, the Banking industry has employed the above findings of the Basel accord to articulate the accomplishment of the capital regulation across the globe purpose (Ortino, 2019; Ramirez, 2017). Which in turn gave rise to Basel I also commonly known as the Basel Capital Accord, rise of Basel II as a new capital formation and the adoption of Basel III after the 2007/2009 crisis. From the present perspective, the status is such that the banking regulators who are the members of the BIS have started the process of adding a full meaning to the accord for the sake of the realization of Basel III or its previous versions depending on the actual level. The last of them is the Basel IV that was finalized in 2017 and is to be implemented in January

2023. A recently implementing standard will result in the need to boost the capital to banking institutions (Neisen & Roth, 2018).

In Kenya, like many other countries, has a history of evolving capital adequacy regulations, influenced by both domestic economic conditions and international regulatory frameworks.

Early Development (1960s-1980s): Kenya's journey with capital adequacy regulations began shortly after its independence in 1963. The Banking Act of 1968 was one of the earliest legislative efforts to regulate the banking sector. However, the focus on capital adequacy was not as stringent. These early regulations were primarily aimed at licensing and supervising banking institutions, with less emphasis on detailed capital requirements" (Central Bank of Kenya, 2019).

Introduction of Basel I (1988-1999): The first attempt to regulate the banks internationally was made by the Basel Committee on Banking Supervision in the year 1988 by introducing Basel I Accord. Kenya began to align its regulations with international standards in the 1990s. In the 1990s, Kenya started to adopt elements of the Basel I framework, which introduced minimum capital requirements based on risk-weighted assets" (Central Bank of Kenya, 2020).

Transition to Basel II (2000-2013): In the early 2000s Kenya was gearing up for the implementation of the Basle II accords that presented a three-pillar approach to capital adequacy that covered operational and market risks. With reference to Central Bank of Kenya, banks of this country have been in the process of implementing the Basel I framework that has been developed to provide structured capital adequacy norms at the international level since 2003. Firstly, Basel I forced the global banks to hold minimum of eight percent of capital adequacy ratio expressed as a fraction of risk weighted assets. The introduction of this framework marked a significant step towards enhancing the resilience of banks against potential financial crises. This was pivotal in establishing a more robust regulatory environment that addressed the capital needs of banks" (Central Bank of Kenya, 2003).

In mid 2000s in order to come closer to Basel II standards, the CBK published guidelines where credit risk was not the only focus, moreover, market and operational risks were taken into consideration as well (Njuguna Ndung'u, the former Governor of the CBK, 2012). After the credit crunch of 2007/2008, there was a renewed emphasis on bank regulation and the integration of the Basel II accord into Kenyan legislation took place in 2009. The critics of Basel II aimed to enhance the quality of risk management practices through the usage of more

comprehensive tools for measurement of the credit, market, and operating risks. The CBK revised the Banking Regulations in 2010 to capture Basel II requirements to improve the capital adequacy measures that will, in addition to measures of the amount of capital, incorporate quality of capital as well as risks to which institutions are subjected. The Basel II framework has provided Kenyan banks with better tools for risk management, ensuring they maintain adequate capital buffers in the face of potential financial turmoil, (Ngugi & Kiberu, 2011).

Implementation of Basel III (2014-Present): In response to evolving financial risks and the limitations of Basel II, the Basel Committee introduced Basel III, and Kenya began its gradual implementation process in 2015. With Basel III, more rigid capital standards were set, and the types of capital were extended to CET1 Capital to enhance the form of banks. Furthermore, it stressed the need for the appropriate measurement of liquidity and established the LCR and the NSFR. Kenya's banking sector has gradually adopted Basel III regulations to enhance resilience, with the CBK issuing directives on higher capital buffers and stricter liquidity requirements, (CBK Annual Report, 2017). This has shown both commitments to enhance stability in the banking system and align with global practice (CBK 2018)

Recent Developments: In recent years, the CBK has continued to review and strengthen capital adequacy frameworks to adapt to emerging risks, including those posed by fintech innovations and economic disruptions caused by the COVID-19 pandemic. The emphasis has shifted towards ensuring that banks remain resilient in times of economic uncertainty and ensuring compliance with international best practices. The current regulatory environment in Kenya is designed not only to ensure stability but also to promote innovative financial solutions that can address the needs of a dynamic economy" (Achieng, 2020).

Kenya's capital adequacy regulations have evolved significantly over the decades, influenced by both domestic needs and international regulatory developments. From the initial focus on licensing and supervision to the adoption of comprehensive risk-based frameworks, these regulations have played a crucial role in maintaining the stability and resilience of Kenya's banking sector.

2.3.2 Financial Stability

Schinasi (2004) defines financial stability as stability of the financial institutions, stability of the markets, no disturbances encountered, low fluctuations ever encountered within a sector. These are standard features that are a must in any financial sector that must deliver. The topic

on financial stability has policy and academic interest that has informed the selection of the subject. This is still a subject of debate since the credit crunch begin in 2008/2009 (Arcand et al., 2012), (Cecchetti and Kharroubi, 2012); (Beck et al., 2014). According to Cartapanis, (2011) he notes that the main reason of financial stability being a public good is as follows: Other people can also use it at the same time; hence, it is non-rival and due to the fact that it cannot exclude anyone from using this public good as well. Profitable here means that financial institutions in a country are making profits and having enough liquidity for holding numerous securitized assets against liabilities (Klaas and Vagizova, 2014). Therefore, even such indicators as capital quality, asset and liability quality could be compensated by some level of financial stability ensuring effective performance that would cause credit aggression intensification, credit risk growth and losses likelihood. Being sufficiently capitalized by risk assets security level while financial stable was reliability guarantee itself for bank liquidity, and their unreasonably high profitability indicates effectiveness in terms of resource utilization within credit organisms (Hodachnik, 2009).

2.3.3 Empirical Studies Globally

Oduor, Ngoka and Odongo's work titled Capital Requirement, Bank Competition and Stability in Africa published in December 2017 raised the following questions: What happens to the banking sector in Africa when the minimum regulatory capital increases? Additionally, what can be done with an increase of the regulatory capital since as stated earlier higher capital adequacy measures lead to a rise in concentration of the banking sector? In a panel study approach using data on 167 banks from 37 African countries over the period 2000-2011, this study found out that beefed capital enhances financial instability in Africa except for big banks, hence more capital did not enhance safety of African banks. Moreover, increasing regulatory capital raises foreign bank costs thereby rendering domestic banks uncompetitive because sourcing for and holding extra local bank capital is expensive through cheap funding parent by foreign banks. Hence, they doubted the value in increasing regulatory capital heading for a shot in the arm majorly expected to improve the stability and competitiveness of African financial sector. It will also try to determine the relationship between capital adequacy ratios and the performance of Ghanaian banks using Net Profit after Tax and Return on Capital Employed as variables. The research design used was quantitative type of explanatory. In this case, the study has employed General Least Square random effects panel estimation method to gauge CAR impact on bank performance. This observation has been made in relation to the capital

adequacy ratio; that is, how increased capital adequacy ratio improves the performance of banks in terms of net profit after tax.

According to these presented results, it means that capital adequacy ratio has a negative relationship with banks' performance especially for return on capital employed. Similarly, Okoro (2019) attempted to establish relationship between CA and financial performance of deposit money banks in Nigeria for period 2008-2017 adopted panel approach and the flow of financial performance of bank is analyzed using dependent variable proxy: Return on Asset (ROA). Dependent variables newly suggested: liquidity ratio, capital ratio, investment ratio and Loans & Advances as proxy for the dependent variable; capital adequacy of money deposit banks. Another research finding was that there was a moderate positive relationship between capital adequacy and bank performance level.

As pointed by Mohammad (2015), among the drivers of CAR, the specificity of the particular bank is one of the foundational indicators of profit in that bank. However, the study with the help of a pooled OLS method on Pakistani bank banks supported the hypothesis concerning solvency of lowly developed country banks is higher than the solvency score of the developed country's bank. The argument originates from an assumption that the banking organization in the less developed countries satisfies the Basal III Accord in that the minimum capital base amounts to 8 % of the total asset.

Yakubu and Bunyaminu (2023) in their literature review of capital requirement and bank stability in sub-Sahara Africa for the year 2000 to 2017 established that the effects of capital requirement on the stability of the banks in Africa are still relatively under explored and unknown. Applying GMM technique, an econometric technique had indicated that capital requirement bore a positive and significant influence on stability among these banks. But the same study has proved that while institutional quality exists capital adequacy is negative to stability. By so doing, they concluded that it is important for Sub-Saharan African banking systems to fully comply with regulatory capital requirements.

In the Sri Lankan context, implementation of the capital adequacy requirements according to the Basel III framework was put into action from June 2017. The ICAAP was initiated in Sri Lanka with the introduction of Basel II in 2013. This is supported by L. Chandrasegaran, (2020)

who conducting a study on capital adequacy ratio on the banking industry on the Sri Lankan market and its performance. The research method that was used in the study is descriptive explanatory research. Some of these are CAR, CC, AQ, RWA/TA and the tier 1 capital to total assets. This non-interest income to average asset, net interest margin and return on average assets were all proxies for measuring the profitability of an organization since its dependent variable for measurement is profit. From the estimated regression equation, we observed that only with regards to 'capital adequacy ratio', has a positive direct relationship with non-interest income/average asset while other variables have negative coefficients. Additionally, it shows there is a negative relationship between Tier-1 capital to total and non-interest income to average assets. This means that the asset quality was an inverse significant function with net interest margin. They also realized that other independent variables bore no significant relationship with the dependent variables as stated in the same source.

Arijan (2017) in his cross-sectional study employed a mixed model approach to describe and understand the; characteristic and changes of capital requirement, and the effect that they have on the performance of Swedish banks. The increases were that capital adequacy ratios where negatively and significantly associated with ROE in both the large as well as the small, specialized banks. Of course, it is possible to highlight and analyze the positive and significant impact of the capital requirement and the NIM of the niche banks identified by the study.

The article by Pasaman (2017) considers the impact of a particular period on the bank's capital adequacy ratio, net interest margin and Non-Performing Loans to evaluate its health level. Testing involved obtaining permission from the Bank's management, while the data was collected for five years from Indonesia Stock Exchange. There is an inverse relationship between capital adequacy ratio and bank profitability, according to this study. Net interest margin has the effect on increasing the profit of the bank in the sense of its expansion. The author described this could be so since a portion of Net Interest is included in NIM (Net interest margin). In the same literature it has been noted that NPLs affects the profit levels of the banks negatively.

2.3.4 Empirical studies in Kenya

According to Naliaka, Tibbs and Bulla's (2022) research, a descriptive survey was used to test the hypothesis on whether state capital adequacy has any relationship between financial performance of commercial banks listed in NSE Kenya. The results from the study indicated that there is a positive and significant relationship between capital adequacy requirements and

financial performance for these banks. However, no investigation was made into the stability of the banking system while the findings were based on a sample of NSE listed banks. This current research aims to analyze the entire industry operation and give approximations about how strong capital adequacy affects financial stability.

In his research, Musyoka (2017) carried out a census survey regarding capital adequacy among forty-two banks in Kenya where he collected secondary sourced financial statements. Data from this study was analyzed using descriptive statistics like frequency tabulation, percentage distribution as well as pie charts and line graphs to establish if there exists any correlation between dependent and independent variables. A cross-sectional analysis showed that there is an inverse relationship between capital adequacy and financial performance.

Mugwang'a (2014) employed Multiple Linear Regression Analysis and Correlation Coefficient to examine the empirical work done on what factors will determine the Capital Adequacy in Kenyan Commercial Banks for the time period of 2009-2013. The study established a positive correlation between capital adequacy and capital risk, but it did not find any correlation of capital adequacy with other risks like liquidity risk, credit risk, interest rate risk, ROA, ROE, and RPR. These risks were neither low nor high in effecting capital adequacy as would be interpreted by approximately 81 percent.

The research in the area of practices regarding the use of bank capital in managing credit risk and maintaining stability in the financial markets. To assess the conditions of financial stability, the study developed a debased Financial Soundness Index. In using annual data from 2001 to 2020, a Panel Vector Auto Regression Model was applied involving 37 banks to analyze the impact of bank capital on credit risk and stability of the banking system. In general, financial stability index long-term trend still indicates that the stability of banks is still high even though the statistics started declining from the year 2011 and the instability margins from the year 2016. The findings decried that; bank capital was a factor that reduced credit risk and enhanced financial stability. The paper found that bank capital is essential in the financial stability as a result of reducing the credit risks, and based on this called on the authorities to ensure that they keep on implementing and adopting proper capital measures that will help in achieving the noble goals of financial stability and promotion of bank lending as outlined by Kiemo, Talam & Rugiri, 2022. The only difference that can be made is that the current study shall be a time series study, and it shall use the ARDL cointegration model which is more complex when compared to the VAR model.

Itibi, Wafula & Kariuki, (2023) thus carried out a study with an aim of examining the relationship between micro-prudential regulatory variables and the stability of the commercial banks. This study used panel data on 32 banks in Kenya for the year 2010 to 2020 which were obtained from the annual reports of the said banks. Due to the existence of heteroscedasticity and autoregression in the data, FGLS was used in the study. Finally, the study showed that capital level, efficiency of management and earning power are the factors that affect the stability of the banks. Hence, there is a need to persist with the program of capital requirement enhancement as a sign of the growth of more bank consolidation. The current study is distinguished from this study because it covers the whole banking industry and is a time series study for 2000-2022. This study will employ the ARDL cointegration model, FGLS being less favorable when among the two models.

2.4 Conceptual Framework/Model

This section presents the conceptual framework underlying the study, which illustrates the relationship between the dependent variable, financial stability (FS), and the independent variables, capital adequacy requirements (CAR), exchange rate (EXR), and gross domestic product (GDP). The model is grounded in the economic theory that suggests capital adequacy and macroeconomic indicators play critical roles in determining financial stability within the banking sector.

The conceptual model is based on the premise that financial stability (FS), as a dependent variable, is directly influenced by capital adequacy requirements (CAR). The capital adequacy requirements are regulatory measures ensuring that banks hold enough capital to absorb potential losses. It is theorized that higher capital adequacy can improve financial stability by reducing the risk of insolvency and enhancing the resilience of the banking sector during economic shocks.

Further, the study recognizes that macroeconomic factors, such as the exchange rate (EXR) and gross domestic product (GDP), can also significantly impact the stability of the financial sector. Exchange rate (EXR) volatility is expected to influence financial stability by affecting the costs of foreign borrowing, asset valuations, and overall economic sentiment. On the other hand, gross domestic product (GDP) serves as a measure of overall economic activity and growth, with a growing economy typically contributing to the stability of financial institutions by increasing demand for goods and services and reducing the likelihood of defaults.

This model seeks to capture the dynamics of how capital adequacy and macroeconomic indicators influence the overall stability of the banking sector, thereby providing a foundation for empirical testing using econometric methods.

The study also acknowledges that the control variables (exchange rate and GDP) are necessary to account for external macroeconomic conditions that might influence the relationship between capital adequacy and financial stability. Thus, the model proposes that financial stability is not determined solely by capital adequacy but is also affected by broader economic conditions, which must be controlled for in the analysis.

Using this conceptual framework, the study aims to test the hypothesized relationships between these variables and offer insights into the determinants of financial stability in the Kenyan banking sector, while addressing the research questions outlined earlier.

2.5 Summary of the Literature and gaps to be filled

From the literature review, studies in this area have looked at capital requirement ratio against performance or profitability of banks, leaving out the bigger picture of banking financial stability of the sector. Most studies have used simple regression analysis which is not a robust analysis technique as compared to the ARDL cointegration model.

The use by regulators of capital requirements rations leads to a number of questions. While there is a lot of focus given to rise in capital requirement ratio, the question of the corresponding level of financial stability in the industry is seldom posed. While ER has been a popular concept in economic theory, opinions in relation to how capital requirements ration enhance financial stability are half and this has been brought out by earlier research which did not give well defined results. The information and explanations for the structure of bank financial stability in Kenya is still limited. This research will endeavor to generate more information on the above stated problem and also, offer a policy prescription. The study therefore seeks to test the effects of capital regulation on financial stability in the entire banking industry.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section develops the research methodology that was utilized in the conduct of the study. It includes the research philosophy and the research design, the type of data and data collection methods, analysis and presentation of the research data.

3.2 Research Philosophy and Approach

The study employed Positivism philosophy, which posits that information is obtained through logical or mathematical processing of the materials, or report of sensory experience; thereby validating that there is no truth outside of the sensory experience.

Positivism is based on a research philosophy that is rationalistic and empiricist and maintains that causes determine consequences, exhibits a deterministic approach (Mertens, 2015). Positivist's philosophy tests hypotheses and use measurement or observation to explain phenomena, arguing that reality is socially generated. This choice is supported by the theoretical framework and conceptual model of the investigation, which were created from hypotheses. It is worthy of note that Positivism is the foundation of the quantitative method of research (Sanya, 2021).

It measures the causative relationship between what is under investigation quantitatively and aims at providing a generalizable explanation to the researched phenomenon by employing figures and other countable instruments (Yilmaz 2013), and it has been described that its strategy is experimental (Slevitch 2011).

3.3 Research Design

The study employed a correlational research design in econometrics to examine the statistical relationship between the dependent variable (Financial Stability) and independent variables (capital adequacy requirements, exchange rate, gross domestic product), both measured at the national level. As Hoover (2005) points out, the two most important methodological concerns with econometrics are the use of probability theory in economics as well as the correspondence between economic theory and probability models.

3.3.1 Model Specification

This study adopted the following model, with financial stability being the dependent variable against the capital adequacy requirements being the independent variable against some control variables.

$$FS_t = f(CAR_t, CV_t) \quad (3.1)$$

Where;

*FS is a nx*1 *vector representing banking financial stability*
CAR_t *is a nx*1 *vector representing Capital Adequacy Requirements*

CV_t *is a nx*1 *vector representing Control Variables (Exchange rate and GDP)*

Equation 3.1 can be re-written as;

$$FS_t = \beta_0 + \beta_1 CAR_t + \beta_2 EXR_t + \beta_3 GDP_t + \varepsilon_t \quad (3.2)$$

t represents time and ε_t is stochastic error term.

3.3.2 Measurement of variables

Table 1.1: Definition and Measurement of Variables and Priori Signs

Variable	Definition	Measurement
Financial Stability (FS)	It is a situation in which the financial structure maintains the resilience to cope with shocks and bursting of bubbles.	Z-score (of all banks) at national level
Capital Adequacy Requirements (CAR)	It is the total regulatory capital divided by its assets a number that is weighted by risk of those assets.	Bank regulatory capital to risk-weighted assets (%)
Exchange Rate (EXR)	The value of one currency for the purpose of conversion to another.	Ksh/USD

Gross Domestic Product (GDP)	The total sum of money used to buy all the goods and services that are produced in a specific calendar year for consumption in the same year.	GDP

It should also be noted that the Z-score is a single index of the stability of the analyzed banks. The Z-Score formula is formed as follows: When the capital structure includes both short-and-long term liabilities, it is better measured incorporating an additional variable, given by the formula: ROA + ((Total Equity (TE))/ (Total Asset (TA)))/ Standard Deviation of ROA. Below is the form by, and the frequently used form by (Hesse, 2007):

$$Z\text{-}score = \frac{ROA + TE/TA}{\sigma ROA} \quad (3.3)$$

The formula presented in 3.3 above provides z-score at the bank level. Thus, the national Z-score measurement is the average of Z-scores of all banks in the country, and it is given by:

$$Z\text{-}score_{national} = \frac{1}{N}\sum_{i=1}^{N} Z\text{-}score_i \quad (3.4)$$

Where;

$Z\text{-}score_i$ = Z-score of an individual bank, i

N = Number of banks in the country

The method assumes equal importance of all banks in the country irrespective of their sizes.

Gross Domestic Product (GDP) is meant to control for the prevailing economic conditions, while the exchange rate is meant to control for macroeconomic stability in the country.

3.4 Data Type and Data Sources

The study used a quarterly data collected from the international database called Federal Reserve Bank of St. Louis economic database (https://fred.stlouisfed.org/). The Federal Reserve Bank of St. Louis Economic Database (FRED) is a comprehensive resource that provides a wide range of economic data, including national, international, and regional economic indicators. It contains data on variables such as GDP, interest rates, inflation, employment, and financial

market statistics, offering users access to historical time series from the early 20th century to the present. For this study, data sampled from the FRED database are spanning from first 2000 quarter to the last 2022 quarter.

The CAR was measured using Bank Regulatory Capital to Risk-Weighted Assets (%), which was directly downloaded from the database as quarterly data to an excel file. On the other hand, real GDP was measured as the total sum of money (Ksh) used to buy all the goods and services that are produced in a specific calendar year for consumption in the same year. The quarterly data for Kenyan GDP was retrieved directly from the database to an excel file. The financial stability data was retrieved from the database as Bank Z-Score for Kenya with the quarterly values of Z-scores for Kenyan banks recorded and organized in an excel file, which was downloaded from St. Louis Federal database. The Exchange Rate was measured as the value of Kenyan currency (Ksh) against the United States currently (USD) on quarterly basis. The quarterly exchange rate values were recorded and organized into excel file, which downloaded from the databased. The four excel files were merged into a single csv data file to contain all the variables in one file for data cleaning and analysis.

3.5 Data Analysis and Presentation

To achieve the objectives, the study used descriptive statistics to help in summarizing the data, stationarity tests were used to determine data generation process and properties. In determining both the long run and short run causality between the independent variables and the dependent variable Engle and Granger dual cointegration and error correction was used. Finally, diagnostic tests were carried out in other to determine the validity of the assumption of the model to be used.

3.5.1. Descriptive statistics

In the study descriptive statistic was used to give the summary of the results in terms of maximum, minimum, mean, median, standard deviation, Skewness and Kurtosis and pattern of the same.

3.5.2 Stationarity Tests

Stationarity tests aim at determining the order of integration of each variable. These also helped in determining the Data Generation Process (DGP) of the variables before Cointegration and Error correction tests are done. The study will use the Augmented Dickey Fuller (ADF) test.

Testing procedure for the ADF unit root test involved running the following model;

$$\Delta y_t = \propto + \beta t + \gamma y_{t-1} + \sum_{j=1}^{\rho} \delta_j \Delta y_{t-j} + \varepsilon_{it} \quad (3.5)$$

Where ; $\propto$ is a constant β is a coefficient of a time trend series, γ is the coefficient of y_(t-1), ρ is lag order of the autoregressive Process, $\Delta y_t = y_t - y_{t-1}$, y_(t-1) are lagged values of one order of y_t, Δy_{t-j} are changes of the lagged values and ε_{it} is an error term. The ADF test is going to be crosschecked with and without the constant, time trend and both.

3.5.3 Cointegration Analysis and Error Correction

As a means of checking this relationship between long-run and short run relationship among the variables known as cointegration, is the error correction. The study used the cointegration technique known as Autoregressive Distributed Lag (ARDL). The justification for the use of this technique stems from the following benefits: Firstly, the ARDL cointegration technique is equally effective in a given study regardless the order of integration of variables in the study, secondly, it is relatively less sensitive in nature and produces standardized results when testing the exist or non-exist of at most one long run relationship between the underlying variables in the context of the present study, its therefore appropriate to utilize the above given.

Setting $FS_t = y_t$ *and* $CAR_t, EXR_t, GDP_t = x_t$ (3.6)

The cointegration equation and error correction model under the ARDL model can be expressed as follows;

$$\Delta y_t = \gamma_0 + \gamma_j y_{t-1} + \gamma_k x_{t-1} + \sum_{i=1}^{m} \gamma_j \Delta y_{t-1} + \sum_{i=0}^{m} \gamma_k \Delta x_{t-1} + \varepsilon_t \quad (3.7)$$

Equation 3.1 has two parts; the first part represents the long-run dynamics of the model, and the second part represents the short run relationship.

3.5.4 Diagnostic Tests

As part of checking on the normality of data in the study, the Jarque–Bera test used; this tests whether the sample data is normal in terms of skewness and kurtosis of the data set. J-B statistic is always nonnegative, there is a scenario whereby, if J-B statistic is significantly different from zero, this is a strong indication that data has not got normal distribution. Another property of the J-B statistic is that the test statistic is to be J-B distributed for large samples with two degrees of freedom. The null hypothesis is a point in which the skewness is hypothesized to be equal to zero and in which the excess kurtosis is also hypothesized to be equal to zero. The

theoretical values of mean skewness of samples from a normal distribution are zero and the values of mean excess kurtosis are also zero, but their kurtosis is equal to 3.

3.5.5 Lag Length determination

In Economics, the determination of the lag length is important. Lutkepohl (1993) submits that there is an increase in the mean-square forecast errors when one uses a lag length higher than the actual lag length and that under fitting of the lag length will lead to autocorrelated errors. The study will rely on different information criteria (Akaike and Schwarz).

$$AIC_{(p)} = \log \det(\sum \tilde{u}(p)) + \frac{2}{T} pK^2 \quad (3.8)$$

$$SIC_{(p)} = \log \det(\sum \tilde{u}(p)) + \frac{\log(T)}{T} pK^2 \quad (3.9)$$

3.5.6 Autocorrelation LM Test

The LM test can be employed hand in hand with the Breusch-Godfrey test for checking for the presence of autocorrelation. They were computed at lag order 'h' using auxiliary regression of these residuals u_t on the original right hand regressors and the lagged residual $u_{t-h}$where missing first h values of $u_{t-h}$are replaced by zero.

3.5.7 Heteroscedasticity

In order to test for heteroscedasticity, the study used the LM test for autoregressive conditional heteroscedasticity (ARCH).

3.6 Data Presentation

Data presentation was done in tables and graphs.

CHAPTER FOUR: DATA ANALYSIS

This chapter presents the results of the data analysis conducted to examine the relationship between Financial Stability (FS) and its key determinants: Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP), using a variety of econometric techniques. The analysis begins with descriptive statistics, followed by the investigation of stationarity using the Augmented Dickey-Fuller (ADF) test, which assesses the presence of unit roots in the data. To explore the long-run and short-run dynamics, we employ the ARDL model, incorporating an error correction term to account for the speed of adjustment towards long-run

equilibrium. Additionally, we conduct several diagnostic tests, including the normality test using the Jarque-Bera model, autocorrelation using the Breusch-Godfrey LM test, heteroskedasticity with the Breusch-Pagan test, and a multicollinearity check using Variance Inflation Factor (VIF) to validate the assumptions underlying the regression analysis. The results from these tests provide a comprehensive understanding of the model's performance, highlight key relationships between the variables, and reveal potential areas for model refinement. The chapter concludes by discussing the implications of these findings for policymakers and the banking sector.

4.1 Descriptive analysis

The descriptive statistics for the key variables in this study is presented in Table 4.1 below. They include Financial Stability (FS), Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP) growth rate. The descriptive analysis and visualized historical trends of the data addresses the first research question by providing the historical trends and patterns of the capital adequacy requirements, GDP, exchange rate and their impact on financial stability in the Kenyan banking sector over the period of 2000-2022.

Table 4.0.1: Descriptive statistics of the time series data

Variable	Obs	Mean	Std. dev.	Min	Max
FS	92	14.88468	1.203948	13.02209	16.94755
CAR	92	11.93118	.8752186	10.52086	13.45695
EXR	92	100.4986	15.34126	72.57942	128.0335
GDP	92	4.859349	1.688675	2.086361	7.855112

Starting with Financial Stability (FS), the average financial stability score across the 92 observations is 14.88, indicating a moderately high level of stability in the Kenyan banking sector during the study period. The standard deviation of 1.20 suggests that while financial stability remained fairly stable on average, there was some variability in individual observations. The minimum value of 13.02 and the maximum of 16.95 indicate that the financial stability scores remained within a narrow range, suggesting that the overall banking system in Kenya was relatively stable over time. This stability may reflect effective regulatory measures and sound banking practices during the period under study.

Regarding Capital Adequacy Ratio (CAR), the average ratio stands at 11.93%, which is well above the international minimum requirement of 8% set by Basel Accords. This indicates that on average, Kenyan banks maintained capital reserves that exceeded the regulatory minimum, contributing to financial stability in the banking sector. The standard deviation of 0.88 suggests a relatively low level of variability in CAR across the observations, meaning that most banks consistently maintained capital levels close to the average. The minimum value of 10.52% and the maximum of 13.46% further confirm that the capital adequacy ratios remained within a narrow range, signaling consistent regulatory compliance and risk management practices by Kenyan banks.

The Exchange Rate (EXR) reveals more variability, with an average rate of 100.50 Ksh/USD. The standard deviation of 15.34 indicates substantial fluctuations in the exchange rate, reflecting the impact of external economic factors, such as changes in global markets or shifts in foreign investment. The minimum value of 72.58 and the maximum of 128.03 suggest periods of significant depreciation and appreciation of the Kenyan shilling relative to the US dollar, which could have been influenced by factors such as global economic shocks, changes in the terms of trade, and shifts in investor sentiment towards emerging markets. These fluctuations highlight the challenges the Kenyan economy faces in maintaining exchange rate stability.

The Gross Domestic Product (GDP) growth rate, with an average of 4.86%, suggests that Kenya experienced moderate economic growth during the study period. The standard deviation of 1.69 points to some variability in the growth rate, reflecting fluctuations in the economy due to both domestic and external factors. The minimum growth rate of 2.09% and the maximum of 7.86% indicate that the economy saw periods of both slow growth and stronger economic performance. These fluctuations in GDP growth could be attributed to various factors, including changes in global commodity prices, shifts in government policy, and the impact of global financial crises.

Thus, the descriptive statistics above highlight an overall stable banking sector in Kenya, as reflected in the relatively stable financial stability and capital adequacy ratios. However, the substantial fluctuations in the exchange rate and moderate variability in GDP growth emphasize the vulnerability of the Kenyan economy to external economic shocks and the importance of external factors in shaping the overall financial landscape. These descriptive statistics provide a solid foundation for further econometric analysis, such as the cointegration

and ARDL tests, which will allow for a deeper exploration of the relationships between these variables and their impact on financial stability in Kenya's banking sector.

The trend analysis of the variables Financial Stability (FS), Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP) is visualized using time-series line plots. These plots provide a graphical representation of how each variable has evolved over time, helping to identify trends, patterns, and any fluctuations or anomalies in the data, which provide answer to research question (a).

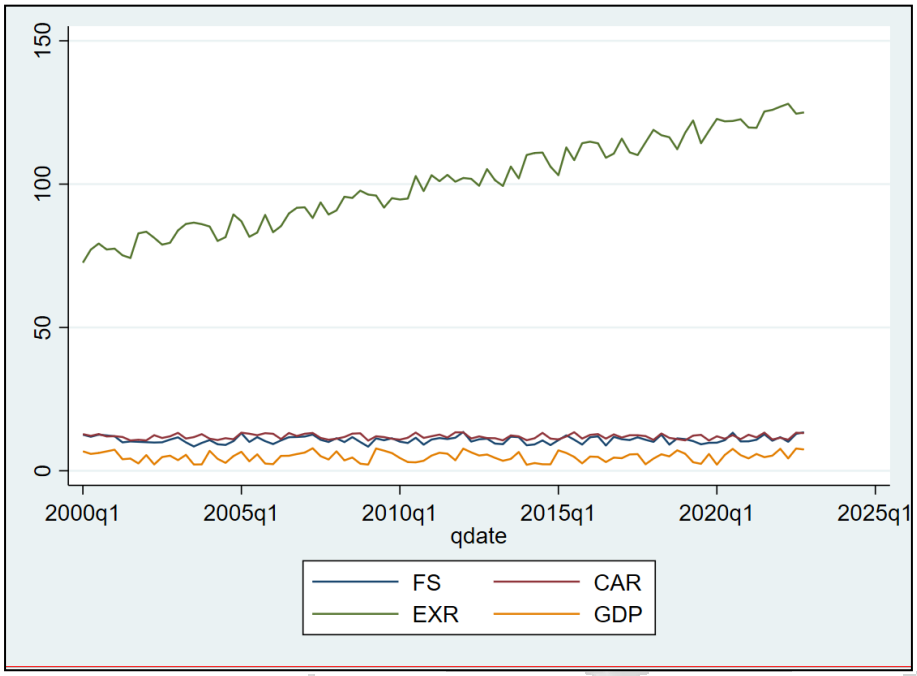

Figure 4.1: Trendline visualization of the data

As shown in Figure 4.1, exchange rate has recorded significant fluctuation over the years while financial stability, capital adequacy ratio and GDP have remained stable over the years.

4.2 Stationarity Test

The results from the Augmented Dickey–Fuller (ADF) test in Table 4.2 below offer important insights into the stationarity of the four key variables in this study: Financial Stability (FS), Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP). The ADF test checks for a unit root in the data, with the null hypothesis (H_0) indicating that the variable is non-stationary, or in other words, follows a random walk without drift.

Table 4.2: Stationarity/ unit root test results

Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	p-value	Conclusion
FS (Financial Stability)	-6.633	-3.524	-2.898	-2.584	0.000	Stationary (Reject H_0)
CAR (Capital Adequacy Ratio)	-6.757	-3.524	-2.898	-2.584	0.000	Stationary (Reject H_0)
EXR (Exchange Rate)	-0.881	-3.524	-2.898	-2.584	0.794	Non-Stationary (Fail to Reject H_0)
GDP (Gross Domestic Product)	-6.345	-3.524	-2.898	-2.584	0.000	Stationary (Reject H_0)

For Financial Stability (FS), the ADF test statistic is -6.633, which is more negative than the critical values at the 1%, 5%, and 10% levels. Specifically, the test statistic is below the critical value at the 1% level (-3.524), and the p-value is 0.0000, which is well below the conventional significance levels (e.g., 0.01, 0.05). These results allow us to reject the null hypothesis of a unit root, indicating that FS is stationary. This suggests that financial stability in the banking sector does not follow a random walk, and its mean and variance are constant over time, implying a stable financial environment during the study period.

Similarly, for the Capital Adequacy Ratio (CAR), the ADF test statistic is -6.757, which also exceeds the critical values at all significance levels. The p-value of 0.0000 confirms the rejection of the null hypothesis, meaning that CAR is stationary. This indicates that the capital adequacy ratio of Kenyan banks has remained stable over time and does not exhibit a random walk, implying effective regulatory measures and consistent capital management by the banks.

In contrast, the Exchange Rate (EXR) shows a test statistic of -0.881, which is far from the critical values at all significance levels. The p-value of 0.7942 is much higher than the typical thresholds (e.g., 0.01, 0.05), meaning we fail to reject the null hypothesis of a unit root. This result indicates that EXR is non-stationary and follows a random walk. The exchange rate of the Kenyan shilling against the US dollar has not remained constant over time, suggesting significant fluctuations, likely due to external economic factors. This non-stationarity implies that the exchange rate variable may need to be differenced or transformed to make it suitable for further analysis.

Finally, for Gross Domestic Product (GDP), the ADF test statistic is -6.345, which is again significantly lower than the critical values at all levels. With a p-value of 0.0000, we reject the null hypothesis, confirming that GDP is stationary. This indicates that the GDP growth rate has remained stable over the study period, suggesting that Kenya's economic growth does not follow a random walk and is not subject to unpredictable changes over time.

The stationarity tests show that Financial Stability (FS), Capital Adequacy Ratio (CAR), and Gross Domestic Product (GDP) are stationary, indicating stable, non-random behavior in these variables over time. However, the Exchange Rate (EXR) is non-stationary, suggesting that it may require further transformation, such as differencing, before it can be used in time series models. These findings are important for subsequent analyses, such as cointegration and ARDL modeling, as stationary variables are suitable for modeling long-run relationships while non-stationary variables need to be addressed before further analysis can proceed.

4.3 Lag Selection Criteria

The results from the lag length selection using the varsoc command help determine the optimal number of lags to include in the model. The selection criteria include Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC). These criteria assess model fit and complexity, and the optimal lag length is typically chosen based on the lowest values of these metrics.

Table 4.3: Lag selection criteria model

Lag-order selection criteria

Sample: **2001q1** thru **2022q4** Number of obs = **88**

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-784.7				715.871	17.925	17.9704	18.0376
1	-657.147	255.11	16	0.000	56.7523*	15.3897*	15.6165*	15.9527*
2	-644.954	24.387	16	0.081	62.0285	15.4762	15.8845	16.4897
3	-629.957	29.995	16	0.018	63.8296	15.499	16.0888	16.9629
4	-614.613	30.687*	16	0.015	65.5026	15.5139	16.2852	17.4282

* optimal lag
Endogenous: **FS CAR EXR GDP**
Exogenous: **_cons**

For lag 0, the FPE, AIC, HQIC, and SBIC values are relatively high compared to those for longer lags. The model without any lags (lag 0) does not capture the dynamics of the variables

effectively, as indicated by the higher values for these criteria. While lag 0 might be suitable for some cases, it is not considered optimal for this model, as it fails to account for the temporal relationships between the variables.

The lag 1 results are the most promising. The FPE, AIC, HQIC, and SBIC values are the lowest at this lag, and the LR test statistic is 255.11 with a p-value of 0.000, suggesting that lag 1 provides the best fit for the model. This indicates that including one lag optimally balances the complexity of the model and it's fit to the data. The statistical significance of the LR test further supports that lag 1 is the most appropriate choice, capturing the dynamics of the variables without overfitting.

At lag 2, the model fit improves slightly compared to lag 0, but the FPE, AIC, HQIC, and SBIC values increase relative to lag 1, indicating that adding a second lag does not improve the model sufficiently. The LR test statistic for lag 2 is 24.387, with a p-value of 0.0810, which is above the conventional significance level (0.05). This suggests that lag 2 is less statistically significant than lag 1 and does not justify the increased complexity of the model.

For lag 3, the model's FPE, AIC, HQIC, and SBIC values are even higher than those for lag 2, further supporting the notion that increasing the number of lags beyond lag 1 does not improve the model's fit. The LR test statistic is 29.995, with a p-value of 0.0180, indicating statistical significance, but it still does not provide a better model fit than lag 1. The increase in complexity with each additional lag, without a corresponding improvement in model fit, suggests that further lags are unnecessary and overfit the data.

For lag 4 produces the highest FPE, AIC, HQIC, and SBIC values among all the lags tested. The LR test statistic is 30.687, with a p-value of 0.0150, which is significant but does not compensate for the worsening fit of the model. The increased complexity from using four lags' results in a model that overfits the data, making lag 4 suboptimal.

The optimal lag length for the model is lag 1, as it provides the best fit with the lowest values for FPE, AIC, HQIC, and SBIC, as well as statistical significance in the LR test. Using one lag strikes the best balance between capturing the dynamics of the variables and avoiding overfitting, making it the most suitable choice for further analysis.

4.4 Cointegration test

The Johansen cointegration test is a powerful statistical tool used to determine whether a long-run equilibrium relationship exists among the variables in this study: Financial Stability (FS),

Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP) (Table 4.4). The test evaluates the presence of cointegrating equations using the trace statistic at various ranks, with the null hypothesis (H_0) stating that there are no more than rr cointegrating relationships among the variables. The results are assessed sequentially by examining whether the trace statistic exceeds the critical value at a given rank.

Table 4.4: Cointegration test

Johansen tests for cointegration

Trend: Constant — Number of obs = 90

Sample: 2000q3 thru 2022q4 — Number of lags = 2

Maximum rank	Params	LL	Eigenvalue	Trace statistic	Critical value 5%
0	20	-716.7409	.	117.1544	47.21
1	27	-693.2935	0.40611	70.2596	29.68
2	32	-674.35501	0.34351	32.3826	15.41
3	35	-658.61941	0.29509	0.9114*	3.76
4	36	-658.16371	0.01008		

* selected rank

At rank 0, the trace statistic is 117.1544, which is significantly higher than the critical value of 47.21 at the 5% level. This allows us to reject the null hypothesis that there is no cointegration among the variables. Thus, the test confirms the presence of at least one cointegrating relationship in the system, indicating that the variables are not entirely independent and share some long-term interdependencies.

At rank 1, the trace statistic remains high at 70.2596, which is above the critical value of 29.68. This leads to the rejection of the null hypothesis that there is at most one cointegrating relationship. The result suggests the presence of at least two cointegrating equations, further strengthening the evidence of long-term linkages between the variables.

At rank 2, the trace statistic is 32.3826, which exceeds the critical value of 15.41. This result allows us to reject the null hypothesis that there are at most two cointegrating relationships, indicating the existence of at least three cointegrating equations in the system. This finding highlights the depth of the long-run equilibrium relationships among the variables under investigation.

At rank 3, the trace statistic drops to 0.9114, which is below the critical value of 3.76. This indicates that the null hypothesis of at most three cointegrating relationships cannot be rejected. Consequently, the test confirms that the number of cointegrating equations in the system is three. This suggests that the variables share three distinct long-run equilibrium relationships, despite potential short-term deviations.

The conclusion of the Johansen test is that there are three cointegrating equations at the 5% significance level. The selected rank is 3, as evidenced by the trace statistic falling below the critical value at rank 3. This finding implies that the variables FS, CAR, EXR, and GDP are linked in the long run and tend to move together over time, even though short-term fluctuations may occur.

The presence of three cointegrating equations has significant implications for the analysis. It confirms that the system of variables is interdependent and driven by underlying economic forces that create a long-term equilibrium. For example, changes in the Capital Adequacy Ratio (CAR) or Exchange Rate (EXR) may have lasting effects on Financial Stability (FS) and GDP, demonstrating the interconnectedness of these macroeconomic and financial indicators.

These findings provide a strong foundation for further analysis, such as using ARD and error correction modeling (ECM). ECM will help to capture both the short-term dynamics and the speed of adjustment toward long-term equilibrium. The confirmation of cointegration also validates the use of models that explicitly account for long-run relationships, such as ARDL or ECM, ensuring that the econometric analysis aligns with the theoretical expectations of long-term linkages among the variables.

4.5 Autoregressive Distributed Lag (ARDL) Analysis

The ARDL model was estimated to examine the relationship between Financial Stability (FS) (dependent variable) and its key determinants: Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP). This model presented in Table 4.5 below incorporates one lag for each variable, chosen based on optimal lag length criteria, and provides insights into both the short-run and long-run relationships among these variables. The results are linked to research question (b), which seeks to determine the long-term relationship between the capital adequacy requirements and financial stability in the Kenyan banking sector.

Table 4.5: Summary table for ARDL regression results

Variable	Beta (β)	SE	t-Statistic	p-Value	95% CI	Significance
Lagged FS (L1)	0.0391	0.0904	0.43	0.667	[-0.1408, 0.2190]	Not significant
CAR	0.7582	0.0570	13.31	0.000	[0.6449, 0.8715]	Significant (1%)
Lagged CAR (L1)	-0.1126	0.0872	-1.29	0.200	[-0.2860, 0.0609]	Not significant
EXR	0.0807	0.0134	6.03	0.000	[0.0541, 0.1073]	Significant (1%)
Lagged EXR (L1)	-0.0783	0.0133	-5.87	0.000	[-0.1048, -0.0518]	Significant (1%)
GDP	0.4927	0.0300	16.41	0.000	[0.4330, 0.5524]	Significant (1%)
Lagged GDP (L1)	-0.0106	0.0525	-0.20	0.840	[-0.1151, 0.0938]	Not significant
Constant (_cons)	0.0421	1.0372	0.04	0.968	[-2.0208, 2.1050]	Not significant

Table 4.6: ARDL model performance metrics

Metric	Value
R-squared	0.8582
Adjusted R-squared	0.8462
F-statistic	71.76
p-value (F-statistic)	0
Log Likelihood	-55.9545
Root MSE	0.4686

Regarding the long-term relationships between capital inadequacy requirements and financial stability as stated in research question (b), the ARDL results indicate that CAR has a significant positive impact on FS in the long run (β = 0.6719, p-value = 0.000). This underscores the importance of maintaining adequate capital levels to enhance financial stability. On the other hand, the results shows that the long-run coefficient for EXR (β = 0.0025, p-value = 0.477) is not statistically significant, suggesting that fluctuation in exchange rate over the study period do not have a meaningful long-term impact on financial stability. However, GDP has a significant positive long-term effect on FS (β = 0.5017, p-value = 0.000). This highlights the role of sustained economic growth in fostering a stable banking sector.

The ARDL results are also linked to the research question (c), which seeks to understand the impact of capital adequacy requirements on financial stability of commercial banks in Kenya. The contemporary effect of CAR is highly significant (β = 0.7582, p-value = 0.000), indicating a strong immediate impact on FS. A 1-unit increase in CAR leads to a 0.7582-unit increase in

FS, reflecting the critical role of adequate capital reserves in mitigating risks and enhancing stability. However, the lagged effect of CAR (β = -0.1126, p-value = 0.200) is not significant, suggesting that the immediate impact of capital adequacy is more pronounced than its delayed effects.

It is also important to note that the short-run impact of EXR is positive and significant (β = 0.0783, p-value = 0.000), indicating that depreciation of the Kenyan shilling temporarily enhances financial stability, possibly by boosting export competitiveness. However, the lagged negative effect (β = -0.0783, p-value = 0.000) suggests that prolonged depreciation can destabilize the financial system due to higher import costs and inflation. On the other hand, GDP exhibits a strong current effect (β = 0.4927, p-value = 0.000), emphasizing the immediate importance of economic growth. Therefore, a 1-unit increase in GDP growth leads to a 0.4927-unit increase in FS in the same quarter. However, the lagged effect of GDP (L1.GDP) has a coefficient of -0.0106, which is not statistically significant (p-value = 0.840), indicating that economic growth primarily influences financial stability contemporaneously rather than with a delay.

The lack of significant lagged effects for most variables indicates that the model may not fully capture delayed dynamics. Exploring alternative lag structures or different econometric frameworks, such as Vector Error Correction Models (VECM), could provide additional insights. The model could also benefit from incorporating additional variables, such as inflation, interest rates, or regulatory changes, to improve its explanatory power. Diagnostic tests for multicollinearity, heteroskedasticity, and autocorrelation are also recommended to validate the robustness of the results.

In conclusion, the ARDL model provides strong evidence that CAR, EXR, and GDP significantly influence financial stability in Kenya's banking sector. The significant concurrent effects of these variables highlight their immediate importance, while the negative lagged effect of the exchange rate underscores the destabilizing potential of currency depreciation over time. These findings offer valuable insights for policymakers and stakeholders in developing strategies to enhance financial stability in the Kenyan banking system.

4.6 ARDL Error Correction Analysis

The ARDL error correction model (ECM) was estimated to examine the short-run and long-run relationships between Financial Stability (FS) and its key determinants: Capital Adequacy

Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP) in Table 4.7. The inclusion of the error correction term captures the speed of adjustment toward the long-run equilibrium after short-term deviations, providing insights into both immediate and persistent effects. The findings of this model provide answers to both research questions (b) and (c).

The model performance metrics in Table 4.8 below demonstrates a strong overall fit, with an R-squared value of 0.9192, indicating that 91.92% of the variation in financial stability is explained by the independent variables. The adjusted R-squared of 0.9124 confirms the robustness of the model even after accounting for the number of predictors. The Root Mean Squared Error (RMSE) of 0.4686 reflects a low average prediction error, further reinforcing the reliability of the model.

The error correction term (L1.FS) has a coefficient of -0.9609, which is highly significant (p-value = 0.000). The negative sign confirms that the system adjusts toward the long-run equilibrium when short-term deviations occur. The magnitude of this coefficient indicates that approximately 96.1% of the disequilibrium is corrected within the next quarter, demonstrating a very rapid adjustment to the long-run equilibrium.

Table 4.7: ARDL error correction model summary

Component	Variable	Beta (β)	SE	t-Statistic	p-Value	95% CI	Sig.
Error Correction	ECT (L1.FS)	-0.9609	0.0904	-10.63	0	[-1.1408, -0.7810]	Significant (1%)
Long-Run Effects	CAR	0.6719	0.0853	7.88	0	[0.5023, 0.8416]	Significant (1%)
	EXR	0.0025	0.0034	0.71	0.477	[-0.0044, 0.0093]	Not significant
	GDP	0.5017	0.0405	12.38	0	[0.4211, 0.5823]	Significant (1%)
Short-Run Effects	D1.CAR	0.1126	0.0872	1.29	0.2	[-0.0609, 0.2860]	Not significant
	D1.EXR	0.0783	0.0133	5.87	0	[0.0518, 0.1048]	Significant (1%)
	D1.GDP	0.0106	0.0525	0.2	0.84	[-0.0938, 0.1151]	Not significant
Constant	_cons	0.0421	1.0372	0.04	0.968	[-2.0208, 2.1050]	Not significant

Table 4.8: ARDL error correction model performance metrics

Metric	Value
R-squared	0.9192
Adjusted R-squared	0.9124
Log Likelihood	-55.9545
Root MSE	0.4686

The ADRL error correction results are linked to research question (b) as it reveals a strong and positive long-run relationship between CAR and FS, with a coefficient of $\beta = 0.6719$ (p-value = 0.000). This result underscores the critical role of capital adequacy requirements in enhancing financial stability over the long term. Higher CARs equip banks with the ability to absorb financial shocks and reduce systemic risks, thereby fostering a more resilient banking sector. These findings align with theoretical expectations and global regulatory standards, such as the Basel Accords, which emphasize the importance of robust capital reserves in promoting long-term financial stability.

The long-run coefficient for GDP ($\beta = 0.5017$, p-value = 0.000) demonstrates a significant positive impact on FS, emphasizing the role of sustained economic growth in maintaining stability within the banking sector. Economic growth enhances the ability of borrowers to meet their financial obligations, reduces non-performing loans, and strengthens the overall health of financial institutions. This finding highlights the interdependence between macroeconomic performance and financial sector stability, suggesting that fostering economic growth is crucial for long-term stability in Kenya's banking system.

The ADRL correction model results are also linked to research question (c), which seeks to examine the impact of capital adequacy requirements. The short-run dynamics provide additional insights into the immediate effects of CAR on FS. The coefficient for CAR in the short run ($\beta = 0.1126$, p-value = 0.200) is not statistically significant, indicating that the impact of capital adequacy requirements is not instantaneous. Instead, the benefits of maintaining higher CARs are realized gradually, as banks strengthen their capacity to manage risks and absorb potential losses over time. This finding underscores the importance of consistent regulatory enforcement and forward-looking risk management strategies to ensure sustained financial stability. Policymakers must recognize that while CARs are critical for long-term

stability, their short-term effects may be limited, necessitating complementary measures to address immediate vulnerabilities in the banking sector.

The result further reveals the adjustment speed and resilience of banking sector in the Kenya's economy. For instance, the significant error correction term (β = -0.9609, p-value = 0.000) highlights the resilience of Kenya's banking sector. The rapid adjustment speed suggests that deviations from the long-run equilibrium are corrected efficiently within a single quarter, ensuring stability even during periods of short-term disturbances. This resilience reflects the robustness of the regulatory framework and the effectiveness of risk management practices within the sector. The ability to swiftly restore equilibrium following economic shocks is a critical characteristic of a stable financial system, providing confidence to stakeholders and fostering trust in the banking sector.

The findings of this analysis have several important implications for policymakers and stakeholders in the Kenyan banking sector. First, the strong long-run relationship between CAR and FS underscores the need for stringent capital adequacy regulations to promote financial stability. Policymakers should prioritize measures to ensure that banks maintain adequate capital levels, aligning with international best practices and regulatory standards. Second, the positive long-run impact of GDP highlights the importance of fostering economic growth as a complementary strategy to enhance financial stability. Efforts to stimulate economic activity, reduce unemployment, and improve the business environment can have a significant stabilizing effect on the banking sector.

The short-run positive effects of exchange rate depreciation, as reflected in the ARDL model, should be managed carefully to mitigate potential long-term destabilizing effects, such as increased external debt burdens and inflationary pressures. Policymakers should adopt a balanced approach to exchange rate management, considering both the short-term benefits and potential long-term risks.

The rapid adjustment speed observed in the ARDL ECM underscores the importance of maintaining a resilient regulatory framework that supports swift corrective actions in response to economic shocks. Exploring additional explanatory variables, such as inflation, interest rates, or political stability, could further enrich the model and provide a more comprehensive understanding of financial stability dynamics in Kenya. Diagnostic tests for multicollinearity, heteroskedasticity, and autocorrelation should also be conducted to validate the robustness of the results.

The ARDL error correction model provides robust evidence of both short-run and long-run relationships between financial stability and its key determinants in Kenya's banking sector. The significant long-run effects of CAR and GDP underscore their critical roles in promoting stability, while the rapid adjustment speed highlights the sector's resilience to short-term shocks. These findings offer valuable insights for policymakers and stakeholders, emphasizing the importance of capital adequacy regulations, economic growth, and effective risk management strategies in ensuring financial stability. By addressing both immediate and long-term challenges, policymakers can develop comprehensive strategies to strengthen the resilience and stability of Kenya's banking system.

4.7 Diagnostic Tests

The diagnostic tests conducted include normality testing using the Jarque-Bera (JB) test, autocorrelation testing with the Breusch-Godfrey LM test, heteroskedasticity testing with the Breusch-Pagan test, and multicollinearity assessment using the Variance Inflation Factor (VIF). These tests evaluate the assumptions underlying the regression model to ensure the validity and reliability of the results.

4.7.1 Normality test: Jarque-Bera model

The normality test evaluates whether the residuals of the regression model follow a normal distribution, a key assumption for many statistical analyses presented in Table 4.9 below. The Skewness and Kurtosis test (sktest) results for the variables are as follows:

For the Financial Stability (FS), the joint p-value for skewness and kurtosis is 0.2393, indicating that the residuals for FS are normally distributed at the 5% significance level. The results for the Capital Adequacy Ratio (CAR) provides a joint p-value of 0.0000, rejecting the null hypothesis of normality. This indicates that the residuals for CAR are not normally distributed, primarily due to kurtosis (p-value = 0.0000). On the other hand, the Exchange Rate (EXR) provides a joint p-value of 0.0001, which rejects normality. Similar to CAR, the kurtosis contributes to the lack of normality. Lastly, Gross Domestic Product (GDP) reveals that the joint p-value is 0.0024, rejects the null hypothesis of normality due to kurtosis.

Table 4.9: Jarque-Bera model for normality test

Variable	Obs	Pr. (Skewness)	Pr. (Kurtosis)	Adj Chi2(2)	Prob > Chi2	Normality

FS	92	0.3872	0.1542	2.86	0.2393	Normal
CAR	92	0.5865	0.0000	24.56	0.0000	Not Normal
EXR	92	0.8600	0.0000	19.66	0.0001	Not Normal
GDP	92	0.7412	0.0001	12.08	0.0024	Not Normal

4.7.2 Autocorrelation test using Breusch-Godfrey LM model

The Breusch-Godfrey test presented in Table 4.10 below examines the presence of autocorrelation in the residuals. The results show a chi-squared value of 0.005 with a p-value of 0.9431 for lag 1. Since the p-value is greater than 0.05, we fail to reject the null hypothesis of no serial correlation, indicating that there is no autocorrelation in the residuals.

Table 4.10: Breusch-Godfrey LM model for autocorrelation test

Test	Lags (p)	Chi2	df	Prob > Chi2	Conclusion
Breusch-Godfrey LM	1	0.005	1	0.9431	No Autocorrelation

4.7.3 Heteroskedasticity test using Breusch-Pagan model

The Breusch-Pagan/Cook-Weisberg test presented in table 4.11 below evaluates whether the variance of the residuals is constant (homoscedasticity). The results show a chi-squared value of 0.12 with a p-value of 0.7301, indicating that we fail to reject the null hypothesis of constant variance. Thus, there is no evidence of heteroskedasticity, and the assumption of homoscedasticity holds.

Table 4.11: Breusch-Pagan model for heteroskedasticity test

Test	Chi2 (df)	Prob > Chi2	Conclusion
Breusch-Pagan/Cook-Weisberg	0.12	0.7301	No Heteroskedasticity

4.7.4 Multicollinearity check using Variance Inflation Factor (VIF)

The VIF assesses multicollinearity among the independent variables, with values above 10 typically indicating high multicollinearity. The mean VIF for the model is 3.46, which is below

the threshold, suggesting that multicollinearity is not a serious concern. However, GDP (D1) and CAR (D1) have VIF values of 5.33 and 4.75, respectively, which are moderately high and may warrant closer attention.

Table 4.12: Variance inflation factor model for multicollinearity test

Variable	VIF	1/VIF	Conclusion
GDP (D1)	5.33	0.1876	Moderate Multicollinearity
CAR (D1)	4.75	0.2104	Moderate Multicollinearity
FS (L1)	4.65	0.2153	Moderate Multicollinearity
GDP	3.85	0.2597	Low Multicollinearity
CAR	3.55	0.2815	Low Multicollinearity
EXR (D1)	1.07	0.9346	No Multicollinearity
EXR	1.03	0.9681	No Multicollinearity
Mean VIF	3.46		Low Multicollinearity

The diagnostic tests indicate that the residuals for FS are normally distributed, meeting a key assumption of regression analysis, while the residuals for CAR, EXR, and GDP violate normality due to kurtosis, which may require transformations or alternative statistical methods. The absence of autocorrelation confirms the validity of the regression model, ensuring that the residuals are not serially correlated. The constant variance of the residuals (homoscedasticity) supports the reliability of the model's standard errors and test statistics. While multicollinearity is not a major issue overall, the moderately high VIF values for GDP (D1) and CAR (D1) suggest potential collinearity concerns that could slightly affect the precision of the coefficient estimates.

4.7.5 Correlation matrix

The correlation matrix presented in Table 4.13 below provides valuable insights into the relationships between Financial Stability (FS), Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP). The correlation between FS and CAR is 0.5839, indicating a moderate positive relationship. This suggests that as the capital adequacy ratio increases, financial stability tends to improve, though the relationship is not perfectly linear.

The correlation between FS and EXR is 0.0783, which is very weak and positive, implying that there is little to no linear relationship between financial stability and exchange rate fluctuations in this dataset. On the other hand, the correlation between FS and GDP is 0.7102, indicating a strong positive relationship. This suggests that as GDP growth increases, financial stability tends to improve, highlighting the importance of economic growth for the stability of the financial sector. The correlation between CAR and EXR is -0.0125, suggesting a negligible and slightly negative relationship, meaning that changes in the exchange rate do not strongly affect capital adequacy. Similarly, the correlation between CAR and GDP is 0.0718, indicating a very weak positive relationship, suggesting that capital adequacy is not strongly influenced by GDP growth in this dataset. Finally, the correlation between EXR and GDP is 0.0386, which is also very weak and positive, suggesting that exchange rate fluctuations have little to no direct relationship with GDP growth.

Table 4.13: Correlation matrix

Variable	FS	CAR	EXR	GDP
FS	1			
CAR	0.5839	1		
EXR	0.0783	-0.0125	1	
GDP	0.7102	0.0718	0.0386	1

The moderate positive correlation between FS and CAR suggests that maintaining a strong capital adequacy ratio is crucial for ensuring financial stability. The strong positive correlation between FS and GDP indicates that economic growth plays a significant role in enhancing financial stability. However, the very weak correlations between FS and EXR, and between CAR and EXR, suggest that exchange rate fluctuations do not have a significant impact on either financial stability or capital adequacy in this context. The low correlations between CAR and GDP also imply that these variables do not strongly influence each other within the given dataset.

4.8 Visualization of the Data

4.8.1 Trendlines analysis

The trend analysis of the variables Financial Stability (FS), Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP) is visualized using time-series line plots. These plots provide a graphical representation of how each variable has evolved over

time, helping to identify trends, patterns, and any fluctuations or anomalies in the data. As shown in Figure 4.1, exchange rate has recorded significant fluctuation over the years while financial stability, capital adequacy ratio and GDP have remained stable over the years.

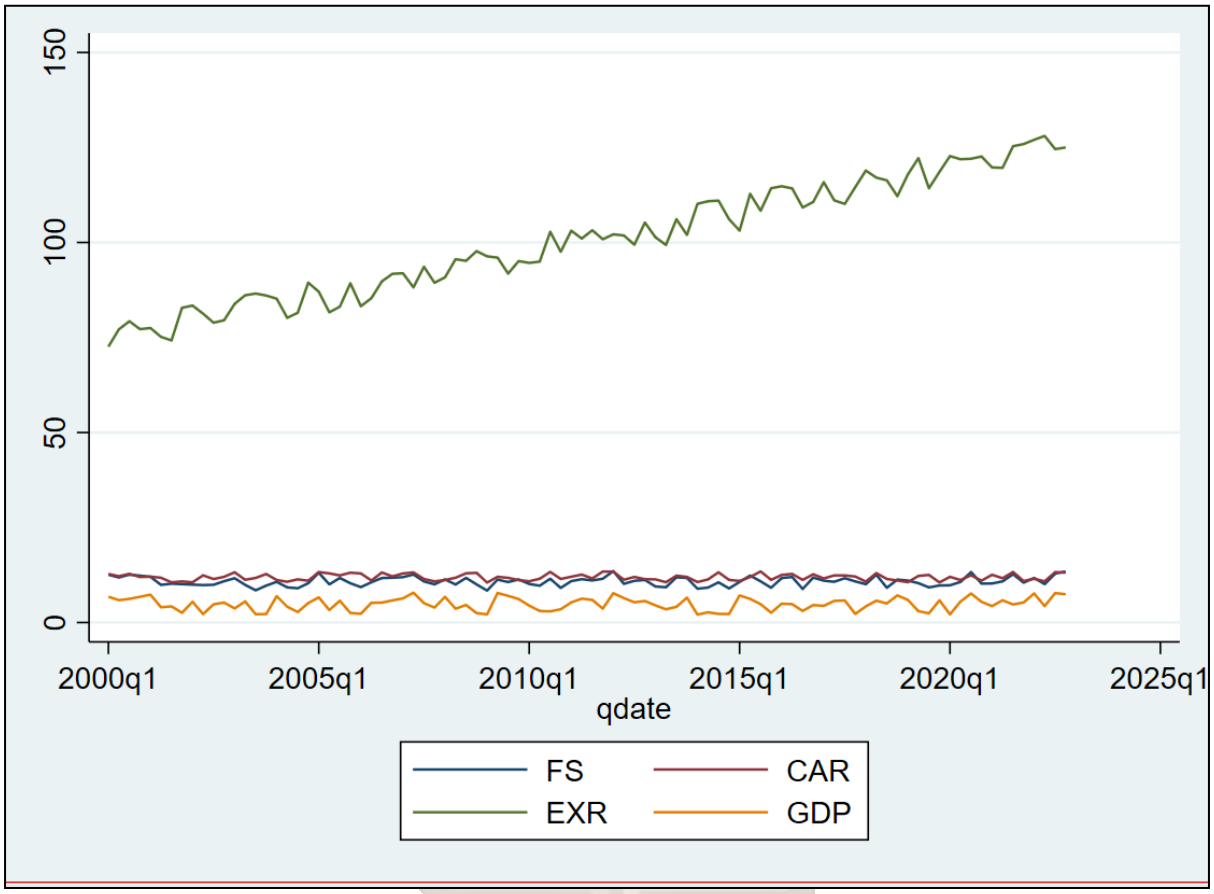

Figure 4.2: Trendline visualization of the data

4.8.2 Autocorrelation function (ACF) plot

The Autocorrelation Function (ACF) plot in Figure 4.2 below has been generated to assess whether the residuals from the model exhibit autocorrelation, which would indicate a correlation between residuals at different time points. The ACF plot shows the correlation of the residuals with their lagged values (e.g., lag 1, lag 2, etc.) and helps to identify any patterns in the residuals that suggest model misspecification, such as autocorrelation.

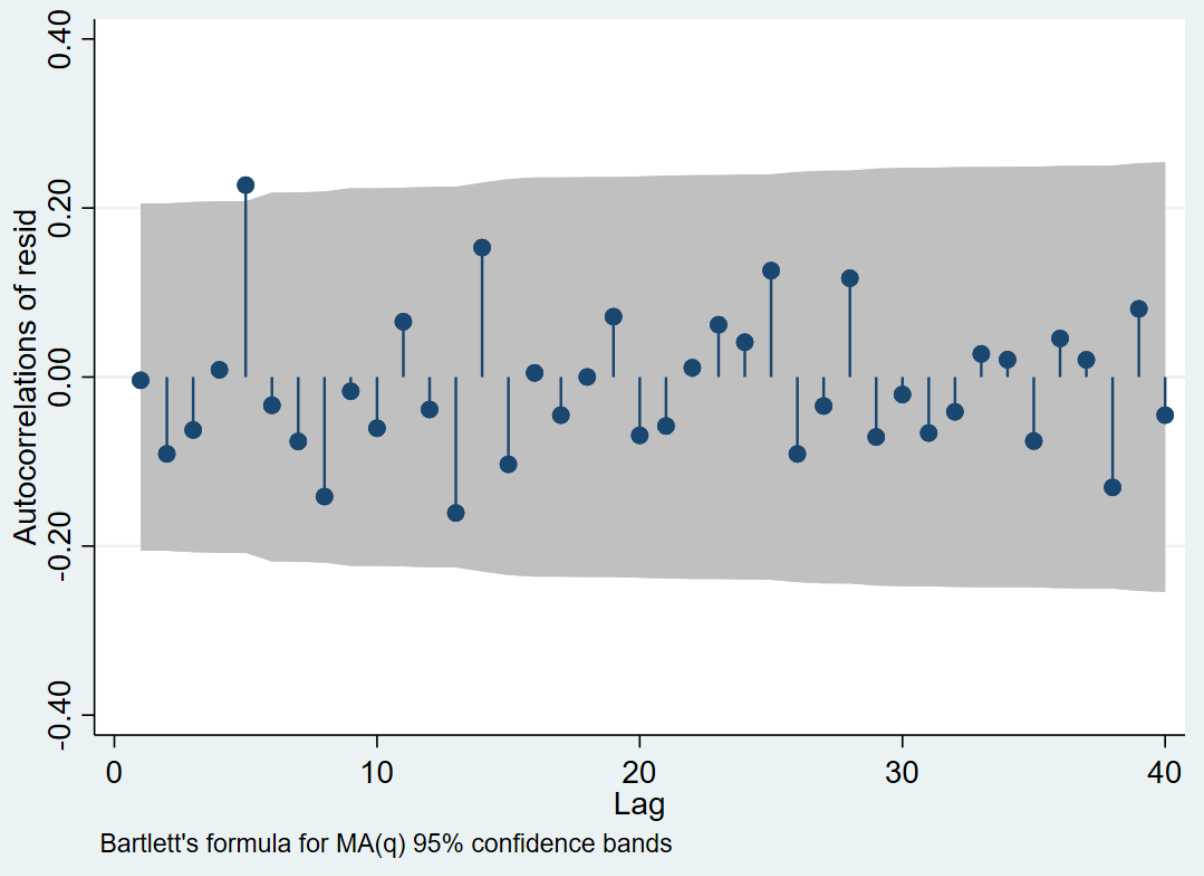

Figure 4.3: Autocorrelation function plot

The plot shows that there is no significant autocorrelation because the autocorrelations are close to zero and within the confidence intervals. This suggests that the residuals are random and independent, which supports the assumption of no autocorrelation in the model. In this context, the ACF plot has confirms that the model assumptions are met and that the residuals do not contain any remaining patterns or structure that the model failed to capture.

4.9 Chapter Summary

This chapter provided a comprehensive analysis of the relationships between Financial Stability (FS) and its key determinants such as Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP), using various econometric techniques. The analysis began with descriptive statistics to understand the basic characteristics of the data. We then tested for stationarity using the Augmented Dickey-Fuller test, followed by the estimation of the ARDL model with an error correction term to capture both short- and long-run dynamics. Diagnostic tests, including tests for normality, autocorrelation, heteroskedasticity, and multicollinearity, were performed to ensure the robustness of the model. The results indicated

significant relationships between FS and CAR and GDP, with EXR showing both short-term and long-term effects. The analysis also revealed some challenges, such as violations of normality for certain variables and moderate multicollinearity for others, suggesting areas for further refinement in future models. These findings provide valuable insights into the key drivers of financial stability in the Kenyan banking sector and offer useful guidance for policymakers and financial regulators.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Study

This study aimed to examine the relationship between Financial Stability (FS) and its key determinants, namely Capital Adequacy Ratio (CAR), Exchange Rate (EXR), and Gross Domestic Product (GDP), using a variety of econometric methods. The analysis started with descriptive statistics to explore the basic characteristics of the data, followed by stationarity testing using the Augmented Dickey-Fuller test to ensure the data were suitable for modeling. The study then employed the ARDL model, incorporating an error correction term (ECM) to capture both short- and long-run dynamics. Diagnostic tests for normality, autocorrelation, heteroskedasticity, and multicollinearity were performed to validate the assumptions underlying the regression analysis. The results highlighted the significant positive relationships between FS and CAR and GDP, with EXR demonstrating both positive short-term and negative long-term effects. Despite the strong fit of the model, some issues such as violations of normality for certain variables and moderate multicollinearity were identified, suggesting potential areas for further model refinement.

5.2 Discussion of Findings

The findings of this study reveal a significant long-run relationship between Capital Adequacy Ratio (CAR) and Financial Stability (FS), confirming the critical role of adequate capital reserves in promoting financial stability in the Kenyan banking sector. This is consistent with previous studies highlighted in the literature review, such as those by Berger and Bouwman (2013), which emphasized that higher capital adequacy improves a bank's ability to absorb shocks, thereby enhancing its stability. Similarly, studies by Naceur and Kandil (2009) also found a positive relationship between capital adequacy and financial stability in emerging markets, suggesting that well-capitalized banks are more resilient to economic fluctuations. The results further align with Basel Committee recommendations, reinforcing the global emphasis on maintaining sufficient capital buffers to safeguard financial institutions.

The findings also indicate that Gross Domestic Product (GDP) has a strong positive relationship with financial stability in the long run, underscoring the importance of sustained economic growth in fostering a stable banking sector. This result is consistent with studies by Mamonov et al. (2018), which highlighted the positive link between macroeconomic stability and a robust financial sector. The Kenyan banking sector's performance appears to be closely

tied to the overall economic environment, as periods of higher GDP growth likely improve borrowers' repayment capacity and reduce the risk of non-performing loans, thereby enhancing financial stability. However, the insignificant short-run relationship between GDP and FS may be attributed to time lags in the transmission of macroeconomic benefits to the banking sector, as suggested by Abubakar and Gani (2013).

Interestingly, the findings regarding Exchange Rate (EXR) reveal contrasting short-run and long-run effects on financial stability. While EXR has a significant positive short-term impact, its long-run effect is insignificant, which aligns partially with findings by Detragiache and Gupta (2006), who argued that exchange rate volatility can have mixed effects on financial stability depending on the currency exposure of banks. In the short run, exchange rate depreciation may boost export competitiveness, improving foreign currency revenues and contributing to financial stability. However, in the long run, sustained depreciation can increase the cost of servicing external debt and importing goods, which may offset these short-term benefits. These mixed effects suggest that the exchange rate's role in financial stability is highly context-dependent and influenced by external factors such as global economic conditions and Kenya's trade balance. These findings highlight the need for nuanced policy interventions to manage short-term exchange rate shocks while ensuring long-term stability in the banking sector.

5.3 Implications of the Findings

The findings of this study offer several important implications for understanding the drivers of Financial Stability (FS) in Kenya's banking sector. The significant positive relationship between FS and CAR underscores the critical role of capital adequacy in ensuring the stability of financial institutions. This suggests that strengthening capital reserves in the banking sector is essential for maintaining financial stability, particularly during periods of economic stress. Additionally, the positive short-term effect of EXR on FS suggests that exchange rate depreciation may offer temporary benefits to financial stability, potentially through improved export competitiveness. However, the negative long-term effect of EXR indicates that sustained currency depreciation could lead to destabilizing consequences, such as rising import costs and external debt pressures. The strong positive relationship between FS and GDP emphasizes the importance of sustained economic growth in fostering financial stability. These findings highlight the interconnectedness of economic growth, capital adequacy, and exchange

rate stability, suggesting that a holistic approach to financial regulation and macroeconomic policy is necessary to maintain financial stability.

5.4 Overall Conclusion

In conclusion, this study provides valuable insights into the factors that influence financial stability in Kenya's banking sector. The findings confirm that Capital Adequacy Ratio (CAR), Gross Domestic Product (GDP), and Exchange Rate (EXR) are significant determinants of financial stability, through their effects vary in the short run and long run. The study highlights the importance of a well-capitalized banking sector, stable macroeconomic conditions, and sustainable economic growth for ensuring financial stability. While the results provide a solid foundation for understanding the dynamics between these variables, some limitations were identified, including issues with normality in the residuals for certain variables and potential multicollinearity. These issues suggest that further refinements in the modeling approach may be necessary to improve the accuracy of the findings.

5.5 Recommendations

Based on the findings of this study, several recommendations can be made to policymakers, financial regulators, and other stakeholders in the banking sector as follows:

- Improve Capital Adequacy: Since CAR has a significant positive impact on financial stability, regulatory bodies should continue to enforce stringent capital adequacy requirements for banks. This will ensure that financial institutions are better equipped to absorb shocks and maintain stability during periods of economic stress.
- Monitor Exchange Rate Volatility: While exchange rate depreciation may provide short-term benefits to financial stability, its long-term effects can be destabilizing. Policymakers should closely monitor exchange rate fluctuations and implement policies to mitigate the risks associated with excessive currency depreciation, such as hedging strategies or interventions in the foreign exchange market.
- Foster Economic Growth: Given the strong positive relationship between GDP and financial stability, government efforts should focus on promoting sustained economic growth. This includes implementing policies that encourage investment, improve infrastructure, and support key sectors of the economy, such as agriculture, manufacturing, and services.

- Address Multicollinearity: The moderate multicollinearity detected in the model, particularly between CAR and GDP, suggests that future research should consider alternative specifications or transformations of variables to reduce collinearity. This would improve the precision of the model's coefficient estimates and lead to more reliable conclusions.
- Improve Model Robustness: The violation of normality in some of the variables' residuals indicates the need for potential transformations or the use of alternative statistical techniques, such as robust regression methods or non-linear models, to better capture the underlying relationships between the variables.

Addressing these recommendations help policymakers and regulators to create a more resilient financial system that is better equipped to withstand external shocks and contribute to sustained economic stability in Kenya. Further research incorporating additional variables and addressing the limitations identified in this study could provide even more nuanced insights into the dynamics of financial stability.

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Appendices

Appendix 1: Data Sources

1. Bank Z-score

https://fred.stlouisfed.org/

https://databank.worldbank.org/reports.aspx?source=1250&series=GFDD.SI.01

2. Capital Adequacy Ratio

https://fred.stlouisfed.org/

https://databank.worldbank.org/source/global-financial-development/Series/GFDD.SI.05#

3. Exchange rate

https://fred.stlouisfed.org/

https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=KE

4. GDP growth rate

https://fred.stlouisfed.org/

https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=KE